

Amina Abubakar  
Fons J. R. van de Vijver *Editors*

# Handbook of Applied Developmental Science in Sub- Saharan Africa

 Springer

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Amina Abubakar • Fons J.R. van de Vijver  
Editors

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*Editors*

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*Amina Abubakar would like to dedicate this work to her late parents Neema Swaleh and Abubakar Ali.*

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**Amina Abubakar, Ph.D.**, is an Associate Professor of Psychology and Public Health at Pwani University, Kenya, and a Research Fellow at the Kenya Medical Research Institute/Wellcome Trust Research Programme. She co-leads the Neuroscience research group at KEMRI-WTRP. She is also an honorary fellow at the Department of Psychiatry, University of Oxford, UK and Department of Culture Studies at Tilburg University, the Netherlands. Her main interests are in the study of developmental delays and impairments among children and adolescents exposed to various health problems such as HIV, malnutrition, and malaria. A focus in her work is the development of culturally appropriate strategies for identifying, monitoring, and rehabilitating at-risk children. She has (co)-authored more than 80 peer-reviewed journal articles and book chapters. She has served on technical working groups, and forums for various international organizations including the World Health Organization, National Academies of Sciences, Engineering and Medicine (USA), Save the Children, and Autism Speaks. She is actively involved in capacity building for African Scientists; she has supervised Postgraduate Diploma, Masters, and PhD students in Kenya. She has also supervised PhD students from South Africa, Tanzania, and Zambia.

**Fons J.R. van de Vijver, Ph.D.**, holds a chair in cross-cultural psychology at Tilburg University, the Netherlands, and an extraordinary chair at North-West University, South Africa, and the University of Queensland, Australia. He has published more than 500 papers and chapters, mainly in the domain of cross-cultural psychology. His research focuses on bias and equivalence, psychological acculturation and multiculturalism, cognitive similarities and differences, response styles, and translations and adaptations. He supervises about 40 Ph.D. and 5 postdoctoral students. He has teaching experience in cross-cultural psychology and methods/statistics. Dr. van de Vijver has presented keynotes and invited lectures at various conferences and workshops in various countries. He is one of the most frequently cited cross-cultural psychologists in Europe.

In addition, Dr. van de Vijver has received grants from various Dutch institutions (e.g., NWO and WOTRO), European Union (e.g., Marie Curie), South African Netherlands Research Programme on Alternatives in Development, and South African National Research Foundation. He is member of several professional organizations, including the International Association for Cross-Cultural Psychology, International Association of

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Dr. van de Vijver is the former editor of the *Journal of Cross-Cultural Psychology* and serves on the board of various journals; he has evaluated manuscripts for over 100 journals as ad hoc reviewer. He has been vice dean for research and vice dean for education of his faculty and vice director of Babylon, the interdisciplinary research center for studies of multicultural societies at Tilburg University. He was a former president of Division 2 (Assessment and Evaluation) of the International Association of Applied Psychology and the European Association of Psychological Assessment. He is the President of the International Association for Cross-Cultural Psychology.

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**Part I**

**Introductory Note**

Amina Abubakar and Fons J.R. van de Vijver

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## Rationale for the Book

Africa is a continent with many young people (United Nations, 2015). In 2015, it was estimated that 41% of Africa's population were children less than 15 years of age (United Nations, 2015). Moreover, projections indicate that if the population growth continues at the current rate, by 2050 half of the world's children will be living in Africa. This population boom has the potential to provide the necessary workforce to propel Africa to economic prosperity, which has so far been elusive. These children can only be an opportunity for Africa if they are thriving and doing well. Statistics so far show that African children represent a large proportion of children from low- and middle-income countries (LMICs) who are failing to achieve their potential (McCoy et al., 2016). Due to exposure to various risk factors, such as infectious diseases, poor nutritional status, and chronic poverty, millions of children in LMICs are at risk of not achieving their potential (Lu, Black, & Richter, 2016; Walker et al., 2007; Walker et al., 2011). A recent analysis of data from 2010 indicated that a significant proportion of children in LMICs are at risk of

experiencing poor development. According to McCoy et al. (2016):

We estimate that 81.0 million children ages 3 and 4 y (95% CI 49.2 million, 113.3 million) in LMICs experienced low cognitive and/or socioemotional development in 2010, with the largest number of affected children in sub-Saharan Africa (29.5 million; 44.0% of children ages 3 and 4 y), followed by South Asia (27.8 million; 37.8%) and the East Asia and Pacific region (15.2 million; 26.0%). (p. 2)

Moreover, these authors noted that low development scores were associated with stunting, poverty, male sex, rural residence, and lack of cognitive stimulation (McCoy et al., 2016). It is, therefore, important to develop intervention programs and strategies to address developmental problems faced by African children if these children are to achieve their promise of propelling Africa's development. Therefore, a book such as the current handbook which synthesizes the evidence is highly needed and timely as it contributes toward offering practitioners and policy makers a resource for their work.

The second reason for the book arises from the underrepresentation of African research and findings in developmental science. In general, psychology as a field is highly skewed (Arnett, 2008). Most of the empirical work informing psychological theories emanates from North America and Western Europe (Tomlinson & Swartz, 2003) with very limited data coming from resource-con-

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strained settings, such as sub-Saharan Africa (Marfo, Pence, LeVine, & LeVine, 2011). This underrepresentation of Africa calls for concerted efforts to broaden the database and to synthesize the existing knowledge base so as to make existing data more available to stakeholders.

Finally, several scholars, such as Marfo, Pence, Serpell, and Nsamenang, have argued that even the little data arising from Africa is “Eurocentric in nature” (Marfo, 2016; Marfo et al., 2011; Pence & Marfo, 2008). The core of their argument is that the extant literature is based on conceptualizations and theoretical backgrounds developed in North America and Western Europe (Marfo, 2016). They further note that the data collection methods and measurement procedures so far utilized in Africa were also largely developed in North America and Europe. Consequently, Africans have hardly had an opportunity to address the concerns of the continent from their point of view. These scholars argue that when studies are largely informed by Western theoretical and methodological approaches, they may fail to acknowledge complex cultural issues leading to biased results. This book addresses these concerns at various levels. First, among the authors, there is a good representation of African-based scholars and of scholars who have actively engaged in research in Africa over a prolonged period. The authors of the different chapters bring a wealth of experience from field work in Africa, thus providing an in-depth understanding of the developmental issues from an African perspective. Moreover, a lot of attention is paid to discussing methodological approaches that enhance the cultural sensitivities while carrying out studies in Africa. Here, for instance, we look at the potential of qualitative research in Africa, highlight approaches for developing tests in Africa, and discuss alternative Afrocentric approaches for doing research. We hope that this extensive approach to dealing with methodological concerns will provide the readers with a rich source of information to develop their appreciation of sociocultural influences in developmental psychology and would contribute toward more culturally sensitive work emanating from Africa.

The publication of this book is not meant to contribute to an indigenous African psychology that is independent of Western psychology. In our view, indigenous psychologies should enrich and be enriched by Western psychology. African developmental science can enrich developmental science in general as the continent harbors many unique cultural contexts for development. Studying how these contexts affect development will enable us to understand differences and similarities with non-African contexts. A truly universal psychology integrates studies done in multiple contexts so as to provide models that overcome the existing Western bias.

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## Principles Guiding This Book

In developing and shaping this book, we have been guided by principles arising from selected theoretical frameworks whose usefulness has been observed in various studies across the African context. In this section, we discuss these principles briefly. The starting point of the selected frameworks is that all development is “development in context” and that human development should always be interpreted in context.

### Human Development Is Influenced by Multiple Layered Environments

In line with the bioecological model, in this book human development is approached as resulting from the influence of both biological and environmental influences. The book has been designed using the core tenets of a bioecological framework which indicates that the course of child development is shaped and influenced by both biological and environment factors including a child’s day-to-day experiences (Sameroff, 1998). According to this framework, developmental and behavioral outcomes are caused by ongoing reciprocal interactions between individuals and their environment (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1993; Sameroff & Chandler, 1975). Child development happens in relationship with and as an inseparable part of

the child's social context. According to the bio-ecological model, child development is shaped by conjoint and interactive effects of individual characteristics (e.g., health, age, and personality) with contextual factors (e.g., parenting behavior and socioeconomic status) (Bronfenbrenner, 1977; Sameroff, 1998). The ecological environment of the individual is seen as a set of nested structures, representing the microsystem, meso-system, exosystem, and macrosystem. The *microsystem* is the most influential to the child since it consists of persons and institutions that directly interact with the child and stimulate or hinder developmental outcome. In this book, the microsystem is addressed through aspects such as examining the influences of maternal and paternal behavior, quality of stimulation at home, and sibling caregiving. The next layer is the *mesosystem*, which represents how the interaction between the persons and institutions in the microsystem influences child growth and development. The third level is the *exosystem*, which is made up of persons and institutions that do not directly interact with the child but whose activities indirectly impact on the child's development, like conditions at work for the parents. The world views, ideologies, and customs of specific cultural groups compose the *macrosystem*. This level affects child development through its influence on behavior and activities of adults surrounding the child (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998). Contextual factors are hierarchically organized from the most distal macro-context (e.g., culture) to the most proximal micro-contextual factors (e.g., familial characteristics). Proximal micro-contextual factors exert relatively stronger influences in shaping outcomes than distal macro-contextual factors (Wachs & Rahman, 2013).

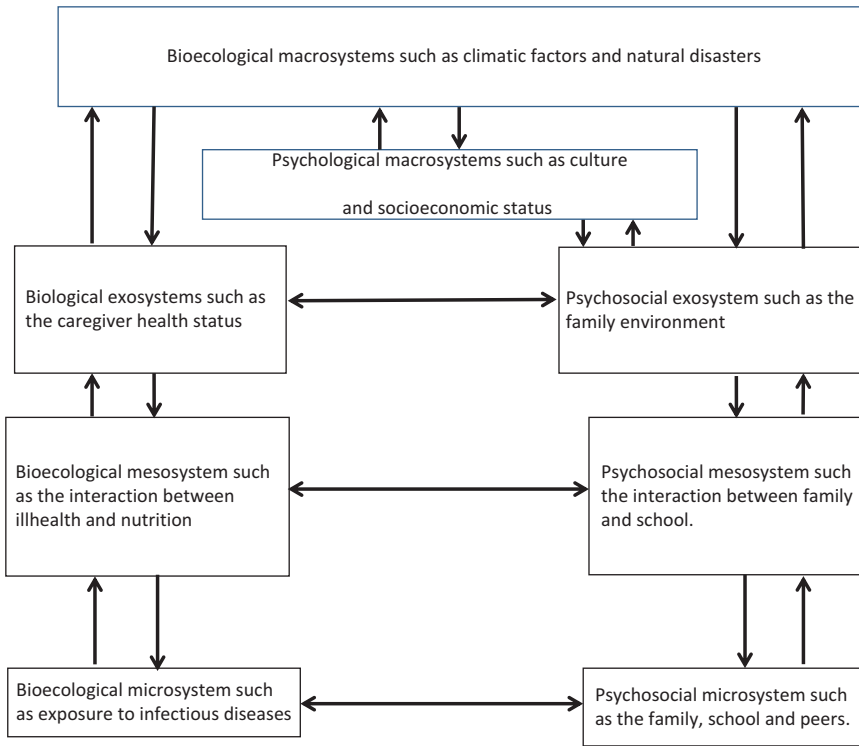
In refining the bioecological model to better suit risk and protective factors in the LMICs, Wachs and Rahman (2013) note three important points. Firstly, most of these risk factors covary (cluster); that is, children experiencing one risk factor (e.g., poverty) are at a higher probability of experiencing another one (e.g., exposure to pathogens) due to the lack of access to clean

water and adequate sanitation which in turn contributes to malnutrition due to wastage of consumed nutrients (see Fig. 1.1).

Secondly, given this clustering of various risk factors, the influence of a single risk factor may not be that strong, but the accumulation of risk is what tends to be most adverse for childhood outcomes. Lastly, in the examination of the different hierarchical contexts, risk factors could be divided into biological and psychosocial risk within the same level. For instance, within the microsystem, the biological risk would include infections and nutritional status, while psychosocial risk would include parental and caregiver characteristics (Wachs & Rahman, 2013) (see Fig. 1.1 for an illustration).

### **Sociocultural Niche as an Important Factor in Shaping Human Development**

Influenced by anthropological traditions, cultural and cross-cultural psychology has gathered evidence to show that the socio-ecological-cultural niche within which a child grows up has a strong influence on child development (Harkness & Super, 1994; Weisner, 2002; Worthman, 2016). Early, very striking results showed that while the trajectory of child development may largely proceed in a similar manner, the pace and rate at which children acquire different skills and the value that is placed on the different skills may range sharply partly due to the sociocultural and ecological niches they are growing up in. For example, early research unveiled what was referred to as "African precocity" (Geber, 1958; Super, 1976; Warren, 1972) [note that some authors and scholars have criticized the use of this term since it takes a Eurocentric view of child development, as children from North America and Europe are taken to provide the standard rate of development, which is why African children were considered precocious]. During this period, it was reported that across numerous societies in Africa, children acquire early motor skills much faster (or at a relatively earlier age than children from Western countries). Paradoxically, it was



**Fig. 1.1** An integrated model of biological and psychosocial environment. *Note:* This figure has been reprinted from Wachs (2003) with permission

simultaneously noted that around the age of 24 months or so, African children started slowing down until they eventually perform worse than children from other regions of the world (largely from those from North America and Western Europe where a lot of published data existed).

These observed differences in cross-cultural child development have been attributed to various factors. One potential source of cross-cultural variation in child development is caregivers' beliefs and practices regarding child development (Harkness & Super, 1996). For instance, it has been observed that African parents spend a lot of time with their children on motor activities. During these activities, they massage their children, place them in a sitting position early in life, and provide other activities to stimulate motor development. The range of these activities is thought to contribute to the early acquisition of motor skills in this context. Similar reports on the impact of parental beliefs and practices on child

development have been recorded with other development domains. For instance, in the 1970s, De Vries and De Vries reported that among the Digo's of Kenya, children were toilet trained very early in life [on average by 6 months] (De Vries & De Vries, 1977). This was achieved because the Digo's believed that children were capable of learning right from the very moment of birth (De Vries & De Vries, 1977). Consequently, Digo mothers started training their children while they were neonates. Digo mothers were observed to place the children on their laps and encourage them (through a hissing sound) to urinate. The training by Digo mothers was carried out at a scheduled time and in a consistent manner. Based on these practices, children were observed to have been toilet trained by 6 months on average which was almost 24 months faster than Kikuyu children and children from Western Europe.

Another source of cross-cultural variations in child development is what are considered adaptive

child-rearing practices adopted by each community to maximize the potential for the survival of not just the child but the whole community. An example of this can be seen from the work of Ed Tronick among the Efe in Congo (Tronick, Morelli, & Ivey, 1992). In a series of ethnographic work, Ed Tronick observed that among the Efe, a series of birth rites and rituals are carried out whose key aim was to ensure the child bonds to multiple caregivers (Tronick, 2007). For instance, in the first few days of life, a child is handled and breastfed by multiple adults. These activities were carried out to ensure that the children bonded with multiple caregivers so that if their mother passed away, they would still have an alternative caregiver. This kind of thinking was adaptive in a society where maternal mortality was extremely high. Moreover, the Efe lived in the forest, as a community they were exposed to an extremely high number of pathogens. For their young ones, building up immunity early in life was a key strategy in enhancing their survival chances. Exposing children to numerous adults early in life ensured that the children were exposed to a variety of pathogens.

### **Culturally Sensitive, Contextually Relevant, and Evidence-Based Intervention Can Make a Positive Change**

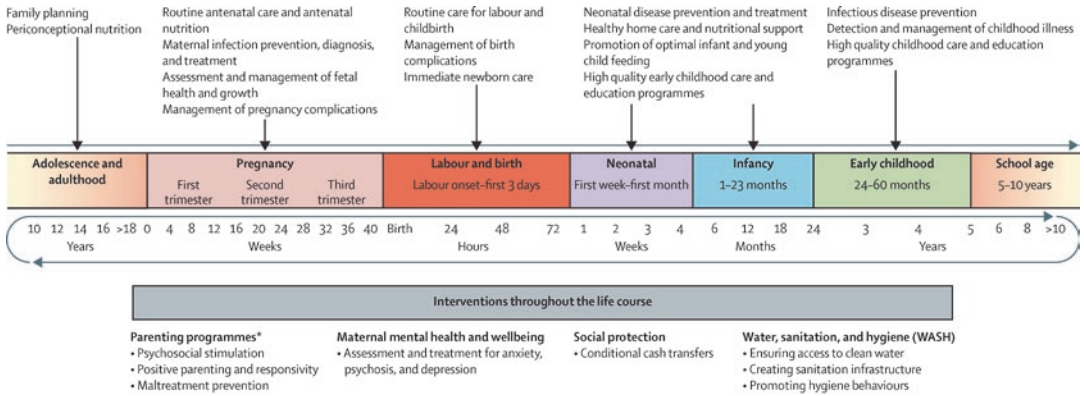
We started the chapter by highlighting the numerous challenges on child development largely because early childhood is especially sensitive to brain insult. Under the right condition, the early years provide a great opportunity for recovery due to brain plasticity (Anderson, Spencer-Smith, & Wood, 2011). Empirical evidence from both basic and intervention science indicates that early childhood is a period of special sensitivity to experiences that promote development and that critical time windows exist when the benefits of early childhood development interventions are amplified (Black et al., 2017; Britto et al., 2017). The evidence indicates that intervention is most efficacious when implemented in the first 2 years of the

child's life, is targeted to the neediest, and uses multiple delivery channels (Pelto, Dickin, & Engel, 1999). Moreover, nurturing care and protection received from parents, family, and community has lifelong benefits including improved health and wellbeing and increased the child's ability to learn and earn. Britto and colleagues have defined nurturing care as "a stable environment that is sensitive to children's health and nutritional needs, with protection from threats, opportunities for early learning, and interactions that are responsive, emotionally supportive, and developmentally stimulating" (Britto et al., 2017, p. 91).

Given the fact that child development in LMICs is impacted on by multiple factors, an intervention targeting multiple areas (i.e., development, nutrition, social protection, and education) is likely to have the most benefit (Aboud & Yousafzai, 2015; Jensen et al., 2015). However, some sectors, such as health services, have been proposed as good entry point to establish contact with pregnant women (Richter et al., 2017), which provides the opportunity to implement interventions prenatally.

Additionally, while there are sensitive periods for intervention, it must be emphasized that both preventive and rehabilitative programs at any period of life are important to enhancing developmental outcomes. (Figure 1.2 presents some of the important interventions across the lifespan.) For resource limited settings such as sub-Saharan Africa, affordability and sustainability are key for the usefulness of any given intervention. Consequently, interventions that can use community-based, low-cost support programs are potentially very useful.

Lastly, moving an intervention from one cultural context to another without adequate adaptation may reduce or even eliminate its effects. It has been urged that it is important to ensure that every aspect of the intervention is tailored to its physical and cultural context. Some scholars have gone as far as suggesting that it is important to acknowledge that existing practices within the communities themselves can be rich sources of information to help plan targeted programs (Sternin, Sternin, & Marsh, 1998).



**Fig. 1.2** Framework to promote young children through a multisectoral approach. *Note:* This figure has been reprinted from Britto et al. (2017) with permission

Our book is rich in examples of intervention strategies that have been tried and tested in sub-Saharan African settings and found to contribute significantly to improving outcomes for these children.

## Overview of the Book

This introductory chapter forms the *first section* of this book. In this chapter, we have provided a rationale for the book, summarized the theoretical and conceptual issues guiding the book, and lastly, summarized the chapters in the book. This information provides the reader with a brief overview of the book. The *second section* of the book discusses the role of psychosocial factors in shaping child development. Parenting behaviors especially the home environment are discussed in two chapters. Moreover, given the specific caregiving context of Africa, we also discussed the role of alternative caregivers especially siblings and fathers. The chapter by *Bornstein et al.* forms the central chapter of this section. It presents data from more than 14 African countries and describes the contemporary situation of children in sub-Saharan Africa with successive foci on child growth, the home environment, parenting, and discipline, using data from the Multiple Indicator Cluster Survey (MICS). The MICS is a nationally representative, internationally compa-

table household survey implemented to examine protective and risk factors of child development in developing countries. The chapter is unique in its use of population-based data to provide results from a national representative sample. The chapter concludes with some policy implications from these findings. *Wekulo-Kitsao et al.* link to the discussion from the previous chapter by focusing on the quality and quantity of stimulation in the home. In a study involving school-aged children in Kenya, the authors provide a detailed description of the home environment before examining the role of the home environment in promoting cognitive and motor functioning in middle childhood. Consistent with what has been reported from other parts of the world, they report that a stimulating home environment, where the child is exposed to a variety of toys, learning materials, and experiences, contributes positively to child development. *Otto and Keller* present data from their work among the Nso in Cameroon. In this chapter, they illustrate the cultural specificities of early socioemotional development in Cameroonian Nso children. They first introduce the cultural models of autonomy and relatedness as a conceptual framework to explain different belief and meaning systems shared by different cultural groups. They investigate Cameroonian Nso parental beliefs, their parenting practices, and their children's formation of attachment relationships and compare these results with those



from middle-class German families. They conclude that the Nso families are more oriented toward relatedness and their early parenting behavior is more aimed at fostering relatedness which is in contrast to middle-class Western families and their orientation toward psychological autonomy in their socialization goals, caregiving strategies, and resulting attachment patterns. The following two chapters address, among other things, the policy and research implications of caregiving contexts. *Abubakar and Van Baar* review the limited data available on fatherhood in Africa. The review is supplemented with original data on the role of fathers from the point of view of both mothers and fathers from a rural setting in Kenya. The final chapter in this section is that by *Mweru* who addresses sibling relationships and its implications for the cognitive, social, and emotional development of children. She presents data from her work in Kenya to provide insight into the role of sibling relationships in shaping childhood outcomes.

*Section 3* reviews and highlights the developmental problems associated with various medical conditions in Africa. *Abubakar* reviews the neurocognitive, mental health, and educational problems associated with infectious diseases. Two common infectious conditions are extensively reviewed (i.e., malaria and HIV) highlighting not only cognitive deficits associated with them but also discussing potential moderators and mediators. The chapter also reviews the impact of less well-known and studied conditions such as meningitis, neonatal sepsis, and jaundice. The key finding from this review is that different infectious diseases significantly and negatively impact on neurocognitive, mental, and education outcomes of children, thus contributing to them failing to achieve their potential. Additionally, it is noted that biomedical and psychosocial risk factors often interact to exacerbate the negative impact of different medical conditions, thus highlighting the need for interventions that are informed by both biomedical and psychosocial models. The second chapter in this section is by *Nampijja*; in this chapter, *Nampijja* looks at the cognitive effects of helminth infections on child development. The chapter starts by reviewing the

literature on the cognitive impact of worm infection and deworming. The author then presents data from a large-scale study which investigated the impact of deworming on cognitive development. The results indicated that worm infection has a small effect on cognitive and executive function; these functions seem to be especially vulnerable to the negative effects of parasitic infections. The third article in this section is by *Hapunda and Pouwer*; they review an increasingly important, yet understudied problem, namely, the effects of diabetes in sub-Saharan Africa. Given the emphasis on communicable diseases, noncommunicable diseases rarely receive a lot of attention in the African context. This much-needed chapter raises awareness of the epidemiology of diabetes and its psychosocial consequences. The last chapter in this section is by *Gladstone*, and it highlights the impact of malnutrition on child development. The chapter starts by discussing the biological mechanisms by which malnutrition impacts on child development. It then goes on to discuss the neurocognitive and neurodevelopmental impacts of malnutrition from studies largely carried out in sub-Saharan Africa. The chapter takes a developmental perspective where data on the impact of malnutrition are presented based on the timing of malnutrition as the impact of malnutrition is expected to be moderated by timing and chronicity of exposure.

The *fourth section* in this book addresses methodological considerations when carrying out developmental science studies in Sub-Saharan Africa. The section starts with a chapter by *Abubakar and Van de Vijver* which discusses approaches to developing tests and scales for use in Africa. The chapter presents a systematic procedure that can be used to carry different processes (i.e., adoption, adaptation, or assembly) alongside approaches for evaluating the level of success in providing an adequate measure for the context in which they are working. The chapter by *Demuth* addresses how qualitative research can fruitfully contribute to applied developmental science in sub-Saharan Africa. *Demuth* argues that qualitative methodologies, particularly ethnographically informed discourse analysis,

provide empirical procedures that allow for the development of a culture-sensitive developmental science. The next chapter by *Foxcroft* discusses ethical issues around child development research in sub-Saharan Africa. Foxcroft notes that while some of the ethical challenges experienced in Africa are common in child development research internationally, some have a uniquely developing world or African flavor to them. The last chapter in this section is by *Nsamenang*. He raises issues and challenges pertaining to research in Africa upstream Euro-American intellectual traditions and scientific ethos. His chapter focuses on developing theories and methodologies that are rooted in and applicable in Africa.

*Section 5* presents various state-of-the-art intervention strategies that have been found to hold great promise in improving developmental outcomes of children in sub-Saharan Africa. In the first chapter, *Novak and colleagues* discuss the development and initial field trial of the latest prototype computerized cognitive rehabilitation training program developed by Michigan State University's Games for Entertainment and Learning Lab. *Klein and colleagues* present a theoretical and practical framework for early intervention. The chapter describes the process of a Mediation Intervention for Sensitizing Caregivers (MISC) of infants and young children. The MISC is primarily concerned with enhancing parents' or caregiver's ability to provide children with quality interaction, consequently affecting their need system and creating dispositions that are essential for future learning. This chapter presents the basic reasons for implementation, processes of intervention, and outcomes of the MISC approach to early intervention, with a special emphasis on the implementation of the MISC in Ethiopia, Uganda, and Kenya and its potential relevance for other countries in Africa. The chapter by *Serpell and colleagues* presents a 4-year research and development program at CAPOLSA (the Centre for Promotion of Literacy in sub-Saharan Africa), aimed at enhancing literacy levels among Zambian children. The process of culturally adapting and evaluating a computer-mediated instructional resource devel-

oped in Finland, for effective intervention in an African society, is discussed in detail. Community-based rehabilitation strategies are the focus of the chapter by *Mpofu and colleagues*. The chapter highlights the fact that CBR remains the most viable instrument for human development support in the sub-Saharan African region. The next chapter by *Friedlander and colleagues* discusses how Literacy Boost, a program based on findings from the mainly developed world literature, functions when it is placed in the sub-Saharan African context. Using data from schools in three countries in sub-Saharan Africa, they describe Literacy Boost and outline the research upon which Literacy Boost was designed. Moreover, the positive impact of Literacy Boost on the reading skills of students is reported.

In the *last chapter* of this book, *Theron* advocates the usage of research evidence to inform policy and practice. Theron urges that in resource-constrained settings such as those in sub-Saharan Africa where disadvantage is rife, researchers have a duty to apply credible research results toward enabling improved life-worlds, above all for children and young people. Drawing on her previous work with the Pathways to Resilience Study, South Africa, Theron demonstrates how authentic researcher-community collaborations support policy and practice uptake of research results.

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## Conclusion

Historically, psychology is firmly rooted in Western culture. It has taken very long to appreciate the link between its models and theories to its cultural context. Fields like developmental science and cross-cultural psychology were and are instrumental in overcoming the spatiotemporal limitations of Western psychology. A truly universal psychology should accommodate differences in behaviors across a wide variety of cultures. Africa and in particular sub-Saharan Africa have not played a strong role in psychology. However, after an era in which the need for African input in psychology was expressed strongly, we now seem to move to an era in which

African psychologists and studies conducted in Africa indicate how African can contribute to psychology, notably to studies that link the unique African context to psychological functioning. Important characteristics of this work were illustrated in the book, such as studies of the psychological sequelae of infections, hunger, or tropical diseases, the consequences of poverty, caregiving beyond the nuclear family, procedures to adapt psychological tests, and an emphasis on policy-relevant and immediately applicable research findings. A final hallmark of this work is the emphasis on high-quality methodology. Quality standards are maintained, both in quantitative and qualitative work. We hope that this book contributes to the further development of African psychology. We do not see African psychology as a discipline that is independent of Western psychology. Rather, African psychology can enrich and be enriched by psychologies from other parts of the world so that our discipline becomes more inclusive and our results more widely applicable and, hopefully, applied.

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## Part II

# Social-Cultural Influences on Child Development

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# Parenting, Environment, and Early Child Development in Sub-Saharan Africa

# 2

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Early childhood is a critical period as rapid gains in physical, cognitive, and socioemotional domains of development constitute “building blocks” of children’s later growth. Despite consensus about the significance of early childhood, and what it portends about ontogeny in the balance of the life span, as well as the life-course consequences of both caregiving and the environments of early development, there is a surprising dearth of population-based multinational data from developing countries on the diverse experiences and conditions that promote or thwart child

well-being. Studies of development, caregiving, and context are requisite to encompass the full scope of childhood. However, context-related limitations continue to constrain our global understanding of child development and caregiving. A narrow participant database in the research literature is one of the major limitations. Perhaps only 10–20% of the body of developmental science emanates from regions of the world that account for perhaps 80–90% of the world’s population (Tomlinson, Bornstein, Marlow, & Swartz, 2014), and critics wisely reject broad generalizations derived from contextually restricted findings (Arnett, 2008; Bornstein, 2010; Henrich, Heine, & Norenzayan, 2010; Serpell, 1990). Thus, most of what is currently known about child development comes from studies of children in the minority developed world. Most of what is known about child development in the majority world of developing low- and middle-income countries (LMIC) still comes from studies of small samples in single locales, even if this situation is changing (for reviews, see Engle et al., 2007; Walker et al., 2007). Population-based multinational data from LMIC are indispensable for identifying countries, regions, and communities where children are at risk, crucial for monitoring which domains of child development are susceptible to which experiences, and necessary to expand the database on human development. Such data would also leverage better-informed national and international policies

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for early child development. Furthermore, taking such aggregates into account would improve our understanding of developmental trajectories for individuals and populations and help to ensure equality of opportunity to all children. The main aim of this chapter is to describe the contemporary situations of multiple domains of early child development across 14 developing sub-Saharan African countries.

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## Poverty in Sub-Saharan Africa

Sub-Saharan Africa (sometimes referred to as *Afrique Noire* or *Black Africa*) is a region best understood for its uniqueness, bewildering diversities, and perceived inconsistencies with Western paradigms of developmental science (Nsamenang & Lo-oh, 2010). Underlying apparent varieties are commonalities among its inhabitants that emanate from ecological adaptations and similarities in historical and present-day experiences. Some of the contextual influences on child development that set this region apart are its very low per capita income in comparison to other regions of the world, terrible burden of diseases including HIV/AIDS, numerous wars and conflicts resulting in displacements of persons, and high infant mortality and comparatively low child survival rates. The region also harbors numerous economically impoverished countries. Together, these factors render children in sub-Saharan Africa among the most disadvantaged.

The United Nations (UN, 2001, p. 2) defines poverty as “a human condition, characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights.” The literature from the developed and developing worlds has cogently demonstrated numerous noxious links between child development and living in conditions of where families have little personal wealth and limited access to other forms of resources that support children’s health and competence. These associations are particularly important to bear in mind important, given esti-

mates of the millions of sub-Saharan children living in economically deprived circumstances (Harper, Marcus, & Moore, 2003).

Sub-Saharan-based knowledge remains largely uncharted territory (Nsamenang & Lo-oh, 2010). Almost all that is known about the region are by-products of European and American cultural precepts that were imported for the purpose of extending mainstream psychology (e.g., Pence & Nsamenang, 2008). Otherwise, issues pertaining to the region will continue to be disregarded or the likelihood of misinterpretation increased.

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## The MICS3

At the World Summit for Children held in 1990, the World Declaration on the Survival, Protection, and Development of Children and its Plan of Action in the 1990s were adopted. Signatory governments pledged to monitor progress toward achieving goals elaborated in the World Declaration. In response, UNICEF developed the Multiple Indicator Cluster Survey (MICS), a nationally representative and internationally comparable household survey for nation states to evaluate country-level progress of children and women in LMIC (UNICEF, 2006). The main purposes of the MICS are to support evidence-based policy formulation, assess trends, and measure disparities. The MICS plays a role in the global scene of planning and reporting on children and women, being a reliable source of data for many indicators that are difficult to find otherwise. The MICS is one of the main tools used to measure progress toward international goals, such as the Millennium Declaration, the Millennium Development Goals (MDGs), and the Sustainable Development Goals (SDGs).

The findings we report in this chapter come from wave 3 of the MICS (MICS3) administered between 2005 and 2010, representing more than 72,000 0- to 4-year-old children in 14 sub-Saharan African countries (Fig. 2.1). We used data from three of the five MICS3 Questionnaires. The Household Questionnaire

**Fig. 2.1** 14 Sub-Saharan African countries in this study



assesses education level and schooling of household members, water and sanitation, and support to children. The Questionnaire for Individual Women assesses maternal and newborn health. The Questionnaire on Children under Five assesses birth registration, early learning, and anthropometry. We used these MICS3 data to focus on four areas of child life: physical growth, household resources, caregiving, and discipline and violence. Although these multiple domains of child development are interlocked (Elder, Shanahan, & Jennings, 2015; Lerner, Hershberg, Hilliard, & Johnson, 2015), for heuristic purposes we treat them separately.

### Child Growth

About 35% of under-5 child deaths, and 11% of the total global disease burden, are attributable to undernutrition (Black et al., 2008). Concerns about growth deficiencies and mor-

ality remain paramount in countries where poverty is endemic. In consequence, a primary MDG established by the United Nations was the reduction of undernutrition (United Nations, 2000). Approximately 167,000,000 children in developing countries are stunted; and, even though prevalence rates of stunting decreased from about 40% in 1990 to about 27% in 2010, projections suggest that about 22% of children in developing countries will likely be stunted in 2020 (De Onis, Blossner, & Borghi, 2012). Furthermore, Victora, de Onis, Hallal, Blossner, and Shrimpton (2010) identified pregnancy, and the first 2 years of life, as critical for the prevention of significant growth problems worldwide. Using data from the WHO global database on child growth and malnutrition, Victora et al. (2010) learned that children in Africa were born at nearly one standard deviation below average on weight-for-age (underweight) and about two-thirds of a standard deviation below average on height-for-age (stunting). From age 2 to age 5, African

children averaged more than two standard deviations below the global mean on both growth indicators.

Poor nutrition and unsanitary conditions are presumed to be the major causes of growth problems, such as stunting, but the link between household- and community-level conditions and children's health remains incompletely characterized. In societies where household facilities and access to material resources are generally low, even small differences in what is available may loom large in determining children's chance of survival and their growth trajectories (Boyle et al., 2006; Darmon & Drewnowski, 2008; Wachs, 2008). Because factors contributing to growth problems in early childhood tend to persist, and because of collateral damage to other biological systems, growth retardation in early childhood often augurs difficulties in cognitive processing and school achievement (Berkman, Lescano, Gilman, Lopez, & Black, 2002; Cheung, 2006; Martorell, Rivera, Kaplowitz, & Pollitt, 1992).

## Household Resources

The quality of children's housing and the materials available in the home play instrumental roles in children's health and adaptive functioning. They also help determine what parents can do to help assure their children's well-being.

**Quality of Housing** For several decades, efforts have been made to establish standards pertaining to housing quality, both as regards the structural materials used to build homes (e.g., mud, thatch, wood) and the internal facilities (e.g., access to toilets, piped water, closed facilities for cooking, and refrigeration appliances). Studies in Ethiopia, Nigeria, Ghana, and Cameroon point to serious problems connected with crowding, poor construction, and inadequate facilities (Aribigbola, 2008; Cameron, 2009; Fiadzo, 2004; Muoghalu, 1991; Yongsi, 2010).

1. *Provisions for water.* WHO estimates that water contaminants account for 4% of all deaths and 6% of all disease burden for young

children. Several African studies indicate that, when water does not come directly into the house, contamination with bacteria and parasites is commonplace, resulting in diarrhea and malnutrition (Roberts et al., 2001; Teklemariam, Getaneh, & Bekele, 2000; Yongsi, 2010). Contaminated water becomes a source of disease that can lead to growth retardation and death (Abou-Ali, 2003; Halpenny, Koski, Valdes, & Scott, 2012; Nandy & Gordon, 2009; Ouattara, N'Guéssean, Yapi, & N'Goran, 2010). Only 58% of people in sub-Saharan Africa have access to improved drinking water sources (i.e., either piped into the home or from other nearby sources such as public taps, tube wells, boreholes, protected dug wells, protected springs, or rainwater collections; WHO/ UNICEF JMP, 2008).

2. *Sanitation facilities.* Not having proper facilities to deal with waste contributes to childhood illness and mortality (Agha, 2000; Mertens, Jaffar, Fernando, Cousens, & Feacham, 1992; Podewils, Mintz, Nataro, & Parashar, 2004) and can lead to behavior and academic problems (Grantham-McGregor & Fernald, 1997; Mendez & Adair, 1999). Fecal-oral spread of bacterial pathogens, resulting from lack of access to appropriate toilets, contributes to diarrhea and growth problems for children (Hong, Banta, & Betancourt, 2006; Podewils et al., 2004; Prüss-Üstün, Kay, Fewtrell, & Bartram, 2004). There is a higher incidence of intestinal parasites in children who share toilets or lack connection to a city sewer system (Ludwig, Fernando, Firmino, & Joao Tadeu, 1999; Mahfouz, El-Morshedy, Fargaly, & Khalil, 1997). Not having adequate toilet facilities at home is particularly problematic for young children as they struggle to withhold bowel movements and fear using pit latrines (Cameron, 2009; Curtis et al., 1995; Lindskog & Lundqvist, 1998).

3. *Food storage/refrigeration.* Poor food storage facilities are a major problem for health and growth in children (Hong et al., 2006; Motarjemi, Käferstein, Moy, & Quevedo, 1993). When homes lack adequate facilities, food is often left out for later consumption,



increasing the likelihood of contamination (Bartlett, 2005). Demographic and Health Surveys from developing countries show that fewer than 25% of urban households in sub-Saharan Africa have a refrigerator (Montgomery & Hewett, 2005). This circumstance creates risks for food contamination and gastrointestinal illness (Ehiri et al., 2001).

4. *Home construction materials.* Poor home construction leads to a diversity of health problems for children. Poor ventilation (often associated with inadequate flooring, wall composition, and roofing) is connected to poor indoor air quality and increased likelihood of respiratory illness (Awasthi, Glick, & Fletcher, 1996; Collins, Sithole, & Martin, 1990). In Cameroon, Yongsu and Ntetu (2008) found that a composite index of housing quality, which included composition of floors and walls, was associated with childhood diarrhea. A study of refugees in Sierra Leone found that rodents were more prevalent in poorly constructed homes, increasing the odds of Lassa fever among residents (Bonner et al., 2007).
5. *Cooking facilities.* WHO (2009) estimated that 2.3 billion people in developing countries use biomass fuels or coal for cooking, particularly in rural areas with limited access to electricity (74% in sub-Saharan Africa). An open stove with no chimney increases indoor pollutants and, as a study in Uganda showed, overall illness rates among family members (Awasthi et al., 1996; Collins et al., 1990; Herrin, Amaral, & Balihuta, 2013). Acute respiratory illness associated with exposure to indoor air pollution is a leading cause of death among young children (Gauderman et al., 2004); and having a stove that uses wood for fuel has been associated with stunting (Hong et al., 2006; Ricci & Becker, 1996). In sub-Saharan Africa, only 6% of homes that use biomass for cooking have improved cooking stoves (WHO, 2009). Having an open stove or fire in the home is also a significant risk factor for childhood burns.

Child survival seems especially sensitive to physical conditions present in the home, albeit how particular components of home conditions

are implicated in child health appears to vary from region to region and even within countries (Chalasanani, 2010; Leventhal & Newman, 2010; Marmot, 2005). Unfortunately, a high percentage of homes in developing countries lacks basic amenities (Aribigbola, 2008; Fiadzo, 2004).

**Material Resources** It is not yet fully clear how household material resources, such as TV, telephone, transportation, and electricity, relate to child well-being. About 1.3 billion people lack predictable access to electricity (International Energy Agency, 2012), with rural areas in developing countries being the most seriously affected (WHO, 2009). Access to electricity increases opportunities to learn from radio and TV and ensures that there will be light for reading and other learning activities (Kanagawa & Nakata, 2008); however, only 47% of traditional homesteads in South Africa had such access (Statistics South Africa, 2008). Having electricity reduces mortality in children under age 5 in developing countries (Ridder & Tunali, 1999; Wang, 2003; Wagstaff, Bustreo, Bryce, Claeson, & the WHO-World Bank Child Health and Poverty Working Group, 2004). Having transportation can also be critical in dealing with certain injuries and illnesses. Furthermore, only with access to transportation can both adults and children access resources that are farther from their dwelling, including attending school and going to facilities that afford opportunities for diversity of experience and increased income.

**Formal and Informal Learning Resources** As the number and variety of objects in a home increase, so do encounters between household members involving those objects (e.g., book reading; Tomopoulos et al., 2006). Modern times have witnessed increases in structured experiences that involve materials specifically designed to promote particular types of learning. These developments fit with societal goals pertaining to the significance of higher-order skills and independence. There is evidence from developing countries that stimulation in the home is associated with children's academic performance (Bradley & Corwyn, 2005; Chiu & McBride-Chang, 2006)

and to indicators of well-being, such as height and nutritional status (Chomitz, 1992; Church & Katigbak, 1991; Cravioto & DeLicardie, 1972).

Many African households have very few materials that children can use to stimulate learning (Aina, Agiobu-Kemmer, Etta, Zeitlin, & Setiloane, 1993; Drotar et al., 1999; Holding, Abubakar, Van Baar, Obiero, & van de Vijver, 2011). The paucity of learning materials present in African homes reflects high rates of poverty and generally low levels of maternal education (Bornstein, Putnick, Bradley, Lansford, & Deater-Deckard, 2015; Goldberg, 1977). Societal modernity, indexed by access to writing tablets, books, electricity, water, radios, TVs, and motor vehicles, is associated with children's improved cognitive functioning and self-managed behavior during play for families living in Kenya (as well as Belize, Nepal, and American Samoa; Gauvin & Munroe, 2009). That said, informal learning resources are items that are readily available in most home environments, but their construction and use may depend more on parental education and family assumptions about their children's future (i.e., things that reflect different aspects of overall standards of living; Bornstein, Putnick, Bradley et al., 2015). Consequently, the implications of children not using formal and informal learning resources may differ.

Being a child's guardian can be a formidable task in conditions of extreme poverty. Poor housing quality and limited access to material resources can directly undermine the health and adaptive functioning of children and limit what parents can do to protect children and promote their development (Bartlett, 1999; Evans, 2006; Leventhal & Newman, 2010).

## Caregiving

The early years are the time when children first make sense of the physical world, forge their first social bonds, and first learn how to express and read basic human emotions. Parenting is a job whose primary object of attention and action is the child—altruistic healthy human children do not and cannot grow up without competent caregiving.

Beyond their children's survival, parents are fundamentally invested in their children's education and socialization broadly construed. Parents have universal responsibilities to educate and socialize young children in ways that are appropriate to their stage of childhood and to prepare young children to adapt to a wide range of life roles and contexts they will occupy as they grow. Thus, caregiver cognitions and practices contribute in important ways to the course and outcome of child development (Bornstein, 2002, 2015; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2001). When they reviewed evidence linking compromised development with modifiable biological and psychosocial risks encountered by children from birth to 5 years of age, Kuklina, Ramakrishnan, Stein, Barnhart, and Martorell (2004) identified three aspects of caregiving consistently related to young children's cognitive and socioemotional competencies: cognitive stimulation, sensitivity and responsiveness to the child, and emotional warmth toward the child.

Caregiving has benefits as well as costs for offspring. Positive caregiving in terms of education and socialization promotes children's cognitive and social competencies and improves success in managing their lives. However, compromised caregiving jeopardizes optimal child development, especially among parents who lack the resources, knowledge, investment, or competencies to rear their young so as to augment individual and common good (Bugental & Grusec, 2006). Societal variation in beliefs and behaviors is always impressive, whether observed among different ethnic groups in one nation or across nation states.

The MICS asks about mothers' specific cognitive caregiving practices in terms of reading, telling stories, and naming, counting, and drawing with their young children. Consider caregivers' reading to children. Joint book reading exposes children to vocabulary and concepts that are not commonly used in everyday conversations (DeTemple & Snow, 2003; Hoff-Ginsberg, 1991); for example, mean length of utterance and responsive replies to children are higher during book reading compared to play and mealtimes (Crain-Thoreson, Dahlin, & Powell, 2001; Lewis & Gregory, 1987; Sorsby &



Martlew, 1991). However, reading to children is widely variable within and between cultures (e.g., Bornstein & Putnick, 2012; DeBaryshe, 1993; Payne, Whitehurst, & Angell, 1994).

Closely related to reading are the other cognitively enriching activities asked about in the MICS. The oral tradition of storytelling is among the oldest means of communicating cultural ideas. Storytelling is in part a linguistic and educative activity (Bruner, 1986; Egan, 1995, 1999), and storytelling constitutes a prominent pastime in most cultures in the developing world (Harari, 2015). Wells (1986) documented links between storytelling and school success and found that literacy development relied on consistent exposure to storytelling and narrative discourse in the home. Like reading, storytelling promotes a range of language and literacy skills in children from complexity of vocabulary and sentence structure to imagination and originality in narrative ability. Caregiver speech directed to young children, as through storytelling, is crucial for early child cognitive development for many reasons. Language is among the most immediate and relevant means parents have to convey both information and affect to children (Bornstein et al., 1992; Garton, 1992; Thiessen, Hill, & Saffran, 2005). Verbal engagement between parents and young children is one of the strongest influences on subsequent language development (Hart & Risley, 1995), and information-salient speech (especially tutorial and didactic features such as naming) has positive predictive associations with child language acquisition (Hoff, 2015; Tamis-LeMonda & Bornstein, 2015).

Young children's numerical experiences provide a foundation for the formulation of standards for early childhood education (Clements, Sarama, & DiBiase, 2004). The mathematics knowledge that children acquire before they begin formal schooling has manifest ramifications for school performance and later career options (National Mathematics Advisory Panel, 2008).

Finally, although the arts often are viewed as a matter of "feeling" or "inspiration," they draw on a wide range of cognitive abilities and skills (Gardner, 1980, 2004; Goodnow, 1977). For exam-

ple, drawing involves perceptive observations of the visual-spatial world, sensitivity to multiple aspects of spatial displays, and capacity to represent information graphically.

The MICS also asks about parents' socioemotional caregiving in terms of playing with children, singing songs, and taking children out of doors. Adults influence the development of child play in many ways: by provisioning the play environment, modeling, engaging children actively and symbolically, responding to children's overtures, and scaffolding more advanced play (Bornstein, 2007). When children play with more mature caregivers, they are furnished with models, stimulants, materials, and opportunities to perform at levels above those they may achieve on their own (Vygotsky, 1978). During such play, children are also guided in the recreation, expression, and elaboration of symbolic themes (Tamis-LeMonda, Katz, & Bornstein, 2002). In some places, caregivers consider play with children to be a central element of the parental role and take an active part in child play, although they may emphasize different aspects (Bornstein, Haynes, Pascual, Painter, & Galperín, 1999; Haight, Wang, Fung, Willians, & Mintz, 1999). In other places, caregivers eschew play with children, reportedly attach no particular value to play, and do not view play as especially significant in children's development (Farver, 1993). Among the Yoruba, only about 11% of children play with toys (Aina et al., 1993). Agiobu-Kemmer (1984) reported that Nigerian mothers needed to be told to play object games with their children.

Like play, children experience music in a variety of ways: through singing, performing on instruments, listening to performances, and dancing. Singing conveys information and emotion at multiple levels from the topics and words of the song through the rhythm and melody of the music to emotional connections between singing partners. Singing is an enjoyable and vital social activity throughout the developing world (Huron, 2003; Trehub & Trainor, 1998). Singing does not require literacy and appears to be effective in sustaining child attention (Nakata & Trehub, 2004). With children's attention captured, caregivers can use song to convey emotional information, and

singing allows adults and children to synchronize their emotional states, affording an important social regulatory function (Bergeson & Trehub, 1999; Dissanayake, 2000; Nakata & Trehub, 2004; Trehub & Trainor, 1998). Caregiver sensitivity and child affect regulation play important roles in the development of secure attachment (de l'Etoile, 2006), and singing consolidates this vital feature of the mother-child relationship (Standley & Whipple, 2003). The MICS also asks about mothers taking children outside the house or their common enclosure which facilitates parent and child sharing new sights, sounds, and other events that deepen their relationship.

Parents' activities are directed to meet the biological, physical, cognitive, and socioemotional requirements of children. Caregiving plays an influential part in early child development because it regulates the majority of child-environment interactions and helps to shape child adaptation (Bornstein, 2015). Many studies evidence short- and long-term influences of caregiving practices on child development. By reading, telling stories, and engaging in naming, counting, and drawing with their children, parents ready their children with basic cognitive skills and set the stage for children's entry into the worlds of literature, school, and culture. By playing with their children, singing songs, and taking them out of doors, parents instill in their children a foundation of socioemotional competencies and confidence to engage the wider social world.

Challenging even in optimal circumstances, successful caregiving is rendered extraordinarily more difficult when family resources are inadequate. Edin and Lein (1997) described poor mothers' constant struggles to provide food, housing, and other necessities as well as keep their children out of danger. It is hypothesized that parents under such stress would generally have difficulty mobilizing effective levels of caregiving (Repetti & Wood, 1997). In Western settings, low-socioeconomic status (SES) parents are less likely to provide children with stimulating learning experiences, such as reading (Feitelson & Goldstein, 1986) or appropriate play materials in the home (Gottfried, 1984). Lower-SES mothers also converse with their children less, and in systematically less

sophisticated ways, than middle-SES mothers do with their children (Hoff, 2015). In McLoyd's (1998) analysis, the stresses on poor parents stemming from the day-to-day struggle to find resources, and the stresses of trying to cope with living in deteriorated dangerous circumstances, likely undermine caregiving skills and contribute to disorganized family life.

## Discipline and Violence

Parents in all countries are faced with the task of socializing children to be competent members of their society. However, the values that parents place on particular child characteristics, and parents' goals for their children's future development, differ considerably across countries (Bornstein, 2010). As a result, parents' socialization practices may vary in part as a function of their childrearing aims and expectations about desirable behavioral outcomes for their children (Bornstein & Lansford, 2010). Parents' discipline strategies embody an important means parents use to socialize children because discipline can function to correct misbehavior and promote desired behaviors in the future. Parents hold a wide range of beliefs regarding the acceptability and advisability of different forms of discipline and marshal a wide range of discipline practices to manage children's behavior (Mistry, Chaudhuri, & Diez, 2003). Despite within-country differences in these beliefs and behaviors, many appear to be shaped by the cultural context in which parents live (Garcia-Coll & Magnuson, 1999).

Parents' range of responses to children's misbehavior includes explanation and reasoning, isolation, removal of privileges, and diverse forms of physical violence (spanking, slapping, and restraining), to name a few. Although corporal punishment has received more research attention than other forms of discipline, parents differ in their use of corporal punishment and in their use of a variety of other discipline strategies. For example, in some cultures, calling the child derogatory names is accepted and practiced as a means of teaching the child right from wrong, whereas in other cultures this kind of name-calling would be

deemed verbally abusive (Fung, 1999). Likewise, some cultural groups rely more heavily on the manipulation of privileges to manage children's misbehavior than do other cultural groups (Kim & Hong, 2007). It is possible to conceptualize parents' nonphysical and physical discipline strategies as representing a gradient of severity, ranging from mild (e.g., offering explanations) to harsh (e.g., yelling or name-calling) verbal techniques and mild (e.g., spanking) to harsh (e.g., beating with an object) physical techniques.

Although societies differ in the degree to which parenting practices are constrained by the social group versus allowed to vary, parents in many societies are given considerable latitude in socializing their children in ways that the parents themselves deem to be acceptable and appropriate. Because of concerns that children are vulnerable to abuse or neglect if parents' socialization practices are left solely to the parents' discretion, children's rights to protection (as well as to nutrition, clean water, and a range of other issues) were made the focus of international attention in the Convention on the Rights of the Child (CRC). The CRC was designed to protect children from abuse and exploitation in a number of domains, and the scope of the CRC has expanded to protect children from physical abuse within their homes. The United Nations conducted a global study of violence against children, which concluded with a goal of putting "an end to adult justification of violence against children, whether accepted as 'tradition' or disguised as 'discipline'" (Pinheiro, 2006, p. 5). Because most physical abuse stems from physical discipline (e.g., Gil, 1970), and because a sizable contingent of scholars, practitioners, and parents defines any form of physical discipline as physical abuse (see Whipple & Richey, 1997), parents' discipline strategies have come under scrutiny in many countries as a result, at least in part, of countries having ratified the CRC. The CRC has been one impetus in shaping UNICEF's position that harsh verbal discipline and physical discipline are harmful to children (see Gershoff, 2002, for a review) and, therefore, unacceptable. Indeed, several countries have legally banned the use of physical discipline (Durrant, 2008).

The present study documents a range of discipline practices parents reported using in 14 sub-Saharan African countries.

The anthropological literature has a history of comparing childrearing practices and value systems across cultural groups using qualitative, ethnographic approaches. For example, Beatrice and John Whiting's Six Cultures Project incorporated observations of children, interviews with mothers, and ethnographic notes to understand parenting practices and children's behavior in Mexico, India, Kenya, the United States, Japan, and the Philippines (Whiting & Whiting, 1975). Using archival ethnographic data collected by anthropologists in 186 preindustrial societies, Ember and Ember (2005) found that several societal-level factors were related to the use of physical discipline in particular. For example, physical discipline was more frequent in societies with higher levels of social stratification and undemocratic political decision making, which the authors suggested may support the theory that parents use physical discipline to socialize children to live in a society with power inequalities. Despite this ethnographic evidence that parents' discipline strategies differ across cultural contexts, the vast majority of such studies in the quantitative developmental science literature have been conducted using North American and European samples, and studies of other cultural groups often have relied on families that have immigrated to North America and Western Europe (for exceptions, see Gershoff et al., 2010; Lansford et al., 2005; Lansford & Deater-Deckard, 2012). Thus, the extent to which parents use different types of discipline strategies is virtually unknown for those countries that are underrepresented in developmental science.

Our MICS analyses tally how often parents and other caregivers in their household used 11 different disciplinary behaviors within the last month: nonviolence (offering explanations, removing privileges), psychological aggression (yelling, name-calling), physical violence (spanking, shaking), and severe physical violence (slapping on the head, beating with an object) as well as general endorsement of the use of corporal punishment.

## Methods of Study in 14 Sub-Saharan African Countries

### Participants

Data were obtained from 14 developing countries in sub-Saharan Africa: Burkina Faso, Burundi, Cameroon, Central African Republic, Côte D'Ivoire, Djibouti, the Gambia, Ghana, Guinea-Bissau, Mozambique, Nigeria, Sierra Leone, Somalia, and Togo (Fig. 2.1). Together, three countries are east, one is south, and the remainder are west and central; these regions differ with respect to economic development and frequency of exposure to emergencies and crises. In consequence, we cannot treat all the same. However, these countries all constitute developing nations (National Center for Children in Poverty, 1999; UNICEF, 2006), as defined with reference to the World Bank's system of classification of economies based on gross national incomes per capita, quality of life (life expectancy, literacy rates), and economic diversification (labor force, consumption). Families with at least one child under

5 years composed the samples. If the family had more than one child younger than 5 years of age, a single child was randomly selected from the family for inclusion. Characteristics of the samples are presented in Table 2.1.

### Procedures

We used data from the third round of the Multiple Indicator Cluster Survey (MICS3; UNICEF, 2006). Each country designed and selected a national probability sample and field implemented the MICS3 with minimum deviation from an overall standard design. A three-stage sample frame was used: (1) primary sampling units (PSUs) were defined, if possible, as census enumeration areas, and they were selected with systematic probability proportionate to size (pps); (2) segments (clusters) were identified; and (3) households were selected within each segment that were to be interviewed in the survey. To foster simple implementation, implicit stratification was followed. When this form of geographic stratification is used together with pps

**Table 2.1** Sample characteristics

|                          | N      | Child age (months) |       | Child gender | Caregiver age (years) |       | Caregiver education |      | Crowding |      |
|--------------------------|--------|--------------------|-------|--------------|-----------------------|-------|---------------------|------|----------|------|
|                          |        | M                  | SD    | % female     | M                     | SD    | M                   | SD   | M        | SD   |
|                          |        |                    |       |              |                       |       |                     |      |          |      |
| Burkina Faso             | 4,168  | 27.14              | 15.99 | 49.8         | 30.54                 | 8.14  | 0.17                | 0.47 | 2.84     | 1.12 |
| Burundi                  | 4,694  | 28.83              | 16.69 | 51.5         | 31.41                 | 8.56  | 0.81                | 0.53 | 3.26     | 1.23 |
| Cameroon                 | 4,490  | 27.02              | 16.38 | 50.5         | 29.70                 | 9.44  | 1.05                | 0.78 | 2.82     | 1.23 |
| Central African Republic | 6,706  | 26.94              | 16.93 | 49.7         | 28.87                 | 9.23  | 0.68                | 0.70 | 2.55     | 1.63 |
| Côte D'Ivoire            | 6,604  | 27.30              | 16.57 | 48.5         | 29.68                 | 9.30  | 0.47                | 0.69 | 3.30     | 1.72 |
| Djibouti                 | 1,549  | 29.67              | 16.02 | 47.4         | 32.17                 | 8.23  | 0.52                | 0.78 | 4.02     | 2.15 |
| Gambia                   | 4,909  | 25.64              | 15.97 | 49.0         | 30.05                 | 9.03  | 0.51                | 0.77 | 2.76     | 1.18 |
| Ghana                    | 2,661  | 29.05              | 16.83 | 48.8         | 31.94                 | 9.22  | 0.86                | 0.90 | 3.43     | 1.59 |
| Guinea-Bissau            | 4,532  | 27.05              | 16.30 | 51.7         | 30.38                 | 10.11 | 0.40                | 0.66 | 2.89     | 1.80 |
| Mozambique               | 8,246  | 27.81              | 16.80 | 50.5         | 29.50                 | 9.33  | 0.84                | 0.63 | 3.27     | 1.37 |
| Nigeria                  | 12,292 | 27.74              | 16.14 | 48.9         | 30.82                 | 9.01  | 0.75                | 0.91 | 3.04     | 1.54 |
| Sierra Leone             | 4,258  | 28.44              | 16.44 | 50.6         | 31.95                 | 10.86 | 0.32                | 0.67 | 2.84     | 1.58 |
| Somalia                  | 3,889  | 28.51              | 17.15 | 48.8         | 30.66                 | 9.61  | 0.41                | 0.56 | 4.38     | 2.18 |
| Togo                     | 3,169  | 27.50              | 16.37 | 49.4         | 30.82                 | 8.83  | 0.61                | 0.74 | 2.93     | 1.28 |
| Total                    | 72,167 | 27.60              | 16.50 | 49.7         | 30.38                 | 9.30  | 0.63                | 0.76 | 3.09     | 1.59 |

*Note:* Caregiver education is coded as 0 = no schooling or only preschool; 1 = primary school, nonstandard curriculum, religious school; 2 = secondary school, vocational, or tertiary school; 3 = higher education. Crowding is coded as the average number of people in the household per bedroom/sleeping area

sampling, the sample proportionately distributes into each of a nation's administrative subdivisions as well as its urban and rural sectors.

Child growth indicators were derived from the anthropometry module of the MICS3 Questionnaire for Children Under Five. Household resources questions pertaining to quality of housing, material resources, and formal and informal learning resources were taken from the water and sanitation and household characteristics modules of the Household Questionnaire and the child development module of the Questionnaire for Children Under Five. Caregiving questions were taken from the birth registration and early learning module of the Questionnaire for Children Under Five. Discipline and violence questions were taken from the child discipline module of the Household Questionnaire and were only asked of caregivers of children over two (therefore, the sample for these items consists of caregivers of children ages 2–4). Some countries did not ask particular modules. If the question was not asked, it is represented as missing data (–) in the tables. MICS3 Questionnaires are available at <http://mics.unicef.org/tools?round=mics3>.

## Child Growth

As part of the MICS administration, trained administrators weighed and measured every child younger than five who was present in the home using standard equipment and a common WHO protocol provided by UNICEF (2012). Using the resulting weight and height data, we adapted and implemented the World Health Organization's (WHO, 2011) Child Growth Standards SPSS macro for the MICS data. This macro uses standard data files to calculate *z*-scores for height-for-age and weight-for-age based on WHO (2006; WHO & UNICEF, 2009) Child Growth Standards. We then used predefined cutoff values of two SDs below the mean to identify children who were stunted (<–2.00 SD on height-for-age) and underweight (<–2.00 SD on weight-for-age). According to the World Health Organization (WHO, 1997), low height-for-age and stunting most often reflect prolonged undernutrition. Stunted children tend to

have a history of being underfed or ill. Being underweight may also reflect poor nutrition and chronic illness, but a child who scores low on this indicator could either be a stunted child of appropriate weight for stature or a taller child who is underweight, making interpretation more challenging. We report both height-for-age and the percentage who are stunted and weight-for-age and the percentage who are underweight because stunting and underweight are used more for policy reasons, but height-for-age and weight-for-age are continuous variables that have better variance for analytic purposes. Furthermore, *z*-scores and percentages may lead to different conclusions.

## Household Resources

### Quality of Housing

Following the WHO and UNICEF's (2008) drinking water ladder, we coded drinking water into two categories: *unimproved* (0; unprotected springs or wells, tanker-trucks or carts with a small tank/drum, surface water, or bottled water) or *improved/piped* (1; public taps or standpipes, tube wells or boreholes, protected wells or springs, rainwater collection, or piped directly to the household dwelling, plot, or yard). Following the sanitation ladder recommended by WHO and UNICEF (2008), we coded toilet facilities into two categories: *open defecation/unimproved* (0; no facilities/toileting in the bush or field, pit latrines without a slab or platform, hanging latrines, and bucket latrines) or *improved* (1; flush or pour-flush latrines, ventilated improved pit (VIP) latrines, pit latrines with slabs, and composting toilets). The main material of the dwelling floor was recoded into the two superordinate categories of natural/rudimentary (0) or finished flooring (1). Cooking was recoded to indicate whether household cooking used *an open fire or stove* (0) or *a closed stove* (1). Refrigerator was coded as *not present* (0) or *present* (1) in the household.

### Household Materials

Nine household items (radio, TV, mobile telephone, nonmobile telephone, motorcycle or scooter, animal-drawn cart, car or truck, and boat with motor)



were coded as *absent* (0) or *present* (1). Mobile and nonmobile telephone were recoded into a single item to indicate the *absence* (0) or *presence* (1) of either type of telephone in the household. Four items about household transportation—motorcycle or scooter, animal-drawn cart, car or truck, and boat with a motor—were recoded into a single item to indicate the *absence* (0) or *presence* (1) of any kind of transportation not powered by humans.

### Formal Learning Resources

The number of adult books and children's books in the household was recoded into two categories to indicate *no books* (0) or *1 or more books* (1). Store-bought toys were coded as (0) *child does not play with the item* or (1) *child plays with the item*.

### Informal Learning Resources

Three categories of children's toys (household objects, outside objects, and homemade toys) were coded as (0) *child does not play with the item* or (1) *child plays with the item*.

### Caregiving

Children's primary female caregivers were asked whether they, the child's father, or someone else had (1) read to the child; (2) told the child stories; (3) named, counted, or drew with the child; (4) sang songs to the child; (5) taken the child outside the yard, compound, or enclosure; or (6) played with the child in the past 3 days. Each item was coded as 0 = *no* or 1 = *yes*.

### Discipline and Violence

Mothers or primary female caregivers were told, "All adults use certain ways to teach children the right behavior or to address a behavior problem. I will read various methods that are used and I want you to tell me if you or anyone else in your household has used this method with (name of child) in the past month." Caregivers were then asked whether they or anyone in their household had used each of 11 nonviolent, psy-

chologically aggressive, or physically violent practices with the target child in the last month: (1) explained why something (the behavior) was wrong; (2) gave the child something else to do; (3) took away privileges, forbade something, or did not allow the child to leave the house; (4) shouted, yelled, or screamed at the child; (5) called the child dumb, lazy, or another name like that; (6) spanked, hit, or slapped the child on the bottom with a bare hand; (7) hit or slapped the child on the hand, arm, or leg; (8) shook the child, (9) hit the child on the bottom or elsewhere on the body with something like a belt, hairbrush, stick, or other hard object; (10) hit or slapped the child on the face, head, or ears; or (11) beat the child with an implement (hit over and over as hard as one could). These 11 items were adapted from the Parent-Child Conflict Tactics Scale (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) and the WorldSAFE survey questionnaire (Sadowski, Hunter, Bangdiwala, & Munoz, 2004). A twelfth item asked whether the caregiver believed that to bring up/raise/educate the target child properly, it is necessary to punish him or her physically; *don't know/no opinion* responses for this item were treated as missing. Each item was coded as 0 = *no* or 1 = *yes*.

We constructed four discipline indicators following the recommendations of UNICEF (2006) for these items. The nonviolence indicator reflected the percentage of children whose caregivers explained why something was wrong, gave the child something else to do, or took away privileges. The psychological aggression indicator reflected the percentage of children whose caregivers yelled at the child or called the child a name. The physical violence indicator reflected the percentage of children who were spanked with a hand, hit on the extremities, shaken, or hit with an object. The severe physical violence indicator reflected the percentage of children who were hit on the head or who were beaten with an implement. We recognize that views about the severity of specific forms of violence likely vary across countries and therefore caution that our findings should be interpreted with this caveat in mind.

## Aims and Analytic Plan

The main aim of this chapter is to describe the contemporary situations of multiple domains of early child development across 14 developing African countries. To do so, we analyzed how these countries vary with respect to indicators of child growth, household resources, caregiving, and discipline and violence. We used a deviation contrast to compare each country to the grand mean or overall effect of all 14 African countries in the set instead of to a single comparison group because we were not interested in specific country contrasts so much as the general ordering of these sub-Saharan African countries among one another on a continuum. The grand mean or overall effect serves as a midpoint for determining which countries are performing better and worse than average, and so we discuss differences from them and not norms (except for growth, which also had norming data). The grand mean or overall effect was also based on weighted statistics, meaning that each country was weighted equally, instead of countries with larger samples weighting the sample more than countries with smaller samples.

For all tests we report the significance level and a measure of effect size. Sample sizes are so large that even very small effects are statistically significant. In this light, focus on the effect sizes is more meaningful than significances. We report effect sizes for the country deviations from the grand mean (analogous to Cohen's  $d$ ; Cohen, 1988) and from the overall effect (odds ratios,  $ORs$ ). We interpret the size of effects for continuous dependent variables corresponding to Cohen's benchmarks for small (0.20), medium (0.50), and large (0.80)  $ds$ , and they can be interpreted in terms of standard deviations from the grand mean. For example, an effect size of 1.5 means that the mean for that country was 1.5  $SD$  above the grand mean. The effect sizes for dichotomous dependent variables can be interpreted in terms of their odds of occurrence. For example, an  $OR$  of 3.5 means that the odds of caregivers in that country engaging in the target practice are 3.5 times the odds of caregivers in an average hypothetical country (i.e., the overall effect of country) engaging in the target practice.

Statistics for individual indicators are tabled, but for parsimony and illustration, we identify the three countries with the highest and lowest scores. After each section of results, we then look across related indicators to discern which countries score consistently above and below the average or overall effect in that domain.

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## Main Findings from the Study of 14 Sub-Saharan African Countries

### Child Growth

Overall, children in the African countries in our sample were at least 1  $SD$  below average height-for-age and weight-for-age (Table 2.2). Height-for-age and weight-for-age shared 26% of their variance. More than one-quarter of the children under five were stunted, and more than 10% were underweight in every country. Stunting and underweight shared 13% of their variance.

Children in Djibouti, the Gambia, and Ghana had the highest average height-for-age, and children in Guinea-Bissau, Sierra Leone, and Mozambique had the lowest average height-for-age. Djibouti, the Gambia, and Ghana also had the lowest percentages of stunted children, and Guinea-Bissau, Sierra Leone, and the Central African Republic had the highest percentages of stunted children. Looking across height-for-age and stunting, Cameroon, Djibouti, the Gambia, Ghana, and Togo had higher than average height-for-age and lower percentages of children with stunting. Burkina Faso, Central African Republic, Côte D'Ivoire, Guinea-Bissau, and Sierra Leone had lower than average height-for-age and relatively higher percentages of children with stunting.

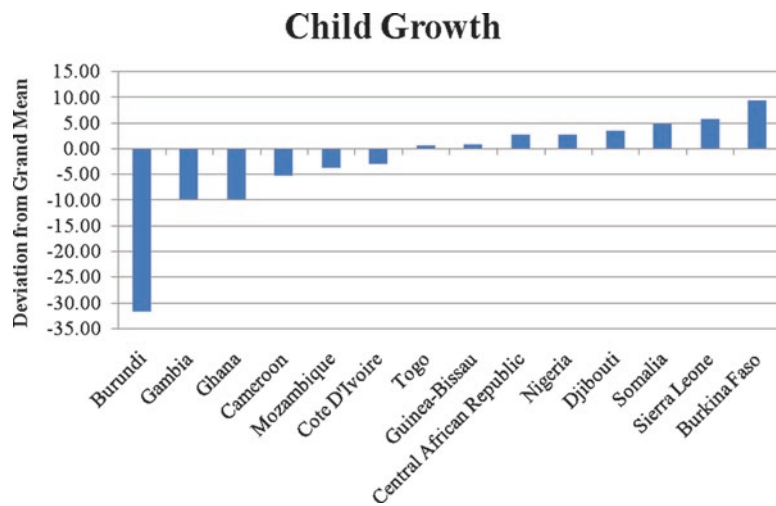
Children in Cameroon, Côte D'Ivoire, and Guinea-Bissau had the highest average weight-for-age, and children in Burkina Faso, Somalia, and Togo had the lowest average weight-for-age. Ghana, Cameroon, and Mozambique had the lowest percentages of underweight children, and Burkina Faso, Djibouti, and Somalia had the highest percentages of underweight children. Looking across weight-for-age and the percentage underweight,

**Table 2.2** Average height-for-age and weight-for-age and percentages of children who were stunted and underweight by country

|                          | Height-for-age |           |           | Stunted |           | Weight-for-age |           |           | Underweight |           |
|--------------------------|----------------|-----------|-----------|---------|-----------|----------------|-----------|-----------|-------------|-----------|
|                          | <i>M</i>       | <i>SD</i> | <i>d</i>  | %       | <i>OR</i> | <i>M</i>       | <i>SD</i> | <i>d</i>  | %           | <i>OR</i> |
| Burkina Faso             | -1.66          | 1.87      | -0.78     | 43.57   | 1.20      | -1.55          | 1.65      | -2.03     | 38.72       | 2.12      |
| Burundi                  | –              | –         | –         | –       | –         | –              | –         | –         | –           | –         |
| Cameroon                 | -1.36          | 1.82      | 0.41      | 37.12   | 0.92      | -0.62          | 1.43      | 1.73      | 15.72       | 0.63      |
| Central African Republic | -1.56          | 2.10      | -0.38     | 43.27   | 1.18      | -1.06          | 1.56      | -0.05, ns | 25.68       | 1.16      |
| Côte D’Ivoire            | -1.53          | 1.88      | -0.26     | 40.55   | 1.06      | -0.86          | 1.31      | 0.76      | 16.89       | 0.68      |
| Djibouti                 | -.91           | 2.70      | 2.20      | 35.81   | 0.86      | -1.18          | 2.03      | -0.53     | 34.65       | 1.78      |
| Gambia                   | -1.18          | 1.55      | 1.13      | 27.99   | 0.60      | -.89           | 1.20      | 0.64      | 15.94       | 0.64      |
| Ghana                    | -1.25          | 1.50      | 0.85      | 29.65   | 0.65      | -0.89          | 1.17      | 0.64      | 14.31       | 0.56      |
| Guinea-Bissau            | -1.79          | 2.07      | -1.29     | 48.06   | 1.43      | -0.88          | 1.36      | 0.68      | 16.93       | 0.68      |
| Mozambique               | -1.69          | 1.41      | -0.90     | 40.29   | 1.05, ns  | -0.92          | 1.15      | 0.52      | 15.89       | 0.63      |
| Nigeria                  | -1.47          | 2.39      | -0.02, ns | 42.57   | 1.15      | -0.97          | 1.88      | 0.31      | 26.46       | 1.21      |
| Sierra Leone             | -1.77          | 1.96      | -1.21     | 47.07   | 1.38      | -1.23          | 1.50      | -0.74     | 27.96       | 1.30      |
| Somalia                  | -1.51          | 2.05      | -0.18     | 40.34   | 1.05, ns  | -1.30          | 1.57      | -1.02     | 32.82       | 1.64      |
| Togo                     | -1.35          | 1.85      | 0.45      | 35.84   | 0.87      | -1.27          | 1.48      | -0.90     | 28.84       | 1.36      |
| Total                    | -1.46          | 2.23      |           | 39.39   |           | -1.05          | 1.71      |           | 23.91       |           |

Note: – = item was not asked in the country. Odds ratios are significant at  $p \leq 0.05$  unless otherwise noted (ns). Children were considered to be stunted if they scored more than 2 *SD* below the standardized mean of 0 on height-for-age, and children were considered to be underweight if they scored more than 2 *SD* below the standardized mean of 0 on weight-for-age

**Fig. 2.2** Ordering of sub-Saharan African countries on indicators for child growth



Cameroon, Côte D’Ivoire, the Gambia, Ghana, Guinea-Bissau, and Mozambique had higher than average weight-for-age and lower percentages of underweight children. Burkina Faso, Djibouti, Sierra Leone, Somalia, and Togo had lower than

average weight-for-age and relatively higher percentages of underweight children.

Figure 2.2 shows the ordering for the countries on indicators of child growth. Scores were calculated by averaging the difference from the



grand mean in each country for the percentages of children who were stunted and underweight.

## Household Resources

### Quality of Housing

Overall, more than one-half of families lived with improved drinking water, fewer than one-half improved sanitation and finished flooring, and fewer than 15% closed cooking facilities or refrigeration (Table 2.3). Among the 14 African countries, Djibouti, the Gambia, and Ghana had the highest percentages of families with improved drinking water, and Sierra Leone, Nigeria, and Somalia had the lowest percentages of families with improved drinking water. The Gambia, Guinea-Bissau, and Djibouti had the highest percentages of families with improved sanitation, and Burkina Faso, Togo, and Sierra Leone had the lowest percentages of families with improved sanitation. Côte D'Ivoire, Togo, and Ghana had the highest per-

centages of finished flooring, and Burundi, Central African Republic, and Guinea-Bissau had the lowest percentages of finished flooring. Djibouti, Guinea-Bissau, and Côte D'Ivoire had the highest percentages of families with closed cooking facilities, and Somalia, Burundi, and Central African Republic had the lowest percentages of families with closed cooking facilities. Finally, Djibouti, the Gambia, and Ghana had the highest percentages of families with refrigeration, and Somalia, Central African Republic, and Burundi had the lowest percentages of families with refrigeration. Taking into consideration all quality of housing indicators individually, all indicators had ORs above 1.0 in Côte D'Ivoire, Djibouti, the Gambia, and Ghana, indicating that they had a greater representation of families with good quality housing, and Burundi, Sierra Leone, and Somalia had ORs at or below 1.0 indicating that they had a lower representation of families with good quality housing.

**Table 2.3** Percentage of households with each quality of housing by country

|                          | Improved/piped water |          | Improved sanitation |          | Finished flooring |          | Cooking (closed stove) |       | Refrigerator |          |
|--------------------------|----------------------|----------|---------------------|----------|-------------------|----------|------------------------|-------|--------------|----------|
|                          | %                    | OR       | %                   | OR       | %                 | OR       | %                      | OR    | %            | OR       |
| Burkina Faso             | 74.9                 | 1.57     | 1.1                 | 0.02     | 34.8              | 0.69     | 1.3                    | 0.36  | 3.3          | 0.49     |
| Burundi                  | 66.0                 | 1.02, ns | 32.1                | 0.78     | 10.5              | 0.15     | 0.3                    | 0.09  | 2.0          | 0.30     |
| Cameroon                 | 61.2                 | 0.83     | 28.9                | 0.67     | 44.8              | 1.04, ns | 10.3                   | 3.06  | 9.5          | 1.53     |
| Central African Republic | 61.6                 | 0.84     | 50.3                | 1.67     | 11.4              | 0.17     | 0.4                    | 0.10  | 1.9          | 0.28     |
| Côte D'Ivoire            | 73.5                 | 1.46     | 55.7                | 2.08     | 79.0              | 4.83     | 16.6                   | 5.30  | 11.0         | 1.80     |
| Djibouti                 | 89.7                 | 4.59     | 60.9                | 2.57     | 59.4              | 1.89     | 64.8                   | 48.91 | 31.0         | 6.54     |
| Gambia                   | 87.0                 | 3.53     | 82.0                | 7.52     | 71.4              | 3.21     | 16.0                   | 5.09  | 16.4         | 2.86     |
| Ghana                    | 77.4                 | 1.79     | 47.2                | 1.47     | 73.0              | 3.47     | 6.7                    | 1.91  | 14.8         | 2.52     |
| Guinea-Bissau            | 57.7                 | 0.72     | 66.5                | 3.28     | 27.9              | 0.50     | 48.2                   | 24.75 | 6.1          | 0.95, ns |
| Mozambique               | 48.6                 | 0.50     | –                   | –        | 32.1              | 0.61     | 3.1                    | 0.85  | 11.5         | 1.90     |
| Nigeria                  | 44.8                 | 0.43     | 36.6                | 0.95     | 53.4              | 1.48     | 2.5                    | 0.69  | 12.2         | 2.03     |
| Sierra Leone             | 42.7                 | 0.39     | 28.0                | 0.64     | 28.2              | 0.51     | 0.4                    | 0.11  | 3.0          | 0.44     |
| Somalia                  | 48.4                 | 0.49     | 36.3                | 0.94, ns | 32.4              | 0.62     | 0.1                    | 0.03  | 1.4          | 0.21     |
| Togo                     | 57.7                 | 0.72     | 24.9                | 0.55     | 75.8              | 4.03     | 2.8                    | 0.78  | 3.7          | 0.55     |
| Total                    | 63.7                 |          | 42.3                |          | 45.3              |          | 12.4                   |       | 9.1          |          |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). – = item was not asked in the country

**Table 2.4** Percentage of households with each material resource by country

|                          | Radio |             | TV   |      | Telephone |             | Transportation |          | Electricity |             |
|--------------------------|-------|-------------|------|------|-----------|-------------|----------------|----------|-------------|-------------|
|                          | %     | OR          | %    | OR   | %         | OR          | %              | OR       | %           | OR          |
| Burkina Faso             | 74.0  | 1.53        | 11.7 | 0.68 | 11.6      | 0.59        | 54.7           | 7.36     | 8.1         | 0.33        |
| Burundi                  | 43.1  | 0.41        | 3.4  | 0.18 | 5.4       | 0.26        | 1.5            | 0.09     | 6.9         | 0.28        |
| Cameroon                 | 64.7  | 0.99,<br>ns | 28.6 | 2.06 | 29.8      | 1.92        | 16.6           | 1.22     | 42.9        | 2.82        |
| Central African Republic | 52.6  | 0.60        | 3.7  | 0.20 | 5.7       | 0.27        | 6.4            | 0.42     | 6.2         | 0.25        |
| Côte D'Ivoire            | 71.7  | 1.36        | 41.0 | 3.57 | 32.5      | 2.18        | 24.2           | 1.95     | 57.6        | 5.09        |
| Djibouti                 | 53.0  | 0.61        | 45.9 | 4.35 | 34.4      | 2.37        | 8.8            | 0.59     | 54.5        | 4.49        |
| Gambia                   | 90.1  | 4.90        | 37.9 | 3.14 | 57.3      | 6.06        | 45.0           | 5.00     | 22.1        | 1.07,<br>ns |
| Ghana                    | 74.8  | 1.60        | 26.1 | 1.81 | 22.8      | 1.34        | 13.6           | 0.96, ns | 38.5        | 2.36        |
| Guinea-Bissau            | 76.1  | 1.71        | 11.6 | 0.68 | 20.8      | 1.19        | 14.8           | 1.06, ns | 11.6        | 0.49        |
| Mozambique               | 59.3  | 0.78        | 21.3 | 1.39 | 36.8      | 2.63        | 8.0            | 0.53     | 19.3        | 0.90        |
| Nigeria                  | 74.6  | 1.58        | 28.5 | 2.05 | 25.9      | 1.58        | 33.5           | 3.08     | 39.3        | 2.43        |
| Sierra Leone             | 42.0  | 0.39        | 4.6  | 0.25 | 1.7       | 0.08        | 3.3            | 0.21     | 8.0         | 0.33        |
| Somalia                  | 35.5  | 0.30        | 6.6  | 0.36 | 14.5      | 0.77        | 11.3           | 0.78     | 15.4        | 0.68        |
| Togo                     | 76.3  | 1.73        | 20.3 | 1.31 | 18.2      | 1.01,<br>ns | 23.5           | 1.88     | 23.2        | 1.13        |
| Total                    | 63.4  |             | 20.8 |      | 22.7      |             | 18.9           |          | 25.3        |             |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns)

### Material Resources

Overall, more than one-half of families had a radio, but one-quarter or fewer had a TV, telephone, access to transportation, or electricity in the household (Table 2.4). Among the 14 African countries, the Gambia, Togo, and Ghana had the highest percentages of households with a radio, and Somalia, Sierra Leone, and Burundi had the lowest percentages of households with a radio. Djibouti, Côte D'Ivoire, and the Gambia had the highest percentages of households with a TV, and Burundi, Burkina Faso, and Sierra Leone had the lowest percentages of households with a TV. The Gambia, Mozambique, and Djibouti had the highest percentages of households with a wired or mobile telephone, and Sierra Leone, Burundi, and Central African Republic had the lowest percentages of households with a wired or mobile telephone. Burkina Faso, the Gambia, and Nigeria had the highest percentages of households with nonhuman-powered transportation, and Burundi, Sierra Leone, and Central African Republic had the lowest percentages of households with transportation. Côte D'Ivoire,

Djibouti, and Cameroon had the highest percentages of households with electricity, and Central African Republic, Burundi, and Sierra Leone had the lowest percentages of households with electricity. Taking into consideration all material resources, ORs were at or above 1.0 on all indicators in Cameroon, Côte D'Ivoire, the Gambia, Ghana, Nigeria, and Togo, indicating that they had an average or greater representation of families with material resources in the household. Burundi, Central African Republic, Sierra Leone, and Somalia had ORs below 1.0, indicating that they had below average representation of families with material resources in the household.

### Formal Learning Resources

Overall, fewer than one-half of families had adult books, children's books, or store-bought toys (Table 2.5). Mozambique, Cameroon, and Ghana had the highest percentages of households with adult books, and Djibouti, Togo, and Central African Republic had the lowest percentages of households with adult books. Ghana, Nigeria, and Sierra Leone had the highest percentages of house-

**Table 2.5** Percentage of households with each formal learning resource and informal learning resource by country

|                          | Formal learning resources |      |                    |      |                   |          | Informal learning resources |      |                 |          |               |          |
|--------------------------|---------------------------|------|--------------------|------|-------------------|----------|-----------------------------|------|-----------------|----------|---------------|----------|
|                          | ≥1 Adult book             |      | ≥1 Children's book |      | Store-bought toys |          | Household objects           |      | Outside objects |          | Homemade toys |          |
|                          | %                         | OR   | %                  | OR   | %                 | OR       | %                           | OR   | %               | OR       | %             | OR       |
| Burkina Faso             | –                         | –    | –                  | –    | –                 | –        | –                           | –    | –               | –        | –             | –        |
| Burundi                  | –                         | –    | –                  | –    | –                 | –        | –                           | –    | –               | –        | –             | –        |
| Cameroon                 | 59.3                      | 2.12 | 15.0               | 1.12 | 34.2              | 1.26     | 49.6                        | 1.19 | 48.9            | 1.08     | 27.8          | 0.83     |
| Central African Republic | 32.6                      | 0.70 | 10.9               | 0.77 | 20.0              | 0.60     | 50.9                        | 1.25 | 50.7            | 1.17     | 34.2          | 1.12     |
| Côte D'Ivoire            | 37.5                      | 0.87 | 7.3                | 0.50 | 31.2              | 1.09     | 37.4                        | 0.72 | 39.0            | 0.72     | 32.5          | 1.04, ns |
| Djibouti                 | 25.8                      | 0.51 | 18.5               | 1.43 | 28.9              | 0.98, ns | 22.3                        | 0.35 | 22.5            | 0.33     | 19.8          | 0.53     |
| Gambia                   | –                         | –    | –                  | –    | 38.4              | 1.50     | 52.0                        | 1.31 | 46.5            | 0.99, ns | 36.5          | 1.24     |
| Ghana                    | 43.1                      | 1.10 | 21.6               | 1.74 | 31.1              | 1.09     | 55.3                        | 1.50 | 58.1            | 1.57     | 33.2          | 1.07, ns |
| Guinea-Bissau            | –                         | –    | –                  | –    | –                 | –        | –                           | –    | –               | –        | –             | –        |
| Mozambique               | 68.5                      | 3.16 | 7.5                | 0.51 | –                 | –        | –                           | –    | –               | –        | –             | –        |
| Nigeria                  | 37.2                      | 0.86 | 20.7               | 1.65 | 16.7              | 0.48     | 32.9                        | 0.59 | 40.2            | 0.76     | 30.0          | 0.92     |
| Sierra Leone             | 36.0                      | 0.82 | 19.0               | 1.48 | 38.7              | 1.52     | 77.2                        | 4.09 | 70.9            | 2.77     | 49.7          | 2.13     |
| Somalia                  | –                         | –    | –                  | –    | –                 | –        | –                           | –    | –               | –        | –             | –        |
| Togo                     | 29.9                      | 0.62 | 10.7               | 0.76 | 29.8              | 1.02, ns | 31.8                        | 0.56 | 47.4            | 1.02, ns | 26.0          | 0.76     |
| Total                    | 41.1                      |      | 14.6               |      | 29.9              |          | 45.5                        |      | 47.1            |          | 32.2          |          |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). – = item was not asked in the country

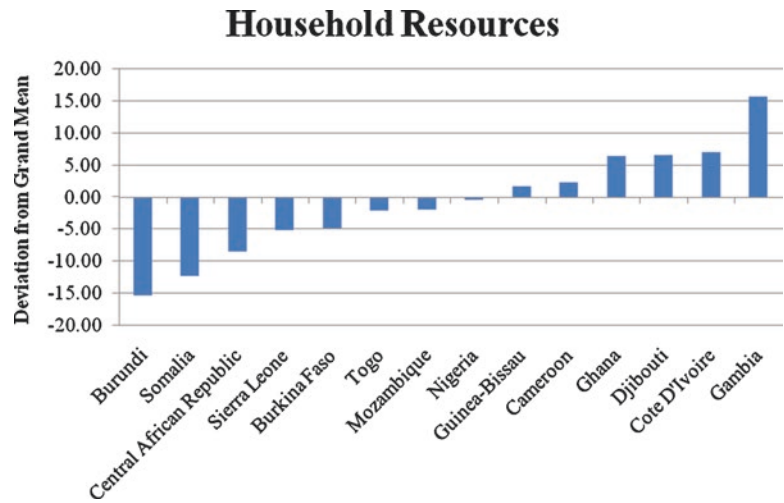
holds with children's books, and Mozambique, Togo, and Central African Republic had the lowest percentages of households with children's books. Sierra Leone, the Gambia, and Cameroon had the highest percentages of households with store-bought toys, and Nigeria, Central African Republic, and Djibouti had the lowest percentages of households with store-bought toys. Taking into consideration all formal learning resources, ORs were above 1.0 on all indicators in Cameroon and Ghana, indicating that they had greater representations of families with formal learning resources, and ORs were at or below 1.0 in Central African Republic and Togo, indicating that they had average or lower representations of families with formal learning resources.

### Informal Learning Resources

Overall, fewer than one-half of children used household objects, outside objects, and homemade toys for play (Table 2.5). Sierra Leone,

Ghana, and the Gambia had the highest percentages of children who used household objects for play, and Djibouti, Togo, and Nigeria had the lowest percentages of children who used household objects for play. Sierra Leone, Ghana, and Central African Republic had the highest percentages of children who used outside objects for play, and Djibouti, Côte D'Ivoire, and Nigeria had the lowest percentages of children who used outside objects for play. Finally, Sierra Leone, the Gambia, and Central African Republic had the highest percentages of children who used homemade toys for play, and Djibouti, Togo, and Cameroon had the lowest percentages of children who used homemade toys for play. Taking into consideration all informal learning resources, ORs were at or above 1.0 on all indicators in Central African Republic, the Gambia, Ghana, and Sierra Leone, indicating an average or greater representation of families with informal learning resources, and ORs were at or below 1.0 in Côte

**Fig. 2.3** Ordering of sub-Saharan African countries on indicators for household resources



D'Ivoire, Djibouti, Nigeria, and Togo, indicating an average or lower representation of families with informal learning resources.

Figure 2.3 shows the ordering for the countries on indicators of household resources. Scores were calculated by averaging the difference from the grand mean in all categories under quality of housing, material resources, and formal and informal learning resources.

**Caregiving**

**Read Books** Overall, fewer than 10% of mothers, fathers, and other people had read to the child in the past 3 days (Table 2.6). Nigeria, Somalia, and Ghana had the highest percentages of mothers who read to their children, and Burkina Faso, Côte D'Ivoire, and Mozambique had the lowest percentages of mothers who read to children. Nigeria, Somalia, and Sierra Leone had the highest percentages of fathers who read to their children, and Burkina Faso, Côte D'Ivoire, and Mozambique had the lowest percentages of fathers who read to their children. The Gambia, Nigeria, and Mozambique had the highest percentages of other people who read to the children, and Burkina Faso, Côte D'Ivoire, and Guinea-Bissau had the lowest percentages of other people who read to the children. Taking into consideration all caregivers individually, all ORs were at or above 1.0 in Djibouti,

Ghana, Nigeria, and Sierra Leone, indicating an average or greater representation of mothers, fathers, and other people who read to children, and ORs were below 1.0 in Burkina Faso, Côte D'Ivoire, and Guinea-Bissau, indicating a lower representation of mothers, fathers, and other people who read to children.

**Tell Stories** Overall, fewer than 20% of mothers, fathers, and other people had told the child stories in the past 3 days (Table 2.6). Somalia, Nigeria, and Cameroon had the highest percentages of mothers who told their children stories, and Burkina Faso, Guinea-Bissau, and Mozambique had the lowest percentages of mothers who told their children stories. Somalia, Nigeria, and Central African Republic had the highest percentages of fathers who told their children stories, and Burkina Faso, the Gambia, and Djibouti had the lowest percentages of fathers who told their children stories. Guinea-Bissau, the Gambia, and Somalia had the highest percentages of other people who told the children stories, and Burkina Faso, Côte D'Ivoire, and Djibouti had the lowest percentages of other people who told the children stories. Taking into consideration all caregivers individually, ORs were at or above 1.0 in Central African Republic, Nigeria, Sierra Leone, and Somalia, indicating an average or greater representation of mothers, fathers, and other people who told children stories, and ORs were at or

**Table 2.6** Percentage of mothers, fathers, and others who read books and told stories to children

|                          | Read books |          |      |          |          |       | Told stories |          |          |        |       |       |          |       |       |       |          |       |       |
|--------------------------|------------|----------|------|----------|----------|-------|--------------|----------|----------|--------|-------|-------|----------|-------|-------|-------|----------|-------|-------|
|                          | Mother     |          |      | Father   |          |       | Other        |          |          | Mother |       |       | Father   |       |       | Other |          |       |       |
|                          | %          | OR       |      | %        | OR       |       | %            | OR       |          | %      | OR    |       | %        | OR    |       | %     | OR       |       |       |
| Burkina Faso             | 0.84       | 0.23     | 0.41 | 0.18     | 0.24     | 0.19  | 0.89         | 0.16     | 0.22     | 0.16   | 0.19  | 0.89  | 0.16     | 0.22  | 0.16  | 0.19  | 0.89     | 0.16  | 0.22  |
| Burundi                  | —          | —        | —    | —        | —        | —     | —            | —        | —        | —      | —     | —     | —        | —     | —     | —     | —        | —     | —     |
| Cameroon                 | 4.79       | 1.35     | 1.58 | 0.72     | 0.79     | 21.14 | 5.23         | 0.79     | 1.78     | 13.79  | 21.14 | 6.59  | 1.23     | 13.79 | 21.14 | 6.59  | 1.23     | 13.79 | 21.14 |
| Central African Republic | 3.83       | 1.07, ns | 3.44 | 1.59     | 0.98, ns | 13.58 | 6.43         | 0.98, ns | 1.04, ns | 16.14  | 13.58 | 9.18  | 1.76     | 16.14 | 13.58 | 9.18  | 1.76     | 16.14 | 13.58 |
| Côte D'Ivoire            | 1.45       | 0.39     | 0.99 | 0.45     | 0.53     | 10.64 | 3.59         | 0.53     | 0.79     | 6.13   | 10.64 | 3.90  | 0.71     | 6.13  | 10.64 | 3.90  | 0.71     | 6.13  | 10.64 |
| Djibouti                 | 4.84       | 1.36     | 3.49 | 1.61     | 0.91, ns | 14.14 | 6.00         | 0.91, ns | 1.09, ns | 6.65   | 14.14 | 3.74  | 0.68     | 6.65  | 14.14 | 3.74  | 0.68     | 6.65  | 14.14 |
| Gambia                   | 3.52       | 0.98, ns | 1.92 | 0.88, ns | 4.06     | 22.20 | 22.20        | 4.06     | 0.82     | 27.89  | 22.20 | 2.25  | 0.40     | 27.89 | 22.20 | 2.25  | 0.40     | 27.89 | 22.20 |
| Ghana                    | 5.67       | 1.61     | 3.68 | 1.71     | 1.53     | 14.73 | 9.70         | 1.53     | 1.15     | 12.89  | 14.73 | 5.67  | 1.05, ns | 12.89 | 14.73 | 5.67  | 1.05, ns | 12.89 | 14.73 |
| Guinea-Bissau            | 2.43       | 0.67     | 1.61 | 0.73     | 0.61     | 2.85  | 4.10         | 0.61     | 0.20     | 49.02  | 2.85  | 6.91  | 1.29     | 49.02 | 2.85  | 6.91  | 1.29     | 49.02 | 2.85  |
| Mozambique               | 2.32       | 0.64     | 1.55 | 0.70     | 1.71     | 10.39 | 10.74        | 1.71     | 0.77     | 21.37  | 10.39 | 4.64  | 0.85     | 21.37 | 10.39 | 4.64  | 0.85     | 21.37 | 10.39 |
| Nigeria                  | 13.52      | 4.19     | 5.17 | 2.43     | 2.15     | 27.07 | 13.11        | 2.15     | 2.47     | 15.5   | 27.07 | 8.39  | 1.59     | 15.5  | 27.07 | 8.39  | 1.59     | 15.5  | 27.07 |
| Sierra Leone             | 4.72       | 1.33     | 3.76 | 1.74     | 1.59     | 18.27 | 10.05        | 1.59     | 1.49     | 19.05  | 18.27 | 10.78 | 2.10     | 19.05 | 18.27 | 10.78 | 2.10     | 19.05 | 18.27 |
| Somalia                  | 5.70       | 1.62     | 3.88 | 1.80     | 0.66     | 49.09 | 4.44         | 0.66     | 6.41     | 1.57   | 49.09 | 19.03 | 4.09     | 1.57  | 49.09 | 19.03 | 4.09     | 1.57  | 49.09 |
| Togo                     | 3.44       | 0.95, ns | 2.49 | 1.14, ns | 0.77     | 13.25 | 5.14         | 0.77     | 1.02, ns | 10.16  | 13.25 | 5.43  | 1.00, ns | 10.16 | 13.25 | 5.43  | 1.00, ns | 10.16 | 13.25 |
| Total                    | 4.39       | —        | 2.61 | —        | —        | 16.06 | 7.88         | —        | —        | 17.71  | 16.06 | 6.72  | —        | 17.71 | 16.06 | 6.72  | —        | 17.71 | 16.06 |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). — = item was not asked in the country

below 1.0 in Burkina Faso, Côte D'Ivoire, Djibouti, and Togo, indicating an average or lower representation of mothers, fathers, and other people who told children stories.

**Name, Count, Draw** Overall, fewer than 35% of mothers, fathers, and other people named, counted, and drew with children in the past 3 days (Table 2.7). Somalia, Sierra Leone, and Nigeria had the highest percentages of mothers who named, counted, and drew with their children, and Mozambique, Djibouti, and Burkina Faso had the lowest percentages of mothers who named, counted, and drew with their children. Sierra Leone, Central African Republic, and Somalia had the highest percentages of fathers who named, counted, and drew with their children, and Mozambique, Burkina Faso, and Djibouti had the lowest percentages of fathers who named, counted, and drew with their children. Sierra Leone, Central African Republic, and the Gambia had the highest percentages of other people who named, counted, and drew with the children, and Djibouti, Burkina Faso, and Togo had the lowest percentages of other people who named, counted, and drew with the children. Taking into consideration all caregivers individually, ORs were at or above 1.0 in Cameroon, Central African Republic, Côte D'Ivoire, Sierra Leone, and Somalia, indicating an average or greater representation of mothers, fathers, and other people who named, counted, and drew with children, and ORs were at or below 1.0 in Burkina Faso, Djibouti, Ghana, Guinea-Bissau, Mozambique, and Togo, indicating an average or lower representation of mothers, fathers, and other people who had named, counted, and drew with children.

**Sing Songs** Overall, fewer than one-half of mothers and other people sang songs to the children in the past 3 days, and fewer than 15% of fathers sang songs (Table 2.7). Sierra Leone, Somalia, and Togo had the highest percentages of mothers who sang songs to their children, and Djibouti, Burkina Faso, and Mozambique had the lowest percentages of mothers who sang songs to their children. Sierra Leone, Togo, and Ghana had the highest percentages of

fathers who sang songs to their children, and Djibouti, Burkina Faso, and Mozambique had the lowest percentages of fathers who sang songs to their children. Sierra Leone, the Gambia, and Central African Republic had the highest percentages of other people who sang songs to the children, and Djibouti, Burkina Faso, and Somalia had the lowest percentages of other people who sang songs to the children. Taking into consideration all caregivers individually, ORs were at or above 1.0 in Cameroon, Central African Republic, Côte D'Ivoire, Ghana, Nigeria, Sierra Leone, and Togo, indicating average or greater representation of mothers, fathers, and other people who sang to children, and ORs were below 1.0 in Burkina Faso, Djibouti, and Guinea-Bissau, indicating lower representation of mothers, fathers, and other people who sang to children.

**Take Outside** Overall, fewer than one-half of mothers, fathers, and other people took the child outside the yard, compound, or enclosure in the last 3 days (Table 2.8). Sierra Leone, Côte D'Ivoire, and Ghana had the highest percentages of mothers who took their children outside, and Guinea-Bissau, Djibouti, and Mozambique had the lowest percentages of mothers who took their children outside. Sierra Leone, Ghana, and Somalia had the highest percentages of fathers who took their children outside, and Mozambique, Burkina Faso, and Djibouti had the lowest percentages of fathers who took their children outside. The Gambia, Sierra Leone, and Côte D'Ivoire had the highest percentages of other people who took the children outside, and Djibouti, Mozambique, and Guinea-Bissau had the lowest percentages of other people who took the children outside. Taking into consideration all caregivers individually, ORs were above 1.0 in Cameroon, Côte D'Ivoire, Ghana, Sierra Leone, and Togo, indicating above-average representation of mothers, fathers, and other people who took children outside, and ORs were below 1.0 in Djibouti and Mozambique, indicating below-average representation of mothers, fathers, and other people who took children outside.

**Table 2.7** Percentage of mothers, fathers, and others who named, counted, and drew and sang songs with children

|                          | Named, counted, drew |       |        |          |       |          | Sang songs |      |        |      |       |          |
|--------------------------|----------------------|-------|--------|----------|-------|----------|------------|------|--------|------|-------|----------|
|                          | Mother               |       | Father |          | Other |          | Mother     |      | Father |      | Other |          |
|                          | %                    | OR    | %      | OR       | %     | OR       | %          | OR   | %      | OR   | %     | OR       |
| Burkina Faso             | 18.88                | 0.49  | 5.95   | 0.56     | 9.93  | 0.41     | 18.88      | 0.27 | 2.66   | 0.29 | 11.68 | 0.32     |
| Burundi                  | —                    | —     | —      | —        | —     | —        | —          | —    | —      | —    | —     | —        |
| Cameroon                 | 35.08                | 1.14  | 11.58  | 1.15     | 21.45 | 1.01, ns | 61.20      | 1.86 | 13.52  | 1.68 | 34.52 | 1.28     |
| Central African Republic | 42.30                | 1.55  | 19.09  | 2.07     | 36.68 | 2.14     | 48.20      | 1.10 | 16.72  | 2.15 | 44.28 | 1.93     |
| Côte D'Ivoire            | 39.28                | 1.36  | 14.02  | 1.43     | 27.35 | 1.39     | 54.57      | 1.42 | 10.91  | 1.31 | 28.75 | .98, ns  |
| Djibouti                 | 11.23                | 0.27  | 6.07   | 0.57     | 7.55  | 0.30     | 17.24      | 0.25 | 2.19   | 0.24 | 5.75  | 0.15     |
| Gambia                   | 26.24                | 0.75  | 9.41   | 0.91, ns | 31.43 | 1.69     | 27.35      | 0.44 | 3.50   | 0.39 | 51.67 | 2.60     |
| Ghana                    | 24.31                | 0.68  | 10.15  | 0.99, ns | 19.80 | 0.91     | 58.40      | 1.65 | 17.70  | 2.31 | 37.77 | 1.47     |
| Guinea-Bissau            | 19.92                | 0.53  | 7.08   | 0.67     | 19.17 | 0.88     | 39.63      | 0.77 | 4.57   | 0.51 | 23.74 | 0.76     |
| Mozambique               | 8.89                 | 0.21  | 2.69   | 0.24     | 20.99 | 0.98, ns | 19.14      | 0.28 | 2.93   | 0.32 | 37.15 | 1.44     |
| Nigeria                  | 49.42                | 2.06  | 9.03   | 0.87     | 23.98 | 1.17     | 52.97      | 1.33 | 9.50   | 1.13 | 29.73 | 1.03, ns |
| Sierra Leone             | 56.88                | 2.78  | 31.61  | 4.06     | 42.25 | 2.70     | 74.45      | 3.43 | 33.56  | 5.42 | 54.93 | 2.96     |
| Somalia                  | 86.79                | 13.85 | 16.11  | 1.69     | 23.45 | 1.13     | 69.88      | 2.73 | 11.13  | 1.34 | 19.00 | 0.57     |
| Togo                     | 25.69                | 0.73  | 10.60  | 1.04, ns | 13.44 | 0.57     | 68.92      | 2.61 | 18.55  | 2.44 | 33.23 | 1.21     |
| Total                    | 34.22                |       | 11.80  |          | 22.88 |          | 46.99      |      | 11.34  |      | 31.71 |          |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). — = item was not asked in the country

**Table 2.8** Percentage of mothers, fathers, and others who took their children outside and played with them

|                          | Took outside |      |        |      |       |      | Played |      |        |          |       |          |
|--------------------------|--------------|------|--------|------|-------|------|--------|------|--------|----------|-------|----------|
|                          | Mother       |      | Father |      | Other |      | Mother |      | Father |          | Other |          |
|                          | %            | OR   | %      | OR   | %     | OR   | %      | OR   | %      | OR       | %     | OR       |
| Burkina Faso             | 57.56        | 1.52 | 9.02   | 0.45 | 24.69 | 0.69 | 41.63  | 0.74 | 11.40  | 0.61     | 37.33 | 0.60     |
| Burundi                  | –            | –    | –      | –    | –     | –    | –      | –    | –      | –        | –     | –        |
| Cameroon                 | 60.33        | 1.71 | 19.38  | 1.10 | 37.24 | 1.25 | 68.91  | 2.30 | 25.70  | 1.63     | 52.63 | 1.12     |
| Central African Republic | 44.90        | 0.92 | 19.59  | 1.11 | 41.30 | 1.48 | 36.32  | 0.59 | 20.07  | 1.19     | 54.16 | 1.19     |
| Côte D'Ivoire            | 73.30        | 3.09 | 24.09  | 1.45 | 50.19 | 2.12 | 65.98  | 2.01 | 25.93  | 1.65     | 59.93 | 1.51     |
| Djibouti                 | 11.81        | 0.15 | 10.33  | 0.53 | 7.30  | 0.17 | 10.46  | 0.12 | 5.29   | 0.26     | 12.46 | 0.14     |
| Gambia                   | 53.36        | 1.29 | 12.29  | 0.64 | 54.38 | 2.51 | 30.86  | 0.46 | 8.47   | 0.44     | 72.94 | 2.72     |
| Ghana                    | 65.80        | 2.16 | 30.97  | 2.05 | 42.35 | 1.55 | 70.31  | 2.46 | 31.38  | 2.16     | 57.16 | 1.35     |
| Guinea-Bissau            | 7.94         | 0.10 | 21.91  | 1.28 | 19.84 | 0.52 | 41.33  | 0.73 | 13.28  | 0.72     | 37.56 | 0.61     |
| Mozambique               | 26.12        | 0.40 | 4.45   | 0.21 | 14.27 | 0.35 | 19.11  | 0.25 | 4.73   | 0.23     | 56.94 | 1.34     |
| Nigeria                  | 45.87        | 0.95 | 19.60  | 1.11 | 41.52 | 1.50 | 52.36  | 1.14 | 16.94  | 0.96, ns | 52.33 | 1.11     |
| Sierra Leone             | 77.88        | 3.96 | 43.59  | 3.53 | 52.23 | 2.30 | 85.25  | 5.99 | 55.10  | 5.79     | 71.35 | 2.52     |
| Somalia                  | 51.12        | 1.18 | 24.57  | 1.49 | 27.56 | 0.80 | 64.69  | 1.90 | 21.33  | 1.28     | 39.77 | 0.67     |
| Togo                     | 62.80        | 1.90 | 19.79  | 1.13 | 35.09 | 1.14 | 59.99  | 1.55 | 26.63  | 1.71     | 50.49 | 1.03, ns |
| Total                    | 49.14        |      | 19.97  |      | 34.46 |      | 49.78  |      | 20.48  |          | 50.39 |          |

Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). – = item was not asked in the country



**Play** About one-half of mothers and other people played with children in the past 3 days, but fewer than 20% of fathers played (Table 2.8). Sierra Leone, Ghana, and Cameroon had the highest percentages of mothers who played with their children, and Djibouti, Mozambique, and the Gambia had the lowest percentages of mothers who played with their children. Sierra Leone, Ghana, and Togo had the highest percentages of fathers who played with their children, and Mozambique, Djibouti, and the Gambia had the lowest percentages of fathers who played with their children. The Gambia, Sierra Leone, and Côte D’Ivoire had the highest percentages of other people who played with the children, and Djibouti, Burkina Faso, and Guinea-Bissau had the lowest percentages of other people who played with the children. Taking into consideration all caregivers individually, ORs were at or above 1.0 in Cameroon, Côte D’Ivoire, Ghana, Nigeria, Sierra Leone, and Togo, indicating average or greater representation of mothers, fathers, and other people who played with children, and ORs were below 1.0 in Burkina Faso, Djibouti, and Guinea Bissau, indicating below-average representation of mothers, fathers, and other people who played with children.

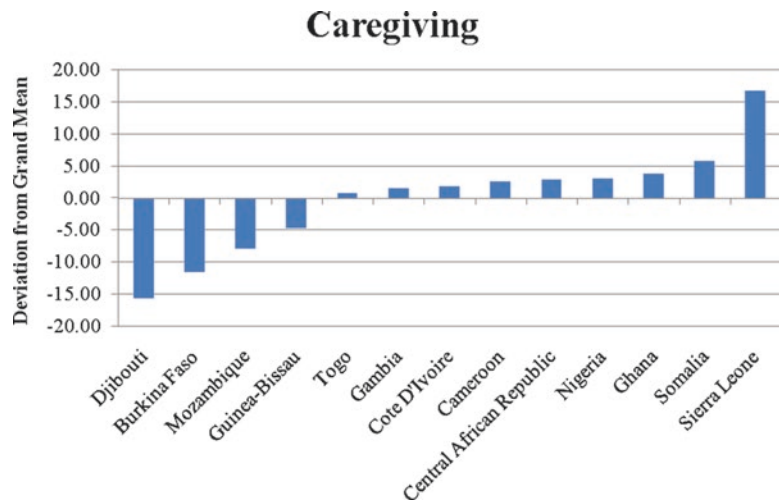
Figure 2.4 shows the ordering for the countries on indicators of caregiving. Scores were calculated by averaging the difference from the

grand mean for reading books, telling stories, naming, counting, and drawing, singing songs, taking a child outside, and playing.

### Discipline and Violence

Overall, over 70% of children in the 14 African countries had experienced nonviolent discipline (explaining why something was wrong, removing privileges) and psychological aggression (yelling, name-calling), over 65% had experienced physical punishment (spanking, shaking), and over 15% had experienced severe physical punishment (being hit on the head or beaten with an implement). Furthermore, across countries, over 35% of caregivers believed that to bring up/raise/educate the child properly, it is necessary to punish him or her physically (Table 2.9). Guinea-Bissau, the Gambia, and Central African Republic had the highest percentages of children receiving nonviolent discipline, and Cameroon, Burkina Faso, and Ghana had the lowest percentages of children receiving nonviolent discipline. Djibouti, Guinea-Bissau, and the Gambia had the lowest percentages of children receiving psychological aggression, and Côte D’Ivoire, Cameroon, and Burkina Faso had the highest percentages of children receiving psychological aggression. Djibouti, Burkina Faso, and Guinea-Bissau had the lowest percentages of children receiving physical punish-

**Fig. 2.4** Ordering sub-Saharan African countries on indicators for caregiving



**Table 2.9** Percentage of families who engage in different discipline strategies and violence

|                          | Nonviolent |      | Psychological aggression |          | Physical punishment |          | Severe physical punishment |          | Need to physically punish |          |
|--------------------------|------------|------|--------------------------|----------|---------------------|----------|----------------------------|----------|---------------------------|----------|
|                          | %          | OR   | %                        | OR       | %                   | OR       | %                          | OR       | %                         | OR       |
| Burkina Faso             | 74.36      | 0.74 | 78.78                    | 1.36     | 58.58               | 0.63     | 16.94                      | 0.93, ns | 40.36                     | 1.23     |
| Burundi                  | –          | –    | –                        | –        | –                   | –        | –                          | –        | –                         | –        |
| Cameroon                 | 71.12      | 0.62 | 83.40                    | 1.84     | 79.42               | 1.72     | 22.42                      | 1.31     | 42.11                     | 1.32     |
| Central African Republic | 83.47      | 1.28 | 78.12                    | 1.31     | 73.91               | 1.26     | 28.91                      | 1.85     | 24.43                     | 0.59     |
| Côte D'Ivoire            | 82.40      | 1.19 | 83.75                    | 1.89     | 73.31               | 1.22     | 17.21                      | 0.94, ns | 38.20                     | 1.12     |
| Djibouti                 | 74.69      | 0.75 | 41.34                    | 0.26     | 55.58               | 0.56     | 19.14                      | 1.08, ns | 32.90                     | 0.89, ns |
| Gambia                   | 85.12      | 1.45 | 68.83                    | 0.81     | 72.05               | 1.15, ns | 16.96                      | 0.93, ns | 30.78                     | 0.81     |
| Ghana                    | 74.68      | 0.75 | 76.78                    | 1.21     | 71.47               | 1.11, ns | 6.15                       | 0.30     | 45.70                     | 1.53     |
| Guinea-Bissau            | 87.86      | 1.83 | 56.47                    | 0.48     | 62.92               | 0.75     | 19.66                      | 1.11, ns | 20.95                     | 0.48     |
| Mozambique               | –          | –    | –                        | –        | –                   | –        | –                          | –        | –                         | –        |
| Nigeria                  | –          | –    | –                        | –        | –                   | –        | –                          | –        | –                         | –        |
| Sierra Leone             | 82.29      | 1.18 | 77.04                    | 1.23     | 71.32               | 1.11, ns | 19.78                      | 1.12, ns | 55.22                     | 2.24     |
| Somalia                  | –          | –    | –                        | –        | –                   | –        | –                          | –        | –                         | –        |
| Togo                     | 76.38      | 0.82 | 74.65                    | 1.08, ns | 69.59               | 1.02, ns | 21.92                      | 1.28     | 30.48                     | 0.80     |
| Total                    | 79.24      |      | 71.92                    |          | 68.82               |          | 18.91                      |          | 36.11                     |          |

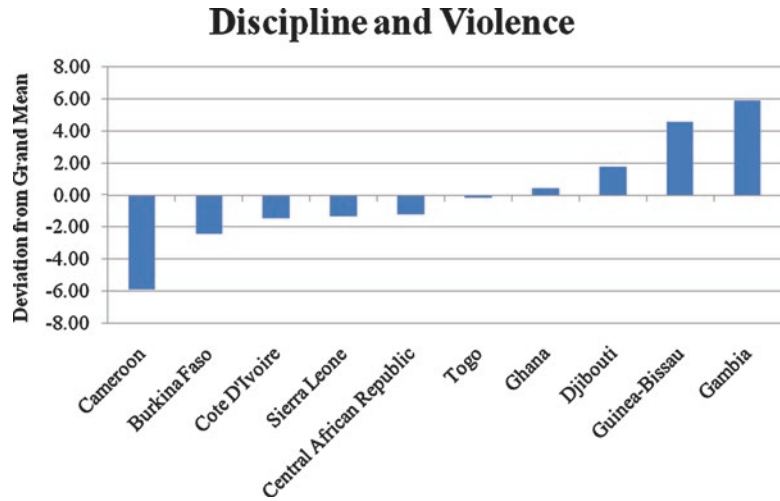
Note: Odds ratios were significant at  $p \leq 0.05$  unless otherwise noted (ns). – = item was not asked in the country

ment, and Cameroon, Central African Republic, and Côte D'Ivoire had the highest percentages of children receiving physical punishment. Ghana, Burkina Faso, and the Gambia had the lowest percentages of children receiving severe physical punishment, and Central African Republic, Cameroon, and Togo had the highest percentages of children receiving severe physical punishment. Finally, Guinea-Bissau, Central African Republic, and Togo had the lowest percentages of caregivers who believed that to bring up/raise/educate their child properly, it is necessary to punish him or her physically, and Sierra Leone, Ghana, and Cameroon had the highest percentages of caregivers who believed that to bring up/raise/educate the target child properly, it is necessary to punish him or her physically. Taking into consideration all discipline strategies individually, the Gambia and Guinea-Bissau had relatively high percentages of

children receiving nonviolent discipline and relatively low percentages receiving psychological aggression, physical punishment, and severe physical punishment. Cameroon and Togo had relatively low percentages of children receiving nonviolent discipline and relatively high percentages receiving psychological aggression, physical punishment, and severe physical punishment.

Figure 2.5 shows the ordering for countries on indicators of discipline and violence. Scores were calculated by averaging the difference from the grand mean in all categories under discipline and violence. In calculating the score, every category that was considered to have a positive effect (i.e., nonviolence) was counted positively and those considered to have negative effects (i.e., psychological aggression, physical punishment, severe physical punishment, and the need to punish physically) were reverse coded.

**Fig. 2.5** Ordering of sub-Saharan African countries on indicators for discipline and violence



### Some Overall Reflections

Most of what is known about children's experiences and child development comes from studies in the developed world where the minority of the planet's young children reside. Clearly, more research is needed to describe the experiences and development of children in the majority of the developing world generally and sub-Saharan Africa specifically.

In this chapter we focused on household conditions and caregiving behaviors considered important for the well-being of children in sub-Saharan Africa. As can be expected, given the range in socioeconomic and emergency situations across the sampled countries, we found remarkable variability in children's home environments. For very young children, lack of access to clean water and facilities for sanitation is a frequently cited risk (Bartlett, 2005); for older children and parents, not having a safe means of cooking can be a major detriment to good health (WHO & UNICEF, 2009). Disease and mortality patterns in sub-Saharan Africa shifted toward the end of the twentieth century (Jamison et al., 2006). Our findings pertaining to weight-for-age (and underweight) were similar to our findings pertaining to height-for-age (and stunting). That overall pattern is not surprising in that being underweight also tends to reflect multiplicative effects of poor nutrition and poor health circumstances (Ricci & Becker, 1996). One

of the fastest growing areas of interventions to improve growth and nutritional status focuses on water and sanitation. Overall, about two-thirds of households in our sample had improved drinking water, and approximately one-half of households had improved toilet and conditions linked to hygiene and sanitation. Only one-third of the households had finished flooring in the home, and only 12% had a closed stove for cooking and 9% refrigeration. With the exception of a radio, one-quarter or fewer households had material resources (TV, telephone, transportation, or electricity). Fewer than one-half of households had any children's books, store-bought toys, or homemade toys; notably, only two countries had as many as 20% of households with children's books.

These findings on poor housing conditions and limited access to learning resources have clear implications for parents, practitioners, and policy-makers. As countries are able to improve infrastructure pertaining to water, sanitation, and health care, severe malnutrition in childhood subsides (Pelletier, 1994). Living in poorly constructed homes with inadequate facilities for drinking, cooking, toileting, and learning poses direct threats to children's health and competence, and renders the tasks of parenting more difficult. Parents themselves are likely to be more stressed and less healthy (e.g., maternal depression is recognized as a major risk factor for poor growth in children who reside in developing countries;

Rahman, Patel, Maselko, & Kirkwood, 2008). Moreover, parents have less time and command fewer resources to provide the kinds of stimulation and nurturance children need to assure well-being. Thus, poor housing both directly and indirectly undermines children's development (Bradley, 2006, 2015; Evans, 2003). One of the great difficulties with the high rate of low-quality home environments in poor countries is that such situations continue the intergenerational transmission of poverty and reduced quality of life. Because poor housing quality and lack of access to high-quality materials at home contribute to poor health and lower competence, they reduce the likelihood of increased GDP at the community and societal levels (Qureshi & Mohyuddin, 2006). Failure to improve GDP then increases the likelihood that low-quality housing persists into the second generation and beyond.

In this connection, it is important to note that what is perceived as "Poor housing" could be attributed to climatic adaptations to a hostile environment. For example, in low-lying and humid West African states of Gambia and Ghana, cooler dwellings made of local materials are more habitable during *harmattan* (hot and windy conditions affecting West African states that border the Sahara desert). Somalia has been at war for many years. Consequently, uncertainties that accompany war conditions do not encourage possession of consumer items, such as refrigerators.

Individual caregiving activities ranged from 0% to 87% in prevalence. Both cognitive and socioemotional forms of caregiving were highly variable across sub-Saharan Africa, but mothers in all countries engaged in more socioemotional than cognitive parenting practices, and taking a child out of doors was the most prevalent form of basic caregiving, followed by playing, singing, and naming, and finally telling stories and reading books. In sub-Saharan Africa, learning is more participatory than individualized, and knowledge does not only derive from books or store-bought or homemade toys. Knowledge derives from indigenous practices, including folklore, idioms, and participatory learning (Nsamenang & Lo-oh, 2010). These findings too have implications for parents, practitioners, and

policymakers. In the sub-Saharan context, cognitive learning often comes through riddles and proverbs more than from books and store-acquired toys. Nonetheless, familiarizing children with books (a decidedly Western way of learning) may constitute a dimension of cognitive caregiving that could link with improved child outcomes. For example, parents can share picture books with children even if parents themselves cannot read. Sub-Saharan African countries might distribute books through clinics or other community sources. The key is to devise channels of distribution and acquisition that are culturally appropriate, sensitive to the constraints parents (mostly mothers) face in daily life, sustainable by families, and scalable to reach the vast numbers of families in need. Lessons could be drawn from approaches that have been found to be effective for improving water quality in the home (Jalan & Somanathan, 2004); however, given that cognitive and socioemotional caregiving requires not only basic levels of literacy and knowledge but also relationship building, more intensive interventions may be required.

Within a past month, 79% of caregivers reported that their child had experienced nonviolent discipline; 72% reported that their child had experienced psychological aggression; 69% reported use of physical violence against the child; and 19% reported use of severe physical violence. Indeed, 36% of caregivers believed that physical punishment is necessary to rear a child properly. Although 19% of caregivers reported that they or someone else in their household had used severe physical violence with the child within the last month, there was wide variation across countries: from 6% in Ghana to 29% in Central African Republic. The prevalence of each type of discipline and beliefs regarding the necessity of physical punishment to rear children properly varied widely across countries. The most frequently reported form of discipline in all countries was explaining to the child why something was wrong. In all but one country, more than 70% of mothers reported that someone in their household had explained to their child why something was wrong at least once in the last month. Because the use of

reasoning and explanations has been shown to contribute to children's empathy, prosocial behavior, and moral internalization of parents' disciplinary messages (e.g., Hoffman, 1963; Krevans & Gibbs, 1996), this particular finding is especially reassuring. Parents in sub-Saharan Africa appear to recognize the value in socializing children with explanations for why their misbehaviors are wrong, with country accounting for only between 4% and 6% of the variance in whether mothers reported that someone had explained to their child why something was wrong in the last month.

A direction for future research will be to understand how differences in beliefs about the acceptability and efficacy of different parenting practices in conjunction with the practices themselves might contribute to children's experience of discipline and, thereby, children's subsequent behavior. Normativeness of physical discipline within a cultural group appears to moderate the link between physical discipline and children's adjustment (Deater-Deckard & Dodge, 1997; Deater-Deckard, Dodge, Bates, & Pettit, 1996). For example, in a study of mothers and children in Kenya as well as China, India, Italy, the Philippines, and Thailand, Lansford et al. (2005) found that, although parents' more frequent use of physical discipline was related to more child aggression and anxiety in all six countries, these links were weaker in countries in which the use of physical discipline was more normative. The disparities we observed on specific measures across sub-Saharan Africa are concerning because we know that such disparities tend to increase over time. Policies, laws, and cultural norms play roles in variation in child development and children's environments. This understanding can inform promotion of children's rights.

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## Country Profiles

Each of the 14 countries in this study had distinct profiles on the constructs we measured. Every country had strengths and weaknesses, relative to the other countries. Here we describe each coun-

ty's functioning across domains, relative to the average or overall effect of countries. Hence, when we say that a country was performing better or worse, it is only relative to the other sub-Saharan African countries in the sample.

*Burkina Faso* Children in Burkina Faso had poorer growth indicators and housing quality (except access to improved water) and mixed material resources (more access to radios and transportation and less access to electricity, television, and telephone). Caregiving was less likely than average for all caregivers in all activities, and discipline was mixed (lower nonviolence and physical punishment, but higher need to punish physically and psychological aggression).

*Burundi* Data were missing for all indicators except housing quality and material resources, which were generally worse than average.

*Cameroon* Children in Cameroon had better than average growth, poorer access to improved water and sanitation, but better than average access to many material resources, books, and toys. Mothers and fathers in Cameroon were more likely to engage in all types of cognitive and social caregiving with their children (except for fathers' reading). Other caregivers were also more likely to sing, take the child outside, and play than average. Finally, discipline showed an unfortunate pattern, with lower than average nonviolence and higher than average psychological aggression, physical and severe physical punishment, and need to punish physically.

*Central African Republic* Children in CAR had poorer growth, housing quality (but better than average access to improved sanitation), and material resources. Books and store-bought toys were less likely to be available, but they had better access to informal learning objects. Fathers in CAR were more likely to engage in all types of cognitive and social caregiving with their children. Mothers were more likely to engage in naming and singing, but less likely to take children outside or play with them. Perhaps compensating for mothers' lower likelihood of interacting, other

caregivers were more likely to tell stories, name, sing, take children outside, and play with children. Finally, CAR children were more likely to be exposed to nonviolent discipline, but also psychological aggression and physical and severe physical punishment (despite a lower endorsement of the need to punish physically).

*Côte D'Ivoire* Children in Côte D'Ivoire had greater weight but shorter height than average. Housing quality and material resources were all above average. There was lower access to books but greater access to store-bought toys in the household. Consistent with the available materials, all caregivers were less likely to read and tell stories and more likely to play with children than caregivers in other countries, and all caregivers engaged in more naming, singing, and taking children outside than average. Caregivers were more likely to engage in nonviolent discipline, psychological aggression, and physical punishment and endorsed the need to physically punish at greater levels than other countries.

*Djibouti* Children in Djibouti were more likely to be underweight but less likely to be stunted. Housing quality was higher than average and material resources were mixed (e.g., greater access to electricity, televisions, and telephones and lower access to radios and transportation). Households were more likely to have children's books (but not adult books) and had an average level of store-bought toys (and fewer informal toys). Mothers and fathers were more likely to read to their children than in other countries, but all other caregiving behaviors were less likely to be engaged in than in other countries. Caregivers were less likely to engage in nonviolent discipline, psychological aggression, and physical punishment.

*The Gambia* Children in the Gambia had better than average growth, housing quality, material resources, and toys. Caregivers other than mothers and fathers were more likely to engage in all caregiving activities than other countries. Mothers and fathers generally engaged in caregiving activities at average or lower than average

levels. Caregivers in the Gambia were more likely to engage in nonviolent discipline and less likely to engage in psychological aggression and had a lower endorsement of the need to physically punish than other countries.

*Ghana* Children in Ghana had better than average growth, housing quality, material resources, and books and toys. All caregivers were more likely to read books, sing songs, take children outside, and play with children. With the exception of mothers telling stories, caregivers were average or below average in telling stories and naming, counting, and drawing. Discipline was mixed, with lower than average nonviolent discipline and more psychological aggression and endorsement of the need to punish physically, but lower severe physical punishment.

*Guinea-Bissau* Children in Guinea-Bissau had lower height (and more stunting) but better weight (and less underweight) than average. Household resources and material resources were mixed (e.g., lower likelihood of having improved water but greater likelihood of improved sanitation, lower access to electricity, but greater access to telephone). With the exception of fathers and other caregivers telling stories, caregiving was less likely than in other countries. Discipline strategies were more positive, with higher use of nonviolent discipline and lower use of psychological aggression and physical punishment and endorsement of the need to punish physically.

*Mozambique* Children in Mozambique had lower height but higher weight (and less underweight) than average. Housing quality was generally lower than average, and household resources were mixed (e.g., higher access to television and telephone, but lower access to electricity, transportation, and radio). Households in Mozambique had greater than average access to adult books, but lesser access to children's books. Mothers and fathers were less likely to engage in all caregiving activities than average, but other caregivers were more likely to engage in reading, storytelling, singing, and playing than in other countries.



*Nigeria* Children in Nigeria had fewer growth problems (stunting and underweight) than average. Housing quality was mixed (worse access to improved water and sanitation, better access to finished flooring and refrigeration), but access to material resources and children's books was higher than average (adult books and toys were lower than average). Caregivers in Nigeria were generally more likely to engage their children in cognitive and socioemotional caregiving practices.

*Sierra Leone* Children in Sierra Leone had poorer growth, lower housing quality, and lesser access to material resources than average. However, households were more likely to have children's books and store-bought toys than average, and caregiving was universally higher than average. Caregivers were more likely to engage in nonviolent discipline and psychological aggression, but less likely to engage in physical punishment and severe physical punishment despite a greater than average endorsement of the need to punish physically.

*Somalia* Children in Somalia had poorer growth, lower housing quality, and lower access to material resources than average. However, maternal and paternal caregiving were universally higher than average.

*Togo* Children in Togo had shorter height but greater weight than average. Housing quality was generally lower but material resources were generally higher than average. Households were less likely to contain books and toys. Cognitive caregiving was average or lower, and socioemotional caregiving was higher than average. Caregivers were less likely to engage in nonviolent discipline and more likely to engage in severe physical punishment than average, despite endorsing the need to punish children physically less.

These detailed country level analyses point to some informative trends. Children in Cameroon, the Gambia, and Ghana have better growth rates than other countries (although still well below the normed global average). In these countries, overall housing quality and material resources appear to be better than average as is provision of formal

and informal learning resources. Another compelling pattern emerged for the Central African Republic, Sierra Leone, and Somalia. In these countries, children's growth is poorer than average. Furthermore, these countries have lower than average housing quality and material resources. However, caregivers there are more likely to engage their children through singing, reading, playing, and naming, counting, and drawing. It should be noted that, if these countries have fewer formal learning resources than average, they have higher levels of informal learning resources. These results suggest that, if resource levels are low, caregivers can still be motivated and engage with the young children. Concentrated analyses are required to understand the lessons learned from these countries that could be leveraged to create effective programs for families. By contrast, in Djibouti, Guinea-Bissau, and Burkina Faso, there appears to be very little interaction between caregivers and children around singing, reading books, and playing.

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## Strengths and Limitations of the MICS

The MICS provides those concerned with children's experiences and child development unique and bountiful data, but data whose limitations need to be acknowledged. Although the MICS contains an impressive number of inhabitants in a substantial number of sub-Saharan countries, the sample sizes vary considerably across countries. Moreover, not all countries provide all data, and comparable data from the developed world are missing. National probability samples are represented, and well-trained national civil workers, demographers, and other key stakeholders from the participating countries worked toward MICS development and administration. Even so, a full consideration of culture and politics in each nation is conspicuous in its absence. The unit of analysis is country, but the sheer number of countries precludes reference to individual national literatures. That is unfortunate, as the MICS user's ability to interpret and contextualize

findings would be enhanced by richer ethnographic understanding of the beliefs, policies, and laws in each country. In this connection, the analyses in this chapter focus on between- and not within-country patterns, which of course vary considerably both within and across samples. MICS data also draw from caregiver reports on limited sets of items, many of which are based on binary yes/no responses. Thus, future directions of MICS data could expand the set of MICS indicators characterizing the proximal environment and link contexts to outcomes. That said, each MICS item references specific domains associated with specific individuals within a specific time period and so may constitute underestimates in the sense that reality probably exceeds the figures presented. Likewise, the data do not take full account of other individuals contributing to the child's life (i.e., beyond mother or principal caregiver). Items in the MICS are reports of mothers (or principal caregivers) about domains in child development, and so are not actual observations, and no controls on reports (as for social desirability of responding; Bornstein, Putnick, Lansford, et al., 2015) are instituted. A complex multinational survey, such as the MICS, is challenging to administer, especially in developing countries. MICS indicators are cross-sectional (precluding causal as well as longitudinal analyses) and subject to historical time as well as seasonality effects (as on the prevalence of certain diseases and infections). These limitations on MICS data constrain their potential.

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### **MICS3 Sub-Saharan Findings Considered Within the Framework of Child Rights to Survival, Development, and Protection**

We conclude this chapter with a discussion of our findings using a lens of the almost universally endorsed Convention on the Rights of the Child (CRC; United Nations General Assembly, 1989). We adopt this human rights-based approach to draw implications from the findings because it is

the most comprehensive and legally binding articulation upholding children's rights to survival, development, protection, and participation (United Nations General Assembly, 1989). The CRC supposes an ecological perspective in stipulating rights, with a prominent role given to contexts of development. Furthermore, General Comment No. 7 "Implementing Child Rights in Early Childhood" (United Nations Committee on the Rights of the Child, UNICEF, & Bernard van Leer Foundation, 2006) is intended to provide more detailed information and guidance regarding the implementation of child rights (Britto, Ulkuer, Hodges, & McCarthy, 2013); it states "Ensuring survival and physical health are priorities, but States parties are reminded that article 6 encompasses all aspects of development, and that a young child's health and psychosocial well-being are in many respects interdependent" (p. 38). Health and psychosocial well-being of the child are prerequisites to realizing human potential (Engle et al., 2007). In other words, all children have rights to high-standard health care and nutrition, to an environment that supports their thriving, to nurturing and stimulating interaction, and to protection from abuse and neglect (including both physical and psychological violence). The CRC offers a suitable lens for analysis and policy recommendations because most early childhood development policies link with CRC principles (Britto, Cerezo, & Ogbunugafor, 2008). Although there is no one-to-one alignment between the spheres of growth, environment, and caregiving covered in this chapter and the three sets of rights of the CRC (survival and development, protection, and participation), there is a conceptual overlap that is useful for discerning implications of the results for policy.

The CRC recognizes that parents and key caregivers are entrusted with the primary responsibility of rearing children, but it is also recognized that they require assistance in creating optimal environments. In their key roles of parenting and childrearing, caregivers and the family need support. Per the CRC, in this chain of duties, local communities, countries, and the larger international community are obligated to support caregivers. The CRC presents duties for



these larger systems for the implementation of child rights (Hodgkin & Newell, 2007). For methodological and strategic reasons, this discussion focuses on policy as a mechanism of change. Policy influences family-level resources and functioning as well as family-level outcomes (Minujin, Delamonica, & Komarecki, 2005). The issues of growth, resources, caregiving, and discipline fall primarily under the categories of child rights to survival and development, and discipline practices and quality of housing are most closely linked with child protection rights.

Article 6 of the CRC states that by becoming a signatory to the CRC countries “shall ensure, to the maximum extent possible, the survival and development of the child.” These assessments of the MICS3 therefore have implications for national-level policies. Our results point to different potential targets for programs and policies in sub-Saharan Africa, including: programs aimed at supporting positive caregiving practices in the home, cognitive stimulation, and diminishing harsh discipline as well as programs aimed at education and family income, such as conditional cash transfers. Globally, long-term benefits from high-quality early intervention programs include better health outcomes for children, higher verbal and mathematics achievement, greater success at school, improved employment and earnings, less welfare dependency, and diminished rates of crime (Britto, Engle, & Super, 2013).

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## Conclusions and Implications

Improvements in infrastructure and access to health care around the turn of the twenty-first century decreased the likelihood that young children will die or suffer growth deficiencies. These movements toward fulfillment of the UN Millennium Development Goals have advantaged young children everywhere. However, improvements have not been uniform within or across countries. To some extent those improvements have shifted what matters as regards community resources, parenting practices, and

household accoutrements, but certain factors (e.g., dearth of household resources, lack of environmental stimulation, poor access to education, failure to protect from disease) continue to play roles in who will survive, grow normally, and thrive. Our findings from sub-Saharan Africa suggest that achievement of MDGs pertaining to child health and development requires continued efforts to modernize community infrastructure and health services and to increase economic well-being. In effect, the quality of a child’s living conditions matters, but (consistent with ecological theories of development; Bornstein & Leventhal, 2015) how much it matters may vary depending on other aspects of the child’s ecology. Not to be forgotten is the need to educate both adults and children. Having parents (especially mothers) who are better educated contributes to the likelihood that children will be better nourished, gain greater access to needed health care, and afford better educational opportunities (Bornstein, Putnick, Bradley, et al., 2015; Gakidou, Cowling, Lozano, & Murray, 2010; Wachs, 2008).

The well-being of the current generation of children and the turnover to the next would almost certainly improve with greater access to income and education (Walker et al., 2007). Even so, efforts to improve standards of living and quality of life are likely fraught with challenges as numerous other factors are implicated in child quality of life and a diverse array of cultural and political considerations helps to determine the likelihood that any effort would result in meaningful change at the individual household level.

There is increased interest in how assets of all sorts can be converted into practices and arrangements that foster children’s health and development (Chowa, Ansong, & Masa, 2010). For those invested in the well-being of children who live in LMIC, the data base on how housing quality and the materials available in homes affect children’s development and their life-course prospects is especially weak. A growing literature documents how poverty and chronic adversity affect parenting; however, that literature is mostly informed by research on children from technologically advanced societies and

research that is limited to select parenting practices. Research that is inclusive, both in terms of the people it investigates and the environmental conditions it considers, remains scarce (Leventhal & Newman, 2010). Moreover, extant research rarely considers indirect pathways through which physical arrangements and access to materials affect children's well-being (but see Bornstein, Putnick, Bradley, et al., 2015). We provide two examples. A study conducted in rural Ethiopia showed that a family's access to sickles and plows increased the likelihood children would attend school regularly as children were not needed as much to help with farming tasks (Cockburn & Dostie, 2007). Bornstein, Putnick, Bradley, et al. (2015) tested how instructional capital (caregiver education) leads to improved infant growth through availability of physical capital (household resources) across 117,881 families living in 39 LMIC. Overall, household resources mediated a large percentage of the association between caregiver education and infant growth across countries characterized by low, medium, and high levels of human development, for girls and boys, and controlling for infant feeding and health. In effect, for child development research to usefully inform housing and economic policy in most countries—policies that necessitate careful decision making and hard choices given limited economic resources—that research must expand in terms of who is studied, what environmental conditions are considered, and what processes linking those conditions to key child outcomes are analyzed. This broader undertaking is also needed to advance the science of environment-development relations more generally. Too much of what we believe about how environments are implicated in children's development derives from research that is insufficiently inclusive of the totality of factors in the home environment that likely matter and the diversity of living conditions present throughout the world. Most developmentalists would probably not have entertained the notion that a family's access to a plow would increase the level of education a child obtains (and all that augurs for employment or health downstream), but exploring such paths in a diverse array of places will almost certainly lead to expansions

and corrections in understanding how environmental conditions function to impact children.

Parents throughout the world are the first and primary individuals entrusted with child caring and the central task of rearing children to become competent members of their society (Bornstein, 2015). From a parent's point of view, child survival is achieved through protection and provision of nourishment, but child thriving is attained through caregiving that involves sharing information through education and inculcating interpersonal competence through socialization. Family, as understood by the CRC, is the closest and most intimate setting where the child has direct interactions with significant others. However, the most proximal context of child development, namely, the family, is influenced by more distal contexts of community, policy, and culture (Bronfenbrenner, 1979; Robinson, Eickelkamp, Goodnow, & Katz, 2008).

A methodological virtue of the MICS data lies in their ability to provide evidence for policy planning. Although implications of our study proceed under this rubric, we are aware that the path is not always direct and simple. Associations among growth, the environment, caregiving, and discipline are interlinked and complex. Survival, development, and protection rights are stated by the CRC as interdependent and indivisible, underlying the importance of holistic policies and integrated programming approaches throughout the life cycle. However, for the purposes of explanation and providing direction for policy, we employ a disaggregated analysis and approach. During the early years, children make great strides in all domains of development—acquisition of gross and fine motor skills, language and cognition, social skills, emotions, and self-regulation (Bornstein, Arterberry, & Lamb, 2014). Interactions with primary caregivers and the characteristics of home, as the most proximal contexts for development, are associated with these great strides. For example, through responsive feeding and adequate nutrition; through exposure to opportunities and optimal conditions of the home; through interactions, such as looking at books, singing songs, and naming objects; and through warm and active nonviolent discipline practices, caregivers influence children's

survival and development positively (Bornstein, 2015). The rights to survival, development, protection, and participation are kindred rights. These inalienable rights could potentially be at risk for a large proportion of sub-Saharan African children by the indicators of growth, exposure to inadequate housing, cognitive and socioemotional caregiving, and violence at home. It has been recommended that all articles and rights of the CRC be implemented with a view to achieving maximum survival and development and protection of the child as this concept embodies the core principle of the CRC—the best interests of the child (Hodgkin & Newell, 2007).

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# Exploring Differences in the Rural Home Environment: The Role of Biological and Environmental Factors

# 3

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The home environment is an important influence on children's health and development (Boivin et al., 1996; Bradley & Caldwell, 1995; Sigman et al., 1989). Having adequate levels of stimulation,

support, and enabling structures at home is especially important for children who live in general conditions of poverty or threat (Bradley & Corwyn, 2006). In order to develop programs to protect children and to promote their healthy development, researchers, policy makers, and practitioners have long felt the need to better understand how children's home environments affect their well-being. Consequently, considerable attention has been devoted to finding ways to gauge the quality of children's environments accurately. One of the most frequently used measures of the quality and quantity of stimulation and support available to a child in the home environment is the Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell & Bradley, 2003).

The Middle Childhood (MC) HOME Inventory (Bradley, 1994), which is the subject of the current investigation, was designed for children aged between 6 and 10 years. It comprises observations of parental responsivity to the child, descriptions of family routines and experiences, measures of orderliness in the home, and the opportunities for stimulation within the child's physical home environment. Several studies suggest that these dimensions of family influence are strongly related to socioeconomic status (Bradley, Corwyn, McAdoo, & Coll, 2001;

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Hart & Risley, 1995). However, in settings where many households are characterized by low parental education and household income, it is unclear whether the indicators contained in the HOME Inventory are optimal for characterizing diversity within the home environments of families.

Bradley, Corwyn, and Whiteside-Mansell (1996) have also reviewed evidence for the validity of the HOME Inventory across different cultural settings. Measurement of certain constructs which are assumed to be universal is expected to yield similar results across cultures (Whiteside-Mansell, Bradley, Little, Corwyn, & Spiker, 2001); however, this may not be the case due to the cultural specificity of the actions, activities, and relationships within the home environment (Bradley & Corwyn, 2005). Across diverse settings, the items in the HOME Inventory may not adequately reflect the manner in which, for example, parental sensitivity to a child's needs and behavior is expressed. For instance, within some societies, a child is not seen as an interactive partner for adults, and parents do not play with their children (Bornstein, 2007). In other societies, adults do not consider it appropriate for a child to be independent, assertive, and inquisitive (Aina, Agiobu-Kemmer, Etta, Zeitlin, & Setiloane, 1993; Greenfield, 1994). On the other hand, some activities which are not included in the HOME Inventory may be just as important to children's well-being among families living in different contexts (Lancy & Grove, 2011; Shweder, 1995). These differing expectations may lead to home environments being described as "limited, deprived or deficient rather than different" (Bernstein, Harris, Long, Iida, & Hans, 2005) and contribute to the limitations seen in the cross-cultural application of the HOME. Such limitations, which are part of a larger problem of how to select indicators to characterize the resources and events present in diverse contexts or with diverse groups (Hagerty & Land, 2007), may compromise the validity of the measure.

Research on child development has consistently shown that the home environment has strong links with child outcome across several spheres (Hart &

Risley, 1995; Sarsour et al., 2011). In addition, among those identified as being most at risk for poor developmental outcomes are those living in poverty in resource-poor settings. Although the HOME Inventory has been used in several scientific studies worldwide (Baker-Henningham, Powell, Walker, & Grantham-McGregor, 2003; Bradley & Caldwell, 1981; Bradley et al., 2001; Burston, Puckering, & Kearney, 2005; Caughy, Randolph, & O'Campo, 2002; Hamadani et al., 2010; Pessanha & Bairráo, 2003) and as part of numerous efforts to evaluate programs for parents and children (Bradley & Putnick, 2012), one major limitation is the overconcentration on children younger than school age (Bradley & Corwyn, 2005). Furthermore, few studies have applied this measure in sub-Saharan Africa (Aina et al., 1993; Bangirana et al., 2009; Goldberg, 1977; Holding, Abubakar, Obiero, & Van de Vijver, 2011; Richter & Grieve, 1991; Sigman et al., 1989). The need for a measure that accurately assesses the proximal processes within the rural child's environment from an ecological perspective provided the impetus for the current study.

Our primary objective was twofold. Through Study 1, we sought to identify the specific actions, objects, events, and conditions within households that influence child well-being. In line with Bronfenbrenner's bioecological theory (Bronfenbrenner & Ceci, 1994), we expected an association between child characteristics, the processes within the home environment, and distal contexts. We aimed to establish the reliability of the modified indicators and whether or not patterns of response varied by age and gender of the school-age child. We also examined the extent to which the quality of the home environment (in terms of availability of stimulating materials, aspects of physical surroundings, and parental nurturance) differed according to child nutritional status and an index of household wealth. In so doing, we sought to obtain preliminary evidence for the validity of the home measure. In Study 2, we validated the modified measure by investigating the associations between the home environment and child outcomes. We set up a model with all the variables in Study 1 (except nutritional status), as well as two child outcomes (language and

motor development) included. The identification of discrete components of the home environment that influence outcome will facilitate the formulation of interventions in a more targeted and effective manner.

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## Method

### Study Site and Sample Selection

The study was carried out in Kilifi County (formerly Kilifi District in the Coast Province of Kenya). More than half of the district's population lives below the poverty line (Kahuthu, Muchoki, & Nyaga, 2005) with incomes of less than \$2 USD a day. The majority (>80%) of the population is engaged in agricultural activities that include crop cultivation and rearing of livestock. Other sources of income include trade and services, tourism, fishing, and mining.

A typical home in Kilifi comprises a large homestead with several small huts in which extended family members live together and share in the daily household chores. It is not uncommon for members from different generations to share in child-rearing duties. Children of school-going age spend a lot of their time outdoors with near-age siblings or peers. Boys have more unstructured time engaging in mostly play activities, while girls attend to household chores such as fetching firewood and water and helping their mothers in the fields (Wenger, 1989).

The participants in this cross-sectional study comprised a subgroup of 146 children aged 8–10 years who were part of a larger program on the development of psychological assessment materials for school-age children (Kitsao-Wekulo, Holding, Taylor, Abubakar, & Connolly, 2013a). Children were included in the main study if they lived within a 5 km radius of five schools randomly chosen to represent a cross section of schools in the district. For the HOME Inventory sub-sample, attempts were made to ensure an equal representation of boys and girls and an appropriate cross section of residential areas. A detailed description of the study area is presented elsewhere (Kitsao-Wekulo et al., 2013a).

### Study 1: Tool Development

For the adaptation and modification of the home environment measure, we followed the systematic test adaptation procedure recommended by Holding, Abubakar, and Kitsao-Wekulo (2009).

**Item Pool Modification** All the items of the original MC-HOME Inventory were translated into Kiswahili, the *lingua franca* of the region, using the descriptions provided in the original manual. We made use of conceptual translations because some words or phrases could not be translated directly. At each stage of translation, we grouped the items into sets and then evaluated them through an iterative process where each set was presented to different respondents.

Initial interviews were conducted with three willing parents to establish the clarity and face validity of the items. A focus group discussion was also held with eight mothers of school-age children to establish their understanding of the item content and if the items would be answered without hesitation. Their responses suggested that some of the items needed further clarification. Our own observations made during data collection pointed to the perceptual richness of the environs of the household. We therefore incorporated an additional item as an indicator of environmental stimulation.

After this process, some of the original content was retained, while other items were modified to take into account the cultural milieu of the study. The Kiswahili version was evaluated for clarity and then back translated by a panel of professionals (a psychologist, a community pediatric nurse, and two teachers) with detailed knowledge of the cultural and linguistic context.

**Training of Interviewers** Prior to the main study, the principal investigator (PH) trained three interviewers to administer the MC-HOME Inventory. For the purpose of this study, the interviewers were referred to as home “visitors.” The interviewers familiarized themselves with the content and structure of the MC-HOME Inventory which were then explained to them in depth. They were provided with information on how 6–10-year-old



children develop and important influences on their development. The interviewers were also instructed on interviewing techniques.

Practical training began with the principal investigator observing each “visitor” administering the inventory. She provided feedback to ensure that the “visitors” understood interview procedures. The “visitors” then conducted mock interviews with selected caregivers while being observed by a trained member of the assessment team. One source of homogeneity in responding was the tendency for interviewees in this community to simply agree with the interviewer. Developing the skills of potential interviewers to elicit responses in a more conversational method was identified as a way of circumventing this problem and obtaining more informative responses. An interview guide with additional prompts and probes was therefore developed and used during the interview to maintain the flow of the conversation. More specific examples of relevant activities were included to facilitate the coding of each item. This guide was modified and updated with relevant information throughout the one-month training period. Throughout the training process, the interviewers recorded their observations and caregiver responses to interview questions. They then used this information to rate the interviews.

**Piloting Phase** After final selection and refinement of items, further piloting took place in the homes of seven children randomly identified from a census database of the study area population available at the Kenya Medical Research Institute. The purpose of these interviews was to evaluate the acceptability of the interview procedure, clarity of the modified items, feasibility of completing the observational items, and variability in responses.

In the initial analysis of pilot data, more than one-third of the items demonstrated a lack of variability, suggesting the need to investigate alternative indicators of inter-household variability. The scoring procedure was expanded to a three-point rating scale (not at all = 0, sometimes = 1, most of the time = 2) and tested on 15 literate parents. Descriptive analysis of the total

scores and responses to individual items indicated that this method yielded greater response variability. This version of the MC-HOME Inventory was then administered to 24 respondents. Across these participants, 94% of the items received multiple ratings.

All the interviews were carried out outside children’s homes as it is uncommon for visitors to be invited into the house. Caregivers (most frequently, mothers) were asked to talk about each item as it related to the target child and family. At the end of the interview, the caregiver was asked for permission to escort the interviewer into the house to see the living conditions inside the family home.

## Materials and Procedures

**Home Environment Measure** The final modified version was renamed the Kilifi-Home Inventory for Primary School Children (Kilifi-HIPSC). The Kilifi-HIPSC was administered to selected primary caregivers who were interviewed at home in the presence of the target child at prearranged times. The “visitors” completed a form on which they recorded the caregivers’ responses verbatim. When specific objects that were not clearly visible were mentioned during the interview (e.g., toys and books that the family possessed), the “visitor” asked the caregiver to show her the items. The interview took about one hour to administer. Appendix 1 presents a summary of the proportion of respondents who selected each rating level and highlights items that were retained from, modified from, or added to the original version. Interrater reliability data were collected for all the interviews conducted. The written responses of one observer were reviewed and recoded by a second rater. Discrepancies in coding were discussed with a third coder until consensus on the correct score was reached (De Temple & Snow, 1998).

**Other Measures** Information on child gender, age, and household wealth was collected using a standard questionnaire. Birth records were used,

where available, to confirm the child's date of birth. In the cases where records were not available, the procedure outlined by Kitsao-Wekulo and colleagues (2013a) was followed where parents were asked to recall major events that occurred around the time of the child's birth. For the purpose of this study, an age variable in 6-month increments was created. Children's heights were measured to the nearest centimeter using a stadiometer, and height-for-age indices to determine nutritional risk were calculated using Epi Info (Centers for Disease Control and Prevention, Atlanta, GA). Growth retardation was defined as height that was more than two standard deviations below the levels predicted for age according to the World Health Organization standards (WHO Multicentre Growth Reference Study Group, 2006).

During the visit, additional information was obtained on aspects of household SES which was calculated as a composite index of six indicators: parental education (mothers and fathers separately—"0" = no education, "1" = <8 years of education, "2" = 8 years of education, "3" = 9–12 years of education, "4" = >12 years of education); parental occupation (mothers and fathers separately—"0" = not known/deceased, "1" = unemployed/housewife, "2" = subsistence farmer, "3" = unskilled/petty trader, "4" = semi-skilled, to "5" = skilled), ownership of small livestock ("0" = none, "1" = <5, "2" = 5+); and, type of windows (a proxy for housing quality among homesteads characterized mainly by grass-thatched mud-walled dwellings) in the child's dwelling ("0" = none, "1" = open, "2" = small, "3" = wooden, "4" = wire, "5" = glass). (Household windows, a proxy for housing quality, demonstrated variability among households characterized mainly by grass-thatched mud-walled dwellings). These items were selected from a review of SES indicators made in the study population. Previous research had revealed a significant positive association of these indices with children's final school examination score (Holding, personal communication, 2003). We derived an index of household wealth that divided the sample into three approximately equal groups—least wealthy (level 1), moderately wealthy (level 2), and the wealthiest (level 3).

## Study 2: Tool Validation

The measures included in developing a model of influences of child characteristics and environmental factors on children's language and motor skills are listed in Table 3.1.

**Child Outcomes** A battery of neuropsychological tests was used to assess children's language skills and motor abilities (Kitsao-Wekulo et al., 2013a).

*Language Skills* The Kilifi Naming Test (KNT), a test of confrontation naming, was used to assess expressive vocabulary (Kitsao-Wekulo et al., under review). In the KNT, the child is asked to spontaneously give one-word responses when presented with a black and white line drawing of a familiar object. Correct responses were coded as "1." A stimulus cue was provided when no response was given, the child stated that they did not know the name of the item, or the item was perceived incorrectly. If the child did not provide a correct response after the stimulus cue, the word that was provided was recorded verbatim. The test was discontinued after six incorrectly named consecutive items. The final score was calculated by summing the number of spontaneously correct items and the number of correct items following a stimulus cue.

*Motor Abilities* Children's motor abilities were assessed using five tests of gross motor abilities covering two areas of motor performance—static and dynamic balance—and three timed tests of fine motor coordination and manual dexterity (Kitsao-Wekulo et al., 2013b). Maximum likelihood factor analysis with oblique rotation was then applied to the  $z$ -scores to reduce the multiple motor scores to ability composites (Ackerman & Cianciolo, 2000). Factor analysis yielded support for a two-factor solution; four tests were loaded on the motor coordination factor, while the remaining four tests were loaded on the static and dynamic balance factor. Factor scores were defined as the mean of the  $z$ -scores for the tests loaded on each factor. Overall motor index was defined as the mean of the two factor scores.



**Table 3.1** Explanation of variables in the structural equation model

| Indicator              | Represents: (concept)                                   | <i>N</i> | Measurement of variable               | Type of variable | Derived from                            |
|------------------------|---|----------|---------------------------------------|------------------|---|
| 1. Household wealth    | Socioeconomic status                                    | 308      | Interview schedule                    | Continuous       | Summation of six SES indicators         |
| 2. Age                 | Maturation  | 308      | Interview schedule                    | Continuous       | Birth records or parental report        |
| 3. Gender              | Biological differences and/or cultural socialization    | 308      | Interview schedule                    | Categorical      | Observation                             |
| 4. Kilifi-HIPSC scores | Opportunities for stimulation                           | 146      | Modified HOME Inventory               | Continuous       | Summation of scores from five subscales |
| 5. Language scores     | Expressive vocabulary or confrontation naming abilities | 308      | Kilifi Naming Test                    | Continuous       | Summated score for 61 items             |
| 6. Motor scores        | Balance and coordination skills                         | 292      | Five gross and three fine motor tests | Continuous       | Average of two factor scores            |

## Test Administration

All the tests were administered at a school near the child's home. Each child was tested individually in a quiet area within sight of other children and in familiar surroundings to minimize test anxiety. Observations by the assessors suggested that none of the children was unduly anxious during the test sessions.

## Analysis

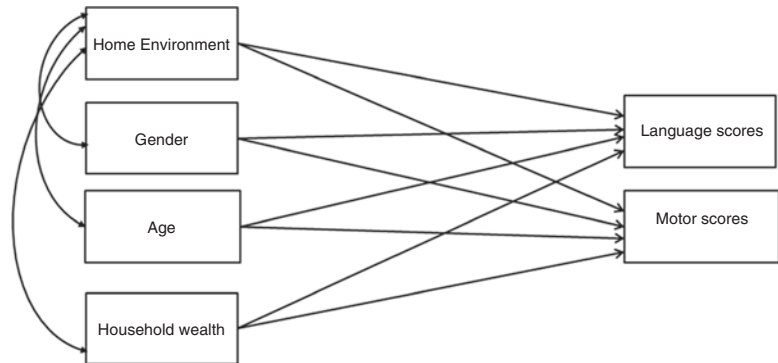
**Study 1** We described the characteristics of the study sample using frequencies and proportions. To establish consistency among raters, we used the kappa statistic. In order to ensure that items had acceptable variability, an item analysis was conducted. Items were clustered into six groups of connected items to derive conceptually meaningful subscales. The relationship of each item to the subscale as a whole was evaluated by examining point-biserial correlations. We used a minimum threshold value of 0.15, and the items whose item-to-subscale correlations fell below this level were dropped from the subscale, except in the case where there were strong conceptual grounds for retention or they contributed to internal consistency (Han, Leventhal, &

Linver, 2004). Internal consistency reliability levels of each of the six subscales were also examined.

The association between the scores on the final subscales and age and gender was tested using an independent samples t-test and analysis of variance. In order to assess convergent validity, we measured correlations between the Kilifi-HIPSC subscales, total score, child nutritional status, and socioeconomic indicators. Correlation and multiple regression analyses were conducted to examine the relationship between Kilifi-HIPSC scores and various potential predictors. We carried out all analyses using SPSS Version 16 and set an alpha level of 0.05 for statistical significance.

**Study 2** Structural equation modeling (SEM) was conducted by developing and testing a path analysis model based on logic and theory about how gender, age, and environmental factors (home environment and SES) would be expected to influence children's language and motor skills. The initial model depicting anticipated paths between predictors and these skills is presented in Fig. 3.1. Only the children who had all measures were included in this analysis ( $N = 146$ ). Specific procedures for model development were to remove nonsignificant ( $p \geq 0.05$ ) paths and

**Fig. 3.1** Hypothesized model of the association between the home environment and child outcomes



use modification indices as suggested by the AMOS SEM program (Arbuckle, 1988) to add paths or correlations that would improve model fit. Chi-square analysis was conducted in initial examination of the goodness of fit to ensure nonsignificance. However, because this method is sensitive to sample size, other indices of goodness of fit included the Tucker-Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) (Bentler & Chou, 1987; Browne & Cudeck, 1993). Acceptable fit was defined as TLI and CFI >0.90 and RMSEA < 0.08 and an excellent fit as TLI and CFI >0.95 and RMSEA < 0.05.

## Results

### Study 1

**Sample Description** Children were on average 9.0 years old (range, 6.5–13 years) and 52.1% were boys. The majority of children were rural residents; 16% lived in a peri-urban area, on the outskirts of the main town. Only 21 (14.4%) children were not attending school (Table 3.2). Children to whom the Kilifi-HIPSC was administered were not significantly different from the remainder in the main study in terms of gender distribution, age, area of residence, nutritional status, and household wealth. However, the Kilifi-HIPSC subsample had significantly less number of years of exposure to school,  $t(306) = 2.574, p = 0.011$ .

**Item Analysis** The observed agreement for the raters across all the 60 items ranged from 0.69 to 0.99, and the average percentage agreement was 93.4%. Kappas ranged from 0.38 to 0.99, and the overall inter-rater reliability was found to be  $\kappa = 0.87, 95\% \text{ CI } (0.838, 0.893)$  (Table 3.3). The mean total score on all the 60 items of the Kilifi-HIPSC was 64.46 (SD = 11.61; range, 37–97) out of a possible maximum score of 120.

A descriptive analysis of the responses revealed that items 8, 10, 14, 17, and 39 were endorsed at levels of >95% at any one of the three ratings. These five items were excluded from further analysis based upon extremely infrequent or frequent endorsement (Clark & Watson, 1995). The final 45 items were grouped into clusters according to the manner in which they cohered conceptually. The groupings in the original MC-HOME Inventory guided this process which yielded six subscales representing language stimulation, parental concern, emotional support, provision for/involvement in activities, cognitive stimulation, and physical environment (Fig. 3.2). All items had acceptable item-to-subscale correlations except for item 27, “Child has free access to musical instrument,” in the provision for/involvement in activities subscale. This item was retained because it differentiated households from each other. Cronbach’s alphas of the subscales ranged from 0.593 to 0.707. Subscales for emotional support and physical environment had the greatest internal consistency levels (Table 3.4). Significant correlations among the subscales ranged between 0.171 and 0.544.

**Table 3.2** Characteristics of the Kilifi-HIPSC subsample

| Variable                  | HOME subsample |      | Non-HOME sample |      |
|---------------------------|----------------|------|-----------------|------|
|                           | N              | %    | N               | %    |
| Gender                    |                |      |                 |      |
| Boys                      | 76             | 52.1 | 72              | 44.4 |
| Girls                     | 70             | 47.9 | 90              | 55.6 |
| Area of residence         |                |      |                 |      |
| Rural                     | 123            | 84.2 | 122             | 75.3 |
| Peri-urban                | 23             | 15.8 | 40              | 24.7 |
| Nutritional status        |                |      |                 |      |
| Stunted                   | 38             | 26.0 | 36              | 22.2 |
| Not stunted               | 108            | 74.0 | 126             | 77.8 |
| Variable                  | M              | SD   | M               | SD   |
| Age (years)               | 8.99           | 1.12 | 9.16            | 1.11 |
| Range                     | 6.5–13.0       |      | 5.00–13.50      |      |
| School experience (years) | 2.47           | 1.72 | 2.96            | 1.63 |
| Range                     | 0–7            |      | 0–6             |      |
| Household wealth          | 8.98           | 4.09 | 8.48            | 3.79 |
| Range                     | 1–21           |      | 1–19            |      |

**Associations with Background Variables** Correlations between age, gender, and the Kilifi-HIPSC subscale and total scores were all nonsignificant. The language stimulation, provision for/involvement in activities, and cognitive stimulation subscales as well as the total scale score were moderately correlated with height-for-age z-scores, such that lower scores were associated with poorer nutritional status. Household wealth positively correlated with all the Kilifi-HIPSC subscales (correlations ranged from 0.280 to 0.567), with the exception of the emotional support subscale (Table 3.5).

**Significant Predictors** The multiple regression model with the two predictors, nutritional status and household wealth, produced  $R^2 = 0.220$ ,  $F(4, 142) = 21.301$ ,  $p < 0.001$  for the language stimulation subscale;  $R^2 = 0.066$ ,  $F(4, 142) = 6.089$ ,  $p = 0.003$  for the parental concern subscale;  $R^2 = 0.133$ ,  $F(4, 142) = 12.007$ ,  $p < 0.001$  for the activities subscale;  $R^2 = 0.333$ ,  $F(4, 142) = 37.025$ ,  $p < 0.001$  for the cognitive stimulation subscale; and  $R^2 = 0.095$ ,  $F(4, 142) = 8.549$ ,  $p < 0.001$  for the physical environment subscale. Nutritional

status and household wealth also predicted nearly 26% of the variance on the combined Kilifi-HIPSC score,  $R^2 = 0.255$ ,  $F(4, 142) = 25.655$ ,  $p < 0.001$ . Table 3.6 summarizes the results of the regression analysis.

## Study 2

### Descriptive Data and Variable

**Intercorrelations** Descriptive data for each of the variables and variable intercorrelations are presented in Tables 3.7 and 3.8, respectively. Gender differences favored boys ( $t(144) = 1.248$ ,  $p = 0.214$ ) on the language test and girls on both the motor,  $t(144) = -0.014$ ,  $p = 0.989$ , and Kilifi-HIPSC,  $t(131) = -0.545$ ,  $p = 0.587$ , scores. These differences were however not significant. Age had a significant effect on the language,  $F(2, 145) = 6.61$ ,  $p = 0.002$ ,  $\eta^2 = 0.085$ , and motor test scores,  $F(2, 145) = 8.48$ ,  $p < 0.001$ ,  $\eta^2 = 0.106$ , but not on Kilifi-HIPSC scores,  $F(2, 145) = 2.574$ ,  $p = 0.08$ ,  $\eta^2 = 0.04$ . Household wealth differences in language skills,  $F(2, 145) = 0.884$ ,  $p = 0.416$ ,  $\eta^2 = 0.01$ , and motor abilities,  $F(2, 145) = 2.05$ ,  $p = 0.133$ ,  $\eta^2 = 0.03$ , were significant only for the Kilifi-HIPSC scores,  $F(2, 145) = 21.74$ ,  $p < 0.001$ ,  $\eta^2 = 0.23$ .

Age showed weak to moderate correlations with household wealth and the two child outcomes. The two environmental variables were moderately correlated with each other, as were the two child outcomes.

**Model Development** The initial model did not result in a good fit. Several revisions to the model were then made by deleting nonsignificant paths. Modification indices did not suggest the need for additional paths or correlations. The final model, shown in Fig. 3.3, provided a good fit to the data,  $\chi^2(9, N = 146) = 10.05$ ,  $p = 0.35$ , TLI > 0.95, CFI > 0.95, RMSEA < 0.05. This model included direct paths from the Kilifi-HIPSC scores to both language and motor scores indicating associations of more enriched home environments with higher scores on both language abilities and motor skills. While higher family resources as assessed by the index for

**Table 3.3** Kappa coefficients for Kilifi-HIPSC items

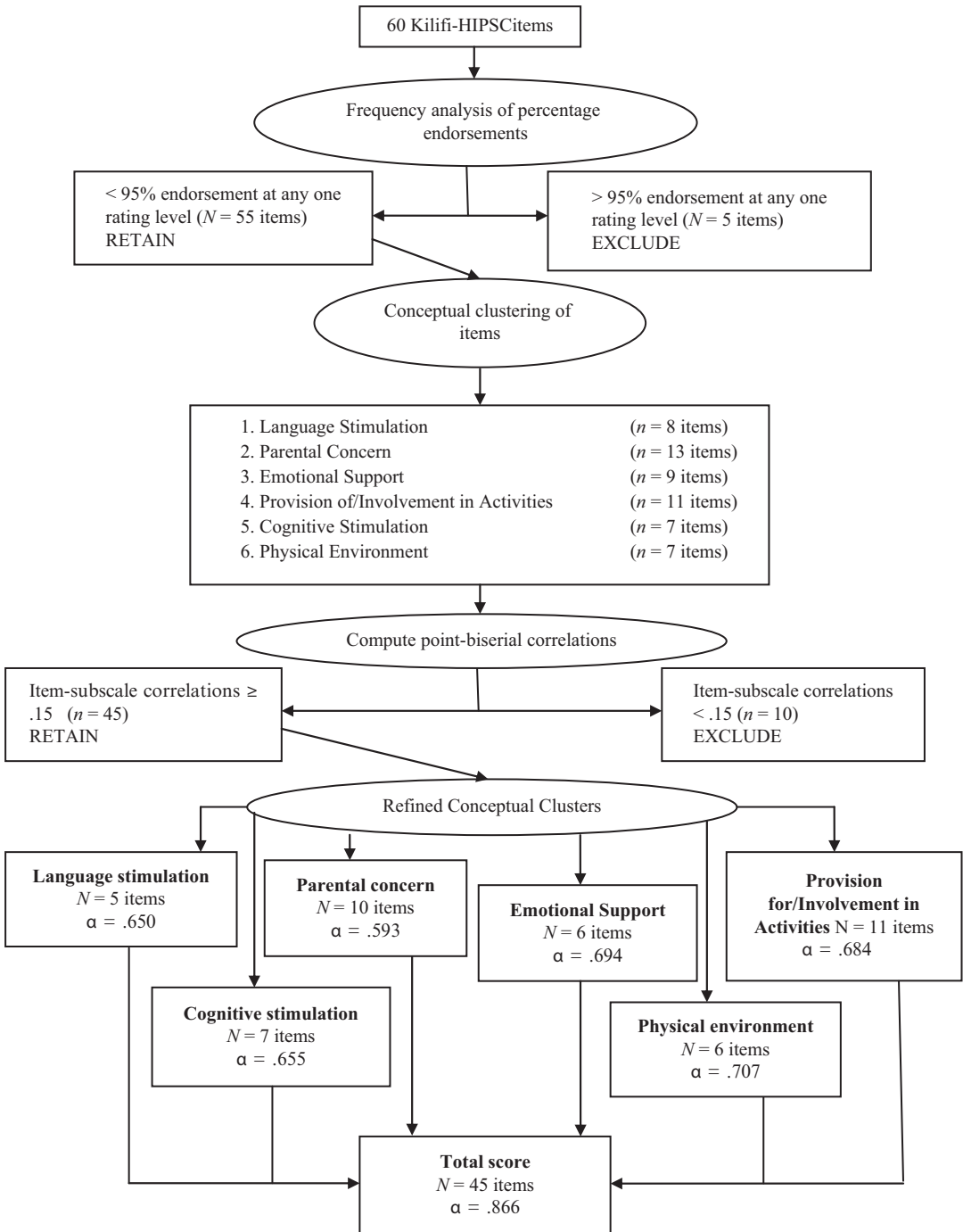
| Items | Percent of overall agreement | Free-marginal kappa | Items | Percent of overall agreement | Free-marginal kappa |
|-------|------------------------------|---------------------|-------|------------------------------|---------------------|
| HP01  | 0.986                        | 0.979               | HP31  | 0.959                        | 0.918               |
| HP02  | 0.884                        | 0.767               | HP32  | 0.993                        | 0.986               |
| HP03  | 0.979                        | 0.959               | HP33  | 0.979                        | 0.959               |
| HP04  | 0.904                        | 0.808               | HP34  | 0.952                        | 0.904               |
| HP05  | 0.966                        | 0.932               | HP35  | 0.904                        | 0.808               |
| HP06  | 0.932                        | 0.863               | HP36  | 0.952                        | 0.904               |
| HP07  | 0.966                        | 0.932               | HP37  | 0.952                        | 0.904               |
| HP08  | 0.979                        | 0.959               | HP38  | 0.938                        | 0.877               |
| HP09  | 0.952                        | 0.904               | HP39  | 0.973                        | 0.945               |
| HP10  | 0.979                        | 0.959               | HP40  | 0.973                        | 0.945               |
| HP11  | 0.863                        | 0.726               | HP41  | 0.986                        | 0.973               |
| HP12  | 0.849                        | 0.699               | HP42  | 0.973                        | 0.945               |
| HP13  | 0.904                        | 0.808               | HP43  | 0.966                        | 0.932               |
| HP14  | 0.959                        | 0.918               | HP44  | 0.918                        | 0.836               |
| HP15  | 0.973                        | 0.945               | HP45  | 0.959                        | 0.918               |
| HP16  | 0.979                        | 0.959               | HP46  | 0.918                        | 0.836               |
| HP17  | 0.973                        | 0.945               | HP47  | 0.897                        | 0.794               |
| HP18  | 0.890                        | 0.781               | HP48  | 0.945                        | 0.890               |
| HP19  | 0.925                        | 0.849               | HP49  | 0.829                        | 0.658               |
| HP20  | 0.692                        | 0.383               | HP50  | 0.945                        | 0.890               |
| HP21  | 0.959                        | 0.918               | HP51  | 0.767                        | 0.534               |
| HP22  | 0.945                        | 0.890               | HP52  | 0.959                        | 0.918               |
| HP23  | 0.966                        | 0.932               | HP53  | 0.883                        | 0.767               |
| HP24  | 0.890                        | 0.781               | HP54  | 0.973                        | 0.945               |
| HP25  | 0.932                        | 0.863               | HP55  | 0.986                        | 0.973               |
| HP26  | 0.925                        | 0.849               | HP56  | 0.973                        | 0.945               |
| HP27  | 0.843                        | 0.685               | HP57  | 0.938                        | 0.877               |
| HP28  | 0.884                        | 0.767               | HP58  | 0.973                        | 0.945               |
| HP29  | 0.932                        | 0.863               | HP59  | 0.973                        | 0.945               |
| HP30  | 0.925                        | 0.849               | HP60  | 0.959                        | 0.918               |

household wealth were correlated with more enriched home environments, direct paths from the wealth index to the language and motor measures were not significant. Higher age at assessment was related to both higher language and motor scores. Gender was not significantly related to either score. Finally, correlation of the structural errors for the two test scores documents the correlation between these two measures. The full model predicts 15% and 17% of the variance in language and motor scores, respectively. The model parameters and covariances depicted in the final model were all significant.

## Discussion

### Study 1

This study highlights the unique contribution of specific components of the home environment that could be targeted to improve children's outcomes in a more effective manner. The Kilifi-HIPSC is a 45-item scale (for the use in middle childhood) that consists of items modified from the original MC-HOME Inventory with regard to content, format, and the examples used. The tool which assesses the quality and quantity



**Fig. 3.2** Flow diagram of the formation of conceptual clusters for the Kilifi-HIPSC items

of stimulation within the home environment was designed to fit the cultural context of the current study setting. The increasing importance of outside environments during this developmental

period (Bronfenbrenner & Ceci, 1994) necessitated the inclusion of an additional item concerned with the immediate surroundings of the household. Trained interviewers who underwent an

**Table 3.4** Characteristics of Kilifi-HIPSC subscales

| Subscales                               | # items | ICC   | <i>M</i> (SD) | Range item-subscale <i>r</i> s |
|---|---------|-------|---------------|--------------------------------|
| Language stimulation                    | 5       | 0.650 | 3.73 (2.676)  | 0.241–0.581                    |
| Parental concern                        | 10      | 0.593 | 7.34 (2.878)  | 0.168–0.419                    |
| Emotional support                       | 6       | 0.694 | 10.12 (1.906) | 0.310–0.740                    |
| Provision for/involvement in activities | 11      | 0.684 | 6.40 (3.916)  | 0.144–0.491                    |
| Cognitive stimulation                   | 7       | 0.655 | 5.29 (2.704)  | 0.198–0.524                    |
| Physical environment                    | 6       | 0.707 | 8.34 (2.405)  | 0.183–0.733                    |

**Table 3.5** Correlations between Kilifi-HIPSC subscale and total scores and background variables

| Subscale                                 | Gender | Age (years) | Height-for-age z-scores | Household wealth |
|--|--------|-------------|-------------------------|------------------|
| Language stimulation                     | ns     | ns          | 0.288**                 | 0.442**          |
| Parental concern                         | ns     | ns          | ns                      | 0.280**          |
| Emotional support                        | ns     | ns          | ns                      | ns               |
| Provisions for/involvement in activities | ns     | ns          | 0.237**                 | 0.344**          |
| Cognitive stimulation                    | ns     | ns          | 0.280**                 | 0.567**          |
| Physical environment                     | ns     | ns          | ns                      | 0.317**          |
| HOME combined score for 45 items         | ns     | ns          | 0.242**                 | 0.499**          |

\* $p < 0.05$ , \*\* $p < 0.01$ , *ns* non-significant

intensive training program generated responses on the items through caregiver reports and observer ratings. We developed a more detailed format than the original semi-structured interview to facilitate data collection. We changed the coding system from a two- to a three-point scale to increase variability in responses. The Kilifi-HIPSC subsample was representative of rural school-age children. Our sample included a sizable proportion of out-of-school children despite the fact that they were more often resident further away from schools and hence less accessible. For school-going children who were in school for most of the day, the requirement of having both the child and the primary caregiver present during the interview may have posed a challenge. However, we scheduled numerous visits to selected homes and visited homes when families were engaged in nondemanding tasks.

The current study contributes to the existing literature in several important ways. First, the Kilifi-HIPSC was reduced in length, and yet its

psychometric properties remained acceptable. Inter-rater reliability for all items ranged from moderate to nearly perfect agreement illustrating the utility of the three-point coding system. Conceptual coherence of items was the primary basis for organizing indicators into meaningful groups. In a previous application of the HOME Inventory within a similar context (Holding et al., 2011), no common underlying structure was found for the components derived from a factor analysis. In line with this earlier study, we therefore did not expect the original factor clusters to be replicated within this population largely due to differences in cultural contexts and the range of behaviors sampled.

Internal consistency reliability levels of the conceptually derived Kilifi-HIPSC subscales ranged from 0.6 to 0.7, consistent with those of the original MC-HOME Inventory (Bradley, Caldwell, Rock, Hamrick, & Harris, 1988). It was not surprising that moderate alpha levels were recorded for some of the subscales; as

**Table 3.6** Regression of nutritional status and household wealth against Kilifi-HIPSC subscale and total scores

| Subscales                | Nutritional status |         |          | Household wealth |         |          |
|--------------------------|--------------------|---------|----------|------------------|---------|----------|
|                          | <i>b</i>           | $\beta$ | <i>t</i> | <i>b</i>         | $\beta$ | <i>t</i> |
| Language stimulation     | 0.495              | 0.203   | 2.699**  | 0.258            | 0.394   | 5.224*** |
| Parental concern         | -0.030             | -0.011  | -0.138   | 0.201            | 0.283   | 3.435**  |
| Emotional support        | -0.153             | -0.088  | -1.029   | 0.030            | 0.064   | 0.749    |
| Activities               | 0.612              | 0.171   | 2.157*   | 0.293            | 0.305   | 3.834*** |
| Cognitive stimulation    | 0.410              | 0.167   | 2.398**  | 0.348            | 0.526   | 7.555*** |
| Physical environment     | 0.147              | 0.067   | 0.824    | 0.182            | 0.307   | 3.780*** |
| Kilifi-HIPSC total score | 1.481              | 0.142   | 1.924    | 1.312            | 0.466   | 6.325*** |

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 3.7** Descriptive data for Kilifi-HIPSC scores and child outcomes

|                  | <i>N</i> | Kilifi-HIPSC scores |       | Language scores |      | Motor scores |      |
|------------------|----------|---------------------|-------|-----------------|------|--------------|------|
|                  |          | <i>M</i>            | SD    | <i>M</i>        | SD   | <i>M</i>     | SD   |
| Gender           |          |                     |       |                 |      |              |      |
| Boys             | 76       | 40.72               | 10.1  | -0.001          | 1.03 | -0.09        | 0.65 |
| Girls            | 70       | 41.77               | 12.84 | -0.212          | 1.01 | -0.09        | 0.65 |
| Age (years)      |          |                     |       |                 |      |              |      |
| ≤8.0             | 41       | 44.58               | 11.67 | -0.46           | 0.87 | -0.30        | 0.53 |
| 8.5–9.0          | 52       | 39.58               | 10.79 | -0.19           | 0.96 | -0.20        | 0.64 |
| ≥9.5             | 53       | 40.34               | 11.62 | 0.26            | 1.09 | 0.18         | 0.66 |
| Household wealth |          |                     |       |                 |      |              |      |
| Level 1          | 58       | 35.69               | 10.51 | -0.17           | 0.99 | -0.10        | 0.68 |
| Level 2          | 45       | 40.84               | 9.19  | -0.19           | 0.98 | -0.22        | 0.68 |
| Level 3          | 43       | 49.09               | 10.47 | 0.07            | 1.11 | 0.06         | 0.56 |

Bradley (2004) postulates, this is not a problem given that there may be no inherent connection between the indicators that we grouped together. What was more important was the inclusion of all (rather than a sample of) causal indicators used to derive our latent constructs to be sure that they were sufficiently representative (Bollen & Lennox, 1991).

After a process of identifying features of the home environment which support child development, we established face validity of the modified measure through parental assessments of the cultural appropriateness and clarity of the items. This step was necessary in a context of low literacy levels, to preclude the limitation of participants responding incorrectly because the items cause confusion or are incomprehensible. We

speculated that parents presumably manifest the beliefs, goals, and patterns of behavior that pervade life in the larger society and therefore had a general idea of the actions, events, behaviors, and conditions that promote their children's well-being (Bradley, 2004). The low to moderate correlations with the index of household wealth and with nutritional status provided evidence for convergent validity of the Kilifi-HIPSC. These positive associations are in line with results from the broader research literature and from other studies in similar contexts (Elardo, Bradley, & Caldwell, 1975; Holding et al., 2011; Kaur & Kalaramna, 2004; Masud, Luster, & Youatt, 1994; Sarsour et al., 2011). Comparisons between the current study and earlier ones should however be made cautiously because many of

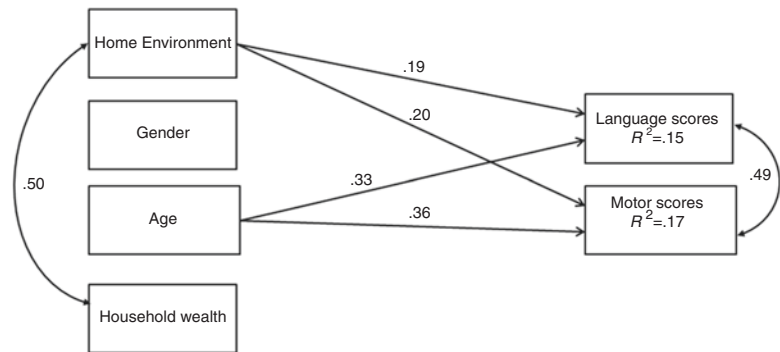


**Table 3.8** Variable intercorrelations

|                        | 1      | 2       | 3       | 4       | 5     |
|------------------------|--------|---------|---------|---------|-------|
| 1. Gender              | 1      |         |         |         |       |
| 2. Age                 | 0.037  | 1       |         |         |       |
| 3. Household wealth    | 0.022  | -0.177* | 1       |         |       |
| 4. Language scores     | -0.103 | 0.311** | 0.084   | 1       |       |
| 5. Kilifi-HIPSC scores | 0.046  | -0.119  | 0.499** | 0.151   | 1     |
| 6. Motor scores        | 0.001  | 0.334** | 0.123   | 0.561** | 0.160 |

\* $p < 0.05$ , \*\* $p < 0.01$

**Fig. 3.3** Final estimated model



these earlier studies were conducted among younger populations.

Second, given the evidence of modest but significant correlations among the Kilifi-HIPSC subscales, we suggest that the modified measure is measuring distinct yet related aspects of the home environment, highlighting their importance. Because they are focused in content, subscales may allow very specific hypotheses about the home environment to be tested (Linver, Brooks-Gunn, & Cabrera, 2004). These newly developed subscales therefore offer an advantage over using the full MC-HOME or factor analysis-derived subscales, as they determine discriminatory features of the home environment. Such information made it possible to distinguish between families providing adequate levels of support and those that offer little or no support.

Third, nonsignificant differences in the patterns of response for boys and girls illustrate the applicability of the measure across both genders. This finding was as expected and suggests that we do not need to make different interpretations

in the scores for boys and girls. An earlier study (Hannan & Luster, 1991) similarly reported little effect of the child’s gender on the quality of the home environment. Contrasting findings have however been reported by Baharudin and Luster (1998) who found that female children received more supportive care than their male counterparts. As the authors themselves highlight, these differences may have arisen because they used a short form of the HOME Inventory. Noteworthy differences between the current and earlier study are the paths followed in the derivation of the short forms of the home measure; the items comprising each version were therefore necessarily different.

Fourth, we demonstrated that scores did not vary significantly across the different age groups studied. Age effects have been previously illustrated by Bradley and colleagues (2001) who compared the frequency with which children were exposed to particular activities in their life experiences from infancy through adolescence. Age differences would have more likely been

evident if the age spread covered in the current study was larger—our study only included children aged approximately between eight and ten years. The lack of an association between the home environment scores and age may therefore be attributed to the restricted age range of the children in the current study. Our findings suggest that the measure is equally applicable across the age range for which it is intended.

Nutritional status and household wealth predicted higher scores on all the subscales (except for emotional support) and total Kilifi-HIPSC scores. Associations of subscale and total scores with household wealth were however stronger and more consistent than those with nutritional status. These findings are consistent with the bioecological theory which stipulates that distal contexts, represented by household wealth, have a substantial effect on the proximal processes within the child's home environment (Bronfenbrenner & Ceci, 1994). Gutman et al. (2003) point to a cognitively stimulating environment as being a protective factor against risk factors such as socioeconomic disadvantage and poor nutritional status. In view of this suggestion, it will be worthwhile to facilitate the identification of particular aspects which are amenable to change, so as to improve the home environments of children living under adverse conditions.

## Study 2

The results from the structural equation model confirm that the home environment is an important influence of child outcomes within the current study setting. The association between the home environment and household wealth illustrates, as have other studies in similar and non-similar contexts (Baharudin & Luster, 1998; Totsika & Sylva, 2004), that the greater the socioeconomic disadvantage in a family, the less stimulating the home environments are for children. As has been stipulated earlier, household wealth exerts its effects on child outcomes through other more proximal variables such as the processes within the home environment. Moreover, the lack of significant associations between household wealth and child outcomes is not without precedence within this

setting (Abubakar et al., 2008). These results suggest that within the current study context, a stimulating home environment has a more pronounced effect on child functioning than the family's socioeconomic status.

As Bradley and Corwyn (2005) have highlighted, an examination of the association between the Kilifi-HIPSC and child outcomes enables us to establish the cultural implications of the changes we made to our tool. Our study findings demonstrate that the Kilifi-HIPSC is a viable and rich alternative to the original MC-HOME Inventory. The brevity of the scale facilitates a quick screening of the promotive aspects of a child's home environment. Furthermore, the derivation of subscales reveals a more precise picture of the proximal processes within the child's home environment. We omitted several items either due to restricted variability or because they did not make a substantial contribution to internal consistency. Nondiscriminative items may however have clinical significance for this population, as it may be the rarity of an event that makes it meaningful. Weak, poorly performing items may provide clues on those aspects of the home environment that need more complete documentation.

Our study demonstrated that the paths linking the home environment and language and motor outcomes in school-age children were of similar magnitude. In addition, although poverty threatens children's development, we were able to demonstrate that it is what happens within the home environment, rather than the resources available to families, that has a more significant effect on child outcomes. The structural equation model presented however accounted for a small proportion of the variance in children's outcomes. These findings may be explained by the limited number of background variables included in the current study. Examination of the influence of maternal characteristics such as age of the mother at first birth and maternal intelligence, contextual factors such as the number of children and the presence of a spouse or a partner, and child characteristics such as birth weight and temperament on the home environment will expand the findings of the current study. We recommend the inclusion of these factors in future studies within similar settings.

## Appendix 1

### Modifications made on the Kilifi-HIPSC

| Original version  | Adapted version   | Percentage endorsement |      |      |
|---|---|------------------------|------|------|
|   |   | 0                      | 1    | 2    |
| <i>Changes in item format</i>   |   |                        |      |      |
| (26) Parent buys and reads a newspaper daily  | (29) A member of the family reads a newspaper   | 59.6                   | 24.7 | 15.8 |
| (34) Family has a TV and it is used judiciously, not left on continuously   | (34) Do you own a TV? Child is allowed free access and it is used judiciously, not left on continuously                 | 26.7                   | 58.2 | 15.1 |
| (36) Child is regularly included in family's recreational hobby   | (36) What do family members do when they have no chores? Is the child involved in that activity?                        | 75.3                   | 15.8 | 8.9  |
| (37) Family provides lessons or organizational membership to support child's talents (Y membership, gymnastic lessons, art center, etc.)              | (37) Family gives training through membership of registered organizations and/or at home to support the child's talents | 88.4                   | 6.2  | 5.5  |
| (38) Child has ready access to at least two pieces of playground equipment in the immediate vicinity  | (38) There are already things in the compound for the child to play with  | 44.5                   | 37.7 | 17.8 |
| (39) Child has access to library card, and family arranges for child to go to library once a month  | (39) Child regularly attends an activity out of the home  | 96.6                   | 1.4  | 2.1  |
| (42) Family visits or receives visits from relatives or friends at least twice a month  | (42) Family visits or receives visits from relatives or friends   | 39.0                   | 24.0 | 37.0 |
| (48) Father (or father substitute) regularly engages in outdoor recreation with the child   | (48) Father (or father substitute) engages child in games to pass time, for example, football                           | 91.1                   | 7.5  | 1.4  |
| (56) There is at least 100 square feet of living space per person in the house  | (56) Number of rooms in the house and number of people in each room   | 0                      | 39.7 | 60.3 |
| <i>Changes in item content</i>  |   |                        |      |      |
| (4) Child is encouraged to read on his own  | (4) Child is encouraged to read. With whom does the child read?   | 45.9                   | 15.8 | 38.4 |
| (27) Family has a dictionary and encourages child to use it   | (31) Family has a Kiswahili dictionary and encourages child to use it   | 89.7                   | 10.3 | 0    |
| (31) Child has free access to at least ten appropriate books  | (28) Child has free access to children's books  | 71.2                   | 8.2  | 20.5 |
| (32) Child has free access to desk or other suitable place for reading or studying  | (30) Child has an appropriate place to read and write   | 34.2                   | 19.2 | 46.6 |
| (43) Child has accompanied parent on a family business venture 3–4 times within the past year (to garage, clothing shop, appliance repair shop, etc.) | (43) Child has accompanied parent on a family business trip within the past year (to buy clothes, etc.)                 | 74.7                   | 15.1 | 10.3 |
| (46) Parents discuss TV programs with child   | (46) Parents discuss news about happenings in the neighborhood, country, or world with child                            | 45.9                   | 11.0 | 43.2 |
| (52) Child's room has a picture or wall decoration appealing to children  | (52) Efforts have been made to have or make equipment which is pleasing and stimulating to the child                    | 91.8                   | 7.5  | 0.7  |
| <i>Changes in examples used in the item</i>   |   |                        |      |      |
| (2) Parent sometimes yields to child's fears or rituals (allows night light, accompanies child to new experiences, etc.)                              | (2) Parent sometimes yields to child's fears or rituals (escorting child out at night, leaving light on at night)       | 11.0                   | 6.2  | 82.9 |

| Original version  | Adapted version   | Percentage endorsement |      |       |
|---|---|------------------------|------|-------|
|   |   | 0                      | 1    | 2     |
| (13) Child puts his outdoor clothing, dirty clothes, and night clothes in special place   | (13) Child knows how to keep school uniform or play clothes and “Sunday best” in a special place  | 15.8                   | 18.5 | 65.8  |
| (30) Child has free access to musical instrument (piano, drum, ukulele, guitar, etc.)   | (27) Child has free access to musical instrument ( <i>kayamba</i> , drum, guitar, etc.)   | 78.1                   | 3.4  | 18.5  |
| (44) Family member has taken child to (or arranged for child to attend) some type of live musical or theater performance  | (44) Family member has taken child to (or arranged for child to attend) some national celebrations, wedding, choir presentation, or theater performance | 73.3                   | 17.8 | 8.9   |
| (47) Parent helps child to achieve motor skills—ride a two-wheel bicycle, roller skate, ice skate, play ball, etc.  | (47) Parent helps child to achieve motor skills—pounding maize, carrying a load on the head, riding a bicycle, or swimming                              | 1.4                    | 13.0 | 85.6  |
| (58) Building has no potentially dangerous structural or health defects (e.g., plaster coming down from the ceiling, stairway with boards missing, rodents, etc.) | (58) Building has no potentially dangerous structural or health defects (e.g., broken wall plastering, falling walls, leaking roof, etc.)               | 4.1                    | 11.6 | 84.2  |
| (14) Parents set limits for child and generally enforce them (curfew, homework, before TV, or other regulations that fit family pattern)                          | (14) Parents set limits for child and generally enforce them (school work, other regulations depending on family routines, e.g., playing near the road) | 1.4                    | 2.7  | 95.9  |
| (1) Family has fairly regular and predictable daily schedule for the child (meals, day care, bedtime, TV, homework, etc.)   | (1) Family has fairly regular and predictable daily schedule for the child (meal times, bedtime, domestic work, etc.)                                   | 0.7                    | 7.5  | 91.8  |
| (53) The interior of the apartment is not dark or perceptually monotonous   | (53) The interior of the house is not dark or perceptually monotonous   | 21.2                   | 69.9 | 8.9   |
| <i>Deletion of item content</i>   |   |                        |      |       |
| (29) Child has free access to record player or radio  | (26) Do you own a radio? Does your child listen to the radio? How often?  | 1.4                    | 17.1 | 81.5  |
| (41) Family member has taken the child on (or arranged for child to take) a plane, train, or bus trip within the past year  | (41) Family member has taken the child on (or arranged for child to take) a bus trip within the past year   | 28.8                   | 24.7 | 46.6  |
| <i>Additional item</i>  |   |                        |      |       |
|   | (60) Compound provides a variety of perceptual experiences  | 59.6                   | 20.5 | 19.9  |
| <i>Other items</i>  |   |                        |      |       |
| (3) Child has been praised at least twice during the past week for doing something  |   | 31.5                   | 8.9  | 59.6  |
| (5) Parent encourages child to contribute to the conversation during visit  |   | 45.9                   | 12.3 | 41.8  |
| (6) Parent shows some positive emotional responses to praise of child by visitor  |   | 8.9                    | 5.5  | 85.6  |
| (7) Parent responds to child’s questions during visit   |   | 85.6                   | 4.8  | 9.6   |
| (8) Parent uses complete sentence structure and some long words in conversing   |   | 0                      | 0    | 100.0 |
| (9) When speaking of or to child, parent’s voice conveys positive feelings  |   | 2.7                    | 3.4  | 93.8  |
| (10) Parent initiates verbal interchanges with visitor, asks questions, makes spontaneous comments  |   | 0                      | 0    | 100.0 |
| (11) Family requires child to carry out certain self-care routines, e.g., make bed, clean room  |   | 1.4                    | 73.3 | 25.3  |
| (12) Family requires child to keep living and play area reasonably clean and straight   |   | 9.6                    | 56.8 | 33.6  |
| (15) Parent introduces the visitor to the child   |   | 92.5                   | 4.1  | 3.4   |
| (16) Parent is consistent in establishing or applying family rules  |   | 3.4                    | 2.1  | 94.5  |

| Original version  | Adapted version | Percentage endorsement |      |      |
|---|-----------------|------------------------|------|------|
|   |                 | 0                      | 1    | 2    |
| (17) Parent does not violate rules of common courtesy during visit  |                 | 0.7                    | 0    | 99.3 |
| (18) Parent has not lost temper with child more than once during previous week  |                 | 4.1                    | 13.7 | 82.2 |
| (19) Parent reports no more than one instance of physical punishment occurred during the past month   |                 | 5.5                    | 19.9 | 74.7 |
| (20) Child can express negative feeling toward parents without harsh reprisals  |                 | 16.4                   | 4.1  | 79.5 |
| (21) Parent has not cried or been visibly upset in child's presence more than once during the past week   |                 | 76.7                   | 17.8 | 5.5  |
| (22) Child has a special place in which to keep his/her possessions   |                 | 69.9                   | 8.9  | 21.2 |
| (23) Parent talks to child during visit (beyond correction and introduction)  |                 | 34.2                   | 30.8 | 34.9 |
| (24) Parent uses some term of endearment or some diminutive for the child's name when talking about child at least twice during visit                           |                 | 8.2                    | 72.6 | 19.2 |
| (25) Parent does not express overt annoyance with or hostility toward the child (complains, describes child as "bad," says child won't mind, etc.)              |                 | 3.4                    | 7.5  | 89.0 |
| (32) (28) Child has visited a friend by him/herself in the past week  |                 | 22.6                   | 12.3 | 65.1 |
| (33) House has at least two pictures or other type of art work on the walls   |                 | 79.5                   | 7.5  | 13.0 |
| (35) Family encourages child to develop and sustain hobbies   |                 | 83.6                   | 8.9  | 7.5  |
| (40) Family member has taken the child to (or arranged for child to visit) a scientific, historical, or art museum within the past year                         |                 | 91.1                   | 6.8  | 2.1  |
| (45) Family member has taken the child to (or arranged for child to take) a trip of more than 50 miles from home (50 miles radial distance, not total distance) |                 | 43.2                   | 26.0 | 30.8 |
| (49) Child sees and spends some time with father or father figure 4 days a week   |                 | 19.9                   | 65.8 | 14.4 |
| (50) Child eats at least one meal per day, on most days, with mother and father (or mother and father figures)  |                 | 30.8                   | 15.8 | 53.4 |
| (51) Child has remained with this primary family group for all his life aside from 2- to 3-week vacations, illnesses of mother, visits of grandmother, etc.     |                 | 13.0                   | 10.3 | 76.7 |
| (54) In terms of available space, the rooms are not overcrowded with furniture  |                 | 18.5                   | 8.2  | 73.3 |
| (55) All visible rooms of the house are reasonably clean and minimally cluttered  |                 | 24.7                   | 17.8 | 57.5 |
| (57) House is not overly noisy—shouts of children, radio, etc.  |                 | 5.5                    | 70.5 | 24.0 |
| (59) Child's outside play environment appears safe and free of hazards  |                 | 5.5                    | 23.3 | 71.2 |

\*The figures in parentheses are the item numbers on the original and adapted versions of the HOME Inventory

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# Early Socio-Emotional Development of Cameroonian Nso Farmer Children

# 4

Hiltrud Otto and Heidi Keller

Since the seminal work of John Bowlby (1969) and Mary Ainsworth (Ainsworth, Blehar, Waters, & Wall, 1978) beginning during the 1960s, the importance of the socio-emotional development has come to the foreground of developmental sciences and instigated an enormous amount of research activities (e.g., Handbook of Child Psychology, Volume 3: Social, Emotional, and Personality Development). However, this research has mainly been conducted in what is recently called the WEIRD world (Western Educated, Industrialized, Rich, Democratic origin; Henrich, Heine, & Norenzayan, 2010). This implies that research is conducted predominantly by Western scholars and generated primarily from Western participants. This is even more pervasive for developmental studies as Anne Fernald (2010) argues in her commentary to the Henrich et al. article in Behavioral and Brain Sciences, since only parents who have the time, the resources, and the motivation will bring their children to university laboratories to participate in research.

These parents mainly belong to highly formally educated, affluent middle class and make up even less than the estimated 5% of the Western population. The research results are generalized to the entire world population and often lay ground for applied programs also in the non-Western world (Keller, 2014). On the other hand, there is abundant evidence from cultural anthropologists and psychologists that human populations differ substantially in their ideas about development, health, and well-being and apply very diverse socialization strategies to reach their estimated developmental goals. Therefore the systematic study of “the neglected 95%” (Arnett, 2008) is crucial in order to contribute to the sustainable development of children and their families. Among the multitude of population pockets of these 95% are traditionally living subsistence-based farmers in non-Western countries, a sizable group of about 30–40% of the world’s population (Keller & Kärtner, 2013). Subsistence-based farmers differ from Western middle-class systematic in their sociodemographic profiles; they can be characterized by high degrees of formal education, late parenthood (between 30 and 40 years), few children, and nuclear, two-generation households. The sociodemographic profile of subsistence-based farmers consists of maximally 7 years of formal education, early parenthood (during the late teen years), many offspring, and multigenerational extended households. We have demonstrated that these different sociodemographic profiles are

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associated with particular cultural models that combine the basic human needs of autonomy and relatedness into specific patterns (Keller & Otto, 2011). The cultural model of Western middle class is organized by psychological autonomy, which emphasizes individual internal control, freedom of individual choices, and primacy of individual intentions, wishes, and preferences. This definition of autonomy has consequences for the definition of relatedness. Accordingly relationships must be conceived of as voluntary, negotiable, and guided by the individual's free choice. The cultural model of subsistence-based farmers is organized by hierarchical relatedness, which emphasizes role obligations and social responsibilities within hierarchically organized family systems. The focus is therefore on the communal system, both in terms of locus of control and target. This definition of relatedness has consequences for the definition of autonomy, which obviously cannot consist in self-selected self-realization but in communal concerns. Autonomy is thus expressed in the action mode as responsible acting for the family (action autonomy). Therefore the question is not whether autonomy or relatedness dominates the respective cultural model, since both are human needs of equal importance. It is nevertheless crucial how they are defined and which are the possible alliances between them. It is obvious that the two conceptions briefly summarized here are adapted to the impositions of the respective sociocultural profiles (for more details, see Keller, 2011; Keller & Kärtner, 2013; Keller & Otto, 2011). It is important to stress that in our analysis of cultural dimensions, we do not refer to countries, but different sociodemographic contexts as the unit of analysis. Countries host multiple sociodemographic contexts that represent multiple cultural models. It is also important to stress that the two models described here do not represent the cultural variability of the globe. As the estimates indicate, Western middle class comprises less than 5% and subsistence-based non-Western farmers about 30–40% of the world population. There are obviously many more cultural contexts that should be placed on the research agendas of developmental scientists.

In this chapter we focus on the socio-emotional development of Nso farmer children. The Nso can be considered as prototypical for the sociodemographic contexts of subsistence-based farmers. They have been introduced into the scientific community by the contributions of two developmental scientists who are both native Nso and who have made professional careers in the developmental science. With his 1992 book, *Human Development in Cultural Context: A Third World Perspective*, A. Bame Nsamenang has offered a coherent framework of a non-Western account of development that has received substantial attention in the scientific community. Since then he has been advocating an “Afrocentric perspective,” often together with Therese Mungah Tchombe, another eminent Cameroonian scholar in the developmental and the educational fields (e.g., *Handbook of African Educational Theories and Practices*, Nsamenang and Tchombe, 2011; *Cross-Cultural Psychology: An Africentric Perspective*, Tchombe, Nsamenang, Keller, and Fülöp, 2013). The other Nso scientist who has tremendously contributed to the understanding of the Nso psychology of child rearing and children's development is Relindis Dzeaye Yovsi, who is today developing and implementing culturally adapted programs for health care, development, and well-being of Sub-Saharan African children for UNICEF (e.g., “A qualitative study of infant and young child feeding practices in Liberia,” quoted in UNICEF, 2010). Relindis Dzeaye Yovsi was crucial in establishing a research station in the Nsoland, where we are able to do research since more than 15 years under the protection of the local king and the titleholders of the Nso community.

The following paragraphs are written in deep appreciation and thankfulness of the support of the Nso community and the tremendous learning experience that we were granted. The Nso have helped us enormously not only to get a glimpse of their culture but also by the often sharp contrasts that enabled us to become aware of our own cultural habitus. This experience should be mandatory for developmental scientists.

In the following paragraphs, we first portray the sociocultural context of the Nso farmer com-

munities. We then describe the “learning environment” (Whiting & Whiting, 1975) of the Nso children and the socialization strategies of the Nso. The construction of the relational network of the Nso children lays ground for the development of attachment relationships, which we introduce from the Nso perspective. We conclude with outlining some implications for mental health programs.

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## The Cameroonian Nso Farmer

The Nso live in the Bamenda Grassfields known today as the North West Province of Cameroon (Goheen, 1992). The Grassfields constitute a distinct area that comprises a number of chiefdoms of various sizes and complexity, of which the Nso is the largest (Chilver & Kaberry, 1967). While these chiefdoms are linguistically and ethnically diverse, they have several features in common, including a chiefship at the center, the presence of men’s secret societies, and an emphasis on title and rank as significant political attributes (Goheen, 1992). The traditional language of the Nso is Lamnso; however, many Nso also speak a form of Pidgin English (Trudell, 2006) as this part of Cameroon was formerly colonized by Great Britain.

With a population of some 250,000 over an area of 2300 square kilometers, Nsoland is heavily populated for an agricultural region, with an average density of some 85 inhabitants per square kilometer compared to an average of 20 per square kilometer nationwide (DeLancey, 1989). In the past, the Grassfields was a forest zone occupied by hunters (Nkwi & Warnier, 1982). Today the forests are almost extinct with only the savanna grass remaining, after which the region is named. The Grassfields is a high lava plateau surrounded by a series of lower plains and valleys. Altitude within the Grassfields varies substantially which leads to changes in temperature and rainfall. The high plateau around Kumbo, the capital of Nsoland, receives over 3000 mm of rainfall annually, while lower regions in the Grassfields average between 1000 and 2000 mm. Average temperatures around Kumbo range from

a mean annual maximum of 66°F to a mean minimum of 51°F (Goheen, 1992, 1996). There are generally a 6–7-month rainy season from April to October, a cool dry season from October to December, and a hot dry season from January to March.

The emphasis placed by local people on regional cultural identity is common in Cameroon with more than 239 ethnic groupings (Goheen, 1992; Nsamenang, 1992). Currently, many conflicts are emerging over land ownership and inheritance of the Grassfields. The main reason for this being the incompatibility between the state-promoted privatization of land, emphasizing individual accumulation, and the core values of Nso, which stress land ownership as a right of citizenship, see the earth as a repository of lineage values and emphasize the moral commitment and generosity of lineage leaders (Konings, 1997). The traditional dialectical relationship between land settlement and tribe supports an internal hierarchy where legitimacy is based on the moral bond between the earth and the ancestors (Goheen, 1992, 1996; Yovsi, 2003).

The Nso society has a strict hierarchy: the Fon is the traditional ruler. He is both the traditional head and the chief religious authority in charge of keeping the ancestors satisfied. His power is controlled mainly by two secret society groups: the “Ngwerong” and the “Ngiri.” New Fons are selected from a group of eligible princes. The Nso society is divided into groups according to lineage. Each lineage group is headed by a “Fai.” Fais are recognized by their glass necklaces and walking sticks. Several lineages are grouped together under a “Shufai” (Goheen, 1992; Nsamenang & Lamb, 1994; Yovsi, 2003). Approximately 40% of the Cameroonian population practice indigenous beliefs, 40% are Christians, and 20% are Muslims (The World Factbook, 2013). Spirits form an important part of the Nso indigenous religion, and jujus (masked representation of spirits) can be seen at important occasions such as funeral celebrations of secret society members (Goheen, 1992).

Most Nso are subsistence-based farmers, growing maize, potatoes, beans, and vegetables. The farm work is done cooperatively among fam-

ily members; however, women are the primary providers of subsistence as they plant, weed, harvest, and also occasionally sell part of the harvest on the market. Apart from this, they also do housework such as cleaning, cooking, and providing childcare (Goheen, 1996). The money is spent on commodities they cannot produce themselves and on children's education (Yovsi & Keller, 2003). Men primarily fulfill communal duties and also gather firewood or are employed in paid labor (Yovsi, 2001). Only after marriage, women rise to full status with rights, privileges, and obligations (Vubo, 2005). Since the Nso are organized patrilineal and patrilocal, women move in with their husband's family when marrying. Women's average age at marriage is in their late teens. The average family size in the Nso is 6–8 persons, usually made up of paternal grandparents, parents, and children. Uncles and aunts and nephews and nieces usually live close by (Goheen, 1996; Keller, 2007; Yovsi, 2003). Household sizes are somewhat transient, since people change locations. Christian Nso families live in monogamy, with polygamy frequent among Muslim families (Vubo, 2005). Families inhabit one house or several houses, often in close vicinity. Houses are arranged in compounds—neighboring houses connected by big open yards where many of the daily activities take place (Yovsi & Keller, 2003). The houses are built of mud bricks with corrugated iron roofs; the kitchen is often in a separate hut, used for cooking and food and firewood storage.

Children are considered to belong to the husband's family. They are expected to help on the farm, do household chores, and take care of younger siblings (Keller, 2007; Mbaku, 2005; Yovsi & Keller, 2003). Mothers breastfeed infants and wean them after 2 or 3 years (Mbaku, 2005; Yovsi, 2003). Infant mortality rate is still very high in Cameroon with 58.51 deaths per 1000 live births (The World Factbook, 2013) and even higher in the rural areas. To increase the probability of survival of grown children and therefore an heir, couples are likely to produce many offspring (Mbaku, 2005). The total fertility rate is 4.0 children born per

woman in Cameroon and may be higher in the rural areas (The World Factbook, 2013).

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### **Pregnancy, Birth, and Socialization Goals Among the Nso Farmer**

In Nsoland children are highly valued and Nso parents attach spiritual, psychological, social, and economic dimensions to children (Nsamenang, 1992). Most ideas held about pregnancy and the practices undertaken during the perinatal period are anchored in Nso endogenous culture: pregnancy is regarded as a divine gift, and expecting couples adhere to certain taboos. During birth, traditional birth attendants take care of the woman and bury the placenta after birth. On the other hand, modern health-care practices become more frequent as well: due to the availability of professional medical care in Kumbo and some health centers in the area, an increasing number of mothers give birth in hospitals, agree on leaving the placenta in the hospital, and use drugs during child birth. However, Nso parents still seem to be inspired more by native knowledge than by modernization (Nsamenang, 1992).

Previous studies found that Nso conceptions of good parenting center around obedience, respect for elders, conformity, and compliance to rules as well as social responsibility and subordinating individual interests to those of the group in order to foster a strong community spirit (Nsamenang & Lamb, 1994; Yovsi, 2003). Nso mothers were found to value socialization goals like “obedience to parents,” “learning to share with others,” and “maintaining social harmony” above goals like “learning to be different from others,” “expressing own ideas,” or “being assertive” (Keller et al., 2006). The goal is to socialize children toward acquiring a “good character.” It is to this end that control and regulation are often administered in childcare. It serves to prevent the child from developing a sense of pride about his own achievement, which would be regarded as “showing off” and a “bad character” (Nsamenang, 1992; Nsamenang & Lamb, 1994; Tchombe, 1997).



## The Formation of a Social Matrix During the First 3 Months of Nso Infants

Once a baby is born, the Nso community takes over responsibility for childcare: they follow norms of collective and shared responsibility (Goheen, 1996; Nsamenang & Lamb, 1994). A Cameroonian proverb says that “a child belongs to the mother only when it is in the womb” (Yovsi, 2003, p. 80). As the Nso live in extended families, they can easily draw on a network of relatives and neighbors when caring for an infant, thereby promoting harmonious and hierarchically organized relationships between family members and the wider social reference group (Mbaku, 2005; Nsamenang & Lamb, 1994; Verhoef, 2005). It is natural for Nso children to grow up among many relatives and neighbors to whom children are committed throughout their lives (Keller, 2007; Verhoef, 2005). In daily life, maternal relatives and siblings often spend more time with an infant than the mother herself. Nso mothers argue that “just one person cannot take care of the child” (Otto & Keller, 2014). Such multiple caretaking arrangements can be found in most traditional African sociocultural contexts (e.g., Keller, 2003; Lamb, Bornstein, and Teti, 2002; Weisner and Gallimore, 1977). Goody (1982) calls this phenomenon “social parenthood” and refers to it as an African phenomenon. An emphasis on social parenthood instead of biological parenthood is especially notable in societies where high mortality and high fertility rates force mothers to economize their energy. Otto (2009; Otto & Keller 2015) reports that impossible demands are placed on single mothers in Cameroon when they are forced to provide their children with adequate resources alone. The respective socioeconomic conditions make it impossible for the mother alone to care for babies without the help of extended family networks.

Infants’ adaptability to multiple caregivers and their responsiveness to being soothed by nursing and back carrying by siblings are central socialization goals of Nso mothers. A consequence of this is the fact that many mothers practiced “giving their infants away” in order to make them

used to others, so as to be able to continue their daily work. Thereby they deliberately prevent exclusive relationships between the child and a specific caretaker. When necessary, they even force their children toward others: “I force him to go to other people. When I see any person, I would like to force the child to go to them, so that I should not be the one who is taking care of the child alone. Because it is not possible that I can be taking care of him alone. He would be disturbing me most often. It means I will not be able to do any other thing” (Otto, 2009).

Mothers who successfully train their children to get used to multiple caregivers can accomplish their daily chores more easily than mothers whose children are not used to other caregivers. Nso mothers are confronted with a heavy workload; hence, with the help of multiple caregivers, the barring of an exclusive relationship between themselves and the child permitted them to pursue their daily work undisturbed. At the same time, multiple caregiving also fosters the integration of children into a broader cultural community, as children interact with many different individuals from an early age, establishing a feeling of unity and belonging between the child and members of the community (Keller et al., 2006; Nsamenang & Lamb, 1994; Yovsi, 2003). Against this background, it is apparent that Nso mothers foster multiple attachment relationships between the child and multiple caretakers.

Infant care practices during the child’s first months of life focus on survival, physical growth, and motor development. An analysis of Nso mothers’ ethnotheories (Yovsi, Kärtner, Keller, & Lohaus, 2009) reveals the picture of a responsible mother as controlling and directing the ongoing activities of the infant with close body contact and vestibular/kinesthetic stimulation. Infants’ obedience and responsibility—the most central socialization goals (Yovsi, 2003)—are achieved by Nso mothers through controlling the infant mostly with the help of bodily signals (Keller, 2007). A good Nso mother teaches the child proper demeanor and respect (Keller, 2007; Keller, Demuth, & Yovsi, 2008). The mother’s priority is to keep the child calm, that is, prevent the child from crying. This is related to the belief



that if the child does not show any negative signals, he or she is happy, which means he or she is in good health. At the same time, calm and compliant children can easily be cared for by other caretakers as well (Otto & Keller, 2015). Nso mothers regard this parenting style as responsible parenting, reflecting high emotional involvement of the mother (Keller, 2007; Keller, Kärtner, Borke, Yovsi, & Kleis, 2005; Keller et al., 2006).

Behavioral observations confirm that Nso mother-infant interactions are characterized by frequent body contact and motor stimulation like moving the infant up and down. Body stimulation can be assumed to accelerate motor development and make the child strong so that the child can help in the household from early age on. Apparently fostering babies' early motor independence helps children to develop action autonomy, i.e., perform chores independently and without help. The parenting style that comprises body contact and motor stimulation is referred to as proximal parenting style (Keller, Abels, et al., 2005).

Using discourse analysis, Demuth (2008) derived recurrent discursive patterns in Nso mother-infant communications. She found that Nso mothers have a highly normative-hierarchical discourse with their 3-months-old infants, positioning the child to obey and to comply in a hierarchical set (Demuth, 2008, Demuth, Keller, & Yovsi, 2011). For example, the mothers were found to respond to signs of negative affect by the child with strategies of vocal distraction and rhythmic animation, expressing disappointment and scolding the child, and commanding the child vigorously to stop crying. At the same time, Nso mother-infant interaction is always facilitated by rhythmic and kinesthetic stimulation, and closeness between the interaction partners is established by bodily proximity as the mother stays in constant skin-to-skin touch with the child. Sharing in the fluidity of rhythmic patterning, by moving the child in the same rhythm as mother speaks, creates a pattern of symmetrical co-participation (Demuth et al., 2011).

Analyzing the same mother-infant communications using a microanalytic approach to study

the timing of the vocal/verbal communication patterns used, the Nso practice of caregiver-infant discourse was found to be also characterized by highly overlapping vocalizations/verbalizations (Keller, Otto, Lamm, Yovsi, & Kärtner, 2008). This overlapping communication style can be assumed to further contribute to the experience of synchrony between the interaction partners. Demuth et al. (2011) conclude that the Nso communicative practices provide a context in which the child learns emotional symbiosis as well as proper demeanor and avoidance of expressing negative affect. Thereby the child develops not only compliant behavior, but also close emotional bonds to others.

In the Nso community that is characterized by a hierarchical social structure and high appreciation of interrelatedness and harmony in relationships, these early parenting strategies prepare the child to establish and keep social harmony and good relationships with other people of the community (Demuth et al., 2011).

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### **The Emergence of Attachment Relationships at the End of the First Year of Life**

During the course of the first year of life, based on interactional experiences with significant others, children form attachment relationships, i.e., close bonds with their regular caretakers. John Bowlby, the father of attachment theory, regarded the attachment system as indispensable to life and accordingly postulated the existence of a universal attachment system, anchored in the human genome (Bowlby, 1969). Attachment theory assumes that differences in early parenting practices lead to the development of specific attachment qualities, which can be secure, insecure, or even disorganized. The empirical method to assess different attachment qualities was introduced by Mary Ainsworth in the context of the so-called Strange Situation (Ainsworth et al., 1978). She invited mother-infant dyads into the university laboratory where the children experienced different situations with varying levels of stress: consisting of confrontations with a

stranger, separations from the mother, and reunions with the mother. Children's ability to regulate their emotional arousal during this situation, their response to the stranger, and their responses to the reunifications with their mothers after brief separations are used as indicators for the classifications. Although Mary Ainsworth made her first observations concerning different attachment qualities in Ugandan homes (Ainsworth, 1967) and developed the Strange Situation Procedure as an adaptation to the behavioral regulations of Bostonian middle-class children, this procedure became nevertheless exported as the standard paradigm for the assessment of attachment qualities across cultural contexts. Cultural anthropologists and psychologists have long expressed their concerns about the cultural validity of the Strange Situation Procedure as well as the core paradigms of attachment theory in general (for an overview, see LeVine, 2014). These concerns are more loudly voiced now with the publication of two volumes collecting evidence of "different faces of attachment" (Otto & Keller, 2014; Quinn & Mageo, 2013).

One of the issues discussed is the regulation of stranger anxiety. Although it can certainly be assumed that stranger anxiety is evolutionary rooted, its phenotypic appearance may differ across cultural contexts. Otto (2009) investigated emotion regulation in confrontation with a stranger of 30 1-year-old Cameroonian Nso children. As 1-year-old Nso infants are not used to being alone at all, the Strange Situation test is not applicable, as this test requires infants to be completely alone in a room for 3 min, which would be completely unnatural for Nso infants and also socially unacceptable since the Cameroonian Nso community considers leaving infants alone as unethical. In order to observe the children's reactions to a stranger, Otto (2009) induced a quasi-experimental setting, in which a native Nso female stranger visited the mothers and their infants in their compounds. Normally other family members, neighbors, or friends were present there as well. A Nso woman who was a stranger to the family approached the infant, picked the infant up, and finally interacted with the infant for up to five minutes. The stranger would gener-

ally hold the infant unless the infant started to fuss or reach out for their mother. Depending on the stranger's judgment and the infant's comfort level, the stranger was free to move around with the infant, to stay close to the mother, or to return the infant to the mother. The mother and other observers received no further instructions on how to behave. The infants' experience of proximity or physical contact with a stranger was designed to elicit observable attachment behaviors in the form of typical emotional reactions and approach/avoidance behaviors.

Three emotion regulation patterns of infants could be identified (Otto, 2009): the largest group of children showed no observable emotional reaction when picked up by the stranger and separated from the mother, a second group of children started showing distress when the stranger increased the distance between the child and the mother, and a third group of children showed distress from the very beginning (i.e., upon seeing the stranger approach and reach out).

The context analysis of these patterns revealed distinct connections between the living circumstances of these children and their emotional reactions: children with no emotional reactions had married mothers and grew up embedded in a traditional extended family system. Their mothers reported significant social support as well as training their infants to get used to many different caregivers. Children changing from a positive to a negative emotional state grew up in a very similar social context: they also had married mothers with an extended family and a strong social support system. The living circumstances of the third group of infants who reacted with fierce negative emotions the very moment a stranger arrived differed from the two other groups: their mothers were singles and lived in the household of their families of origin. This socially stigmatized situation is associated with restricted support. Both, mothers as well as infants, reportedly had had health problems over the course of the past year. Mothers of this group did not refer to strategies that should prevent the child from getting used to an exclusive caregiver.

Emotional inexpressiveness is highly valued by Nso mothers, as they explained in interviews.

They highly estimate children who are not afraid of a stranger: “she [child] has a good disposition, she is happy with you, she is not afraid of you, smiling at you” (Participant 29); who stay quiet: “A good child is one who is always calm” (Participant 18); and who have a positive attitude toward other people: “A good child is one who plays with people, smiles with them” (Participant 10). “From the way a good child is relating to others, politely or not, you’ll just know” (Participant 31). Otto (2009) concludes that mothers of children with emotional inexpressiveness had achieved the desirable socialization goal of calm and even tempered children who don’t cry easily and relate well with others. The second group of children in this study changed to a negative emotional state the moment the stranger increased proximity between them. Those children reacted in a desirable way only at the beginning of the interaction, but subsequently changed to a less desirable reaction. The evaluation of this behavioral change may relate to the maternal reactions: they became rather directive the moment the children displayed negative emotions and tried to impose their idea of appropriate behavior on their children. They verbally criticized their children while actively directing their children’s attention to the stranger and refrained from taking the child back while trying to make the child stay with the stranger. The behaviors of the children who reacted with strong negative emotions to the strange visitor throughout are clearly evaluated as displaying a lack of proper demeanor. But—in contrast to the mothers of the group of children who changed their emotional expressions—these mothers did not try to control their children’s behavior at all during the stranger’s visit. This might be due to the fact that those mothers had turned into the main and only caretakers for their children due to their special situation.

In addition to observational and interview data, cortisol measurements were carried out before and after the interaction with the stranger (Otto, 2009; Keller & Otto, 2011). The change in the children’s salivary cortisol concentration

before and after the stranger’s visit was assessed to analyze the physiological regulation of the infants. The result of the cortisol analyses showed connections between the behavioral and physiological emotion regulation of the children: the expressionless infants demonstrated a decline in their cortisol level; hence, they were neither behaviorally nor physiologically stressed. The children who changed from a positive to a negative emotional state demonstrated an increase in their cortisol level, indicating that they became distressed when the stranger initiated body contact. The third group of infants who displayed negative emotions throughout had the highest cortisol levels at both time points of measurement; they were distressed even when they were in their familiar environment and the stranger had not taken hold of them.

Although the Nso children in the study by Otto (2009) showed distinct emotion regulation and thus attachment behaviors that are actually pretty similar to the behaviors described by Mary Ainsworth et al. (1978), the evaluation of these behaviors is completely different from the two perspectives. Within the Nso, the most adaptive emotion regulation strategy is characterized by calmness and inexpressiveness (Otto, 2009; Keller & Otto, 2011). This behavior is definitely not the same as the secure behavior of a Western middle-class infant, who is supposed to be stressed in the presence of a stranger and should only be at ease with the mother. Inexpressiveness and passivity of infants have even been regarded as a possible indicator for disorganization (cf. True, Pisani, & Oumar, 2001). However, as we have seen, Nso mothers value calm and expressionless infants because those children adapt easily to multiple caregivers and allow the mothers to focus on their daily work (Keller & Otto, 2011). In contrast, the open display of negative emotions, as it is described by Ainsworth for securely attached infants, is definitely not a desirable behavior for the Cameroonian Nso infants and must therefore be considered a less adaptive strategy in this cultural context.

## Implications for Mental Health Programs

The majority of formally trained mental health practitioners receive training in educational institutions that impart knowledge mainly derived from and adapted to Western populations. The applied theories and methods usually do not take the cultural characteristics of other communities into consideration—though they intend to represent the majority world as well (Kağitcibaşı, 2007). Attachment theory (Ainsworth et al., 1978; Bowlby, 1969) is one of the most influential Western theories on the development of early relationships and their long-lasting consequences that has informed trauma studies as well as many early childhood prevention and intervention programs. According to attachment theory, young children evolve their feelings of safety in the world from the physical and emotional availability of the attachment figure; accordingly, the interface between attachment and traumatic experiences needs to be an integral part in the assessment and treatment of young children at risk. Attachment theory regards optimal parenting as a key factor determining attachment quality in infants. Two concepts are used by attachment theory to describe optimal parenting behavior. First is sensitivity, defined as the awareness of the infant's signals, the accurate interpretation of the signals, and the appropriate and prompt response to them (Ainsworth et al., 1974). This conception of optimal parenting behavior implicitly assumes the relevance of dyadic situations and exclusive attention. Moreover, it is clearly child-centered, as the child's wishes and actions guide the mother's reactions. Second is mentalizing concepts such as "mind-mindedness" (Meins and Fernyhough, 1999; Meins, Fernyhough, Johnson, & Lidstone, 2006), describing a mother's ability to reflect about inner states and to support the exploration of the inner world through emotionally open communications about relationships. A key indicator of the adaptive attachment pattern is seen in the fact that the child is capable of autonomous exploration or play in the presence of the attachment person, e.g., the mother.

Contrasting our knowledge of early child development in the Cameroonian Nso community with attachment theory's conceptions reveals a clear cultural bias: attachment theory's concepts are not reflected in the Cameroonian Nso parenting practices or in Nso children's attachment strategies. Instead, they must be considered as developed and appropriate for highly educated Western middle-class families. In general, attachment theory reflects Western middle-class families' beliefs and practices in their orientation toward the development of psychological autonomy in children, which is understood in terms of self-determination (autonomy) and individuality (individual is distinct from others) (see Greenfield, 1996; Rothbaum, Pott, Azuma, Miyake, and Weisz, 2000). Attachment theory stresses the importance of play, exclusive attention, sensitive responsiveness, and mentalistic dialogues for healthy child development; these concepts are inherent in many intervention and prevention programs. However, anthropologists, cultural psychologist, and psycholinguists provide much evidence that these conceptions are not appropriate or even irrelevant for the majority world. Rural farmers such as the Nso with low formal education regard family coherence, subordination to the community, and acceptance of a social will as central in terms of relationship definition. They follow the model of hierarchical relatedness. In contexts where resources for exclusive caretaking are often lacking, caregiving is socially distributed (Nsamenang & Lamb, 1994; Weisner & Gallimore, 1977); attention is almost never exclusively directed toward an infant, but shared between multiple tasks; interactions are more physical than psychological/mental (Ochs, 1988); and emotional expressiveness is not supported (Otto, 2009). Autonomous exploration or play is often not valued when socialization focuses on the development of obedience, respect, and integration into the community.

Unfortunately, studies analyzing conceptions of healthy development as well as risk and disorders from indigenous perspectives are widely lacking. It is our goal for the future to assess indigenous conceptions of relationship

development, attachment, disorder, and risk and discover culture-specific definitions of attachment as well as its behavioral manifestations before applying any interventions based on the Western conceptualization of attachment. The consideration of cultural conceptions of development and developmental problems and disorders is also crucial for the provision of optimal conditions of living for children and families in migration societies. The majority of migrants comes from rural non-Western environments and holds beliefs and applies practices that are mainly oriented toward hierarchical relatedness and action autonomy. The confrontation with the Western mainstream health as well as educational systems is often in stark contrast of what they consider as good and healthy with the unwanted consequences of retiring from these services. This can lead to detrimental effects with regard to educational careers and participation in the societal life. Acculturation research has accumulated evidence that multiethnic identity and the preservation of the culture of origin is a healthy concept with favorable consequences for health, education, and well-being. This knowledge has to be applied now to multicultural realities within and across countries.

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# Fatherhood in the African Context: Review and a Case Study in Kenya

# 5

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Parental influence on child development is immensely important and has been the focus of many developmental psychology and family studies (Bornstein, 2005; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). However, the lion's share of this research has focused on maternal influences (Marsiglio, Amato, Day, & Lamb, 2000; Phares, 1992). In the past two decades, there has been growing interest in understanding fatherhood, its influence on child development, and pathways by which these influences manifest themselves (Marsiglio et al., 2000). This interest has been sparked by a growing set of empirical evidence highlighting the salient role of fathers in shaping child development. For instance, a study by Cabrera, Shannon, and Tamis-LeMonda (2007) indicates that father's engagement has significant effects on children's preschool cognition and language as well as their social and emotional development.

In the African context, there is a dearth of empirical evidence documenting the role of fathers and their direct and indirect influence on child development. In this chapter, we discuss paternal influences on child development at three levels. First, we summarize theoretical and empirical work on paternal roles in extant literature. Second, we review the literature on the father's role in the African context. Thirdly, we present a case study that examines the father's roles, as perceived by themselves and by mothers, in a rural Kenyan community (Kilifi). Finally, conclusions and implications are described.

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## Fatherhood: Theoretical and Empirical Work from a Global Perspective

Over the years, the role of the father has changed drastically (Lamb, 1987, 2013). Historically, fathers were seen as powerful patriarchs who made decisions on behalf of the family. However, in the recent past, the perception of the father's most important role within a family drastically changed from being a powerful and protective patriarch who was a breadwinner, to a more nurturing and involved father (Lamb, 2013). Empirical evidence from the Western world indicates that fathers take many roles toward their children within a family, including being breadwinners, playmates, providing guidance, and

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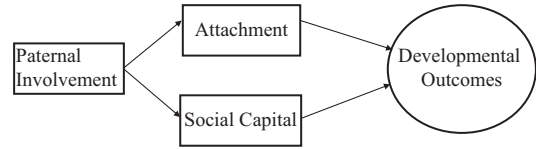
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caregiving (Lamb, 2013). In this section, we highlight some theoretical work that highlights direct and indirect ways in which the father influences his children's life.

Paternal involvement has been proposed to be one of the key ways in which a father influences their child's development (Lamb, 2013). One of the most influential contributions on the positive influence of paternal involvement comes from Lamb and Pleck who presented a theoretical framework on what paternal involvement entails and how it influences child development (Lamb, Pleck, & Levine, 1985; Pleck, 2010). According to them, father involvement has three major components: engagement, accessibility, and responsibility (Lamb et al., 1985; Pleck, 2010). There is empirical evidence to support the assertion from this theory; a systematic review summarizing evidence from longitudinal studies on paternal engagement observed that paternal engagement does contribute to a host of positive developmental outcomes (Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008). In this review, 24 eligible publications were identified; of these, 22 described positive effects of father involvement. They observed that cohabitation between a mother and her male partner was associated with fewer externalizing behavioral problems among her children. Active and regular paternal engagement with the child predicted a range of positive outcomes such as enhanced cognitive development.

There are various theories on how paternal involvement influences child development. However, Pleck presented one of the most influential framework through which paternal involvement influences child development (Pleck, 2007). Attachment and social capital, which are tangible and non-tangible investments fathers make with their children's well-being, are considered to form the pathways through which fathers influence child development (see Fig. 5.1 for an illustration). Paternal involvement has been associated with secure attachment patterns in children. While there is no standard definition of attachment, there is a general agreement that secure attachment plays a very important role in ensuring optimal child development. According to



**Fig. 5.1** Proposed pathways by which paternal involvement influences child development

Bowlby (2005), attachment is an enduring emotional bond which an individual forms with another person. Others such as Papalia and Olds (1993) have defined attachment to be a reciprocal and enduring relationship between an infant and his or her caregiver, each of whom contributes to the quality of the relationship.

Empirical evidence shows that the quality of attachment is associated with the quality of both childhood and adult functioning in various domains (Ainsworth, Bell, & Stayton, 1991; Loeber & Hay, 1997). Securely attached children develop a basic sense of trust for their main caregiver knowing that their caregivers will be there when he/she needs them and also a sense of emotional regulation. Secure attachment allows the child to have a safe and consistent base from which they can explore the world and learn new things. Securely attached children have been observed to experience better social-emotional functioning (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001). Although the bulk of the studies on attachment are with mothers, studies on child-father attachment show the same pattern of results. Children of fathers who spend quality time, have a consistent and predictable presence in their lives, and have warm and loving relationships with them are most likely to present with patterns of secure attachment (Brown, McBride, Shin, & Bost, 2007).

A second pathway, by which the father is seen to influence child development, is through *capital*. This concept reflects the influence of a father on the child's outcome through the resources he provides (Pleck, 2007). These resources can be economical and materials, such as providing food, paying school fees, and clothing. In many traditional societies, the father is seen as the main breadwinner ensuring that his children get all their basic needs. Meeting the basic needs of children is

important since it allows them to grow and develop adequately. However, these are not the only important resources that a father provides to his children. A very important resource that fathers provide to their children is *social capital* (Pleck, 2007). Social capital includes the values that a father teaches his child that serves to ensure that they adequately adapt to their environment. For example, through the use of positive and warm parenting practices, a father can ensure that his child is ready for school and holds high educational aspirations. Additionally, positive role modeling from a father ensures that a child is morally grounded and develops a positive identity and strong work ethics (Pleck, 2007). As children grow up, paternal social capital may also be expressed through an introduction to their networks which then may open opportunities for their children.

Paternal influence on child development may also be indirect. One major indirect pathway is the quality of mother-father relationships. According to family systems theory, the family is a complex, dynamic, and integrated system where each family member influences and is influenced by all others (Minuchin, 1988; O'Brien, 2005). Moreover, it is not just how two family members interact with each other that matters but also the relationship between other members. The quality of the marital relationship affects the family dynamics, including father-child relationships. So how does the mother-father relationship influence child outcomes? There are various potential pathways. One such pathway is supportiveness. By supportiveness, we refer here to the extent to which the couple provides each other with social and economic support. Supportiveness also reflects working together toward mutually agreed upon goals. Similarly, it has been suggested that by observing how their mother and father interact, children learn a lot about emotional regulation, how to interact with others, and how to resolve conflicts among others. Researchers such as Belsky and Vondra (1989) and Enger (1988) have postulated that witnessing positive and low-stress interactions between parents may produce similar behavioral styles in children. Moreover, couples' relationship quality may also affect children's well-being indirectly via parenting behavior.

When the marital relationship is comfortable and happy, both partners experience little stress and good physical and mental health, a "spillover" effect is likely to occur in the way mothers and fathers parent their children and how they interact with their children. Conversely, high levels of conflict in a couple may lead to stress, poor mental, and physical health, and these have been associated with suboptimal parenting behavior such as harsh parenting. Lastly, when a mother and father are having a good relationship, they are likely to want to spend more quality time together as a couple but also as a family with their children.

Paternal involvement requires an investment of time, money, and effort. The way fathers approach this task varies greatly. Most of the variation in patterns of paternal involvement is individually defined. However, some of this variation arises from the sociocultural setting in which parenting takes place. Some of the cultural factors which have been observed to shape paternal practices include husband-wife cooperation, marriage patterns, and residential patterns (Fouts, 2012). For instance, in settings where fathers do not reside in the same household as their children on a permanent basis, i.e., because of working in urban areas, paternal engagement will be reduced.

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## Fatherhood in the African Context

Informed by the cultural context of the Duang, of the Sotho group in South Africa, Lesejane (2006) notes that in the traditional African context, fathers were viewed as the "symbols and custodians of ultimate power and responsibility of the family." According to Lesejane (2006) in the traditional African context, fathers had five major responsibilities:

- They were the custodians of moral authority, which entailed not only teaching children the community's moral values but also punishing them when they did not follow the expected paths.
- They had the final responsibility in the affairs of the family, through making decisions for the family. However, in making these decisions,

they were expected to listen to their family as much as possible.

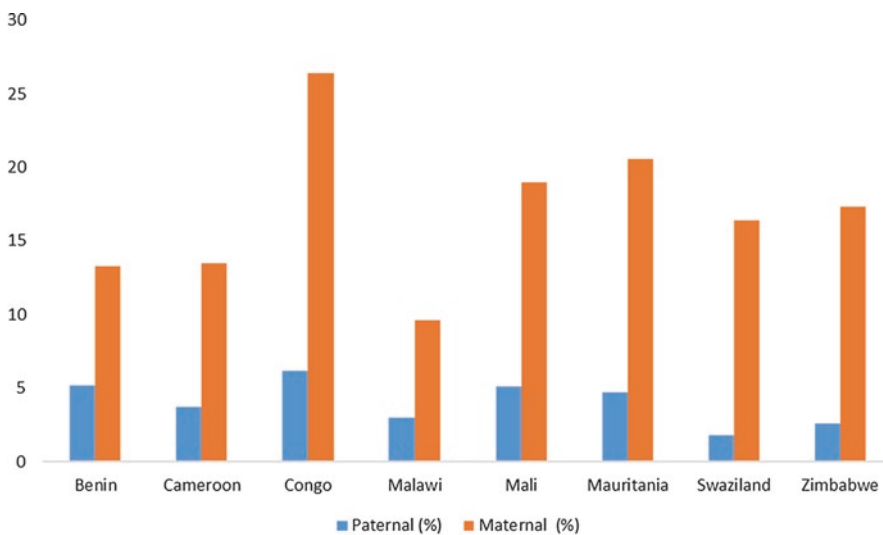
- They were the providers of the material needs of the family.
- They were the protectors of their children and wives.
- And lastly, they were role models for their children especially the boys, whom they trained through mentorship and apprenticeship.

Richter and Smith (2006) carried out an extensive investigation of the perception of fatherhood among children in South Africa. They emphasized the concept of social fathers. According to the authors in the South African context, the father concept was not restricted to biological fathers. Other men from within the extended family, who took the responsibilities of a father, such as uncles, grandfathers, stepfathers, and brothers, were also considered fathers, hence the title “social fathers.” These persons were very important for children whose fathers were not present.

Ethnographic work from within Africa provides interesting snapshots on paternal involvement. In a review chapter, Fouts (2012) provides insight into fatherhood in Central and Eastern Africa, with a specific focus on how different

socioecological niches may influence the way fathering is practiced (Fouts, 2012). The review highlights parenting among foragers, pastoralists and in farming communities. Fouts notes that empirical evidence indicates that fathers among foragers were more involved in direct social engagement and care for their children compared to fathers from pastoralist and farming communities. For instance, among the Aka foragers of Central Africa, fathers were within arm’s reach of their children 50% of the time and held their children for 22% of the day (Hewlett, 1993). This is in sharp contrast to what has been reported among the Gusii of Kenya (who are farmers), where father scores for holding children were extremely low and adult men were rarely seen carrying children.

Data from the UNICEF Multiple Indicators Survey provides some insights on paternal involvement especially in encouraging their children’s learning across different African countries. Results indicate that in general father involvement is way below what was reported for mothers. Figure 5.2 below reflects some selected results from countries presenting data in 2016, 2015, and 2014 database. The results from the figure may be limited in fully evaluating paternal



**Fig. 5.2** Amount of time parents spent with their children aged 3–6 years in an activity aimed at supporting their learning in the past 3 days. *Note:* This figure has been generated based on data and available on the UNICEF website

engagement in the African country studies since these results reflect small aspects of engagement. However, it does provide an interesting glimpse on the relative engagement of fathers versus mothers.

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### **Father's Roles, as Perceived by Themselves and by Mothers in a Rural Kenyan Community**

While the reviewed studies do tell something about the role of African fathers, there is a dearth of literature in this field and a need for more work to understand fatherhood in a rural African setting. In an attempt to fill this gap, the current study set out to answer the following questions: (a) What are the roles of the fathers in general? (b) What are the factors that may hinder fathers from performing their role in the African context? (c) How does the traditional role differ from the modern roles of fathers in the African context?

We set out to get paternal perspectives on these questions. However, we included the mothers too, because earlier studies indicated that both maternal and paternal views shape not only paternal perceptions of their roles but also the actual impact of fathers in the child's life and perhaps the dynamics within the family system.

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## **Method**

### **Study Site**

The study was done in Kilifi, Kenya. Kilifi County is located in the coastal line, bordering the Tana River, Taita-Taveta, Mombasa, and Kwale. It covers an area of 12,610 km<sup>2</sup> and has an estimated population of 1,109,735 inhabitants (Commission on Revenue Allocation, 2011). The majority of families depend upon subsistence farming with approximately 67% of the population in the county living below the poverty line. The majority of the population in Kilifi belong to the Mijikenda ethnic/linguistic group. A traditional home in Kilifi comprises a large homestead

with several small huts built in the compound. In these homes, extended families live together and share in the daily chores such as cooking and fetching water. It is typical for homesteads to have members of three different generations where they share in child-rearing duties. Intergenerational relationships are strictly regulated in this community (Wenger, 1989). For instance, parents largely play a disciplinary role and hence do not pay attention to children's play. Most of the time parents pay attention to children because of administering functional duties such as feeding and washing. The time spent with children and activities with children is moderated by age. Children who have been weaned spend less time with the mother. These children will spend a large amount of time with older siblings who actively participate in child-rearing. For instance, in this community, only 35% of mothers keep their children within visual range when they are 24–35 months old; the rest of the time another person, often a sibling, does this (Holding, Abubakar, Van Baar, Obiero, & Van de Vijver, 2011).

### **Participants**

This study was carried out as part of pilot work to develop materials for assessments of cognitive development and the psychosocial environment for preschool children at the Kenyan coast. Participants were randomly selected from the community or their workplaces. Following verbal informed consent procedures, 9 fathers and 16 mothers were interviewed. Table 5.1 presents the demographic characteristics of those who took part.

### **Data Collection**

Participants were interviewed at venues that were most convenient for them. All the interviews were done by a trained facilitator. All interviews were audio-taped. The sessions were guided by a set of questions to ensure consistency. Probes and clarifications were sought as deemed necessary.



**Table 5.1** Sample characteristics

| Characteristics     | Mothers<br>N = 16         | Fathers<br>N = 9           |
|---------------------|---------------------------|----------------------------|
| Age                 | Min 22, max 53            | Min 32, max 63             |
|                     | Mean 31.69<br>(SD = 7.49) | Mean 37.78<br>(SD = 10.02) |
| Number of children  | Min 2, max 7              | Min 2, max 11              |
|                     | Mean 4.25<br>(SD = 2.04)  | Mean 4.78<br>(SD = 2.90)   |
| Education*          |                           |                            |
| Unschoolled         | 3                         | 1                          |
| Primary education   | 8                         | 3                          |
| Secondary education | 2                         | 1                          |
| Some training       | 3                         | 1                          |
| Professional level  |                           |                            |
| Unemployed          | 2                         | 0                          |
| Unskilled           | 11                        | 2                          |
| Skilled             | 3                         | 7                          |

\* Some of the participants did not provide information on their educational level

### Interview Tool

A checklist of questions was developed by the research team through discussion and consensus. Refinement was based upon the initial interviews and discussion of the initial transcripts. Table 5.2 presents the interview schedule used. The questions presented are core to the interviews; however, probes were introduced to clarify and enhance the quality of the interviews.

### Data Management and Analysis

The final transcripts used for analysis were based on the audio-taped materials. Data were analyzed with the assistance of NVIVO 10 (QSR International; New York), according to the framework analysis (Silverman, 2010; Strauss & Corbin, 1998). The transcripts of the interviews were reviewed and read (familiarization), during which a coding scheme was developed. The first author (AA) developed the coding scheme. The accuracy of the translations of items and interpretation of the findings were checked by two assistants fluent in both English and Swahili.

**Table 5.2** Interview guides

|  |
|--|
| 1. What are the factors that influence child development?                |
| 2. What is the role of the fathers?                                      |
| 3. What are the factors that hinder fathers from performing their roles? |
| 4. Perceived differences between parenting roles now and in the past?    |

## Results

### What Are the Factors that Influence Child Development?

This question was set up to open the conversation as it allowed as to build rapport with the participants. Moreover, we believe that paternal roles would be partially shaped by what they believe the child needs to be provided with, to grow up, and to do well; so, understanding the paternal perception of what a child needs could provide interesting insight on what they think they should provide. So, what are the factors that influence child development according to the fathers we talked to?

- (a) *Provision of basic needs was the most emphasized aspect.* The basic needs mentioned included adequate diet, clothes, housing, clean environment, and health-care needs. The most emphasized need was the provision of a balanced diet with 8/9 fathers mentioning this as an important way to ensure proper growth and development.

*First is good food, give them food that is suitable for children, proper clothing, and every child must get their father's love. [Father, 41 years]*

*First of all, I think for proper growth of the child, the child will need good food, I mean a balanced diet, then if they are not feeling well you need to take them to hospital and get them to get treatment, depending on their illness. [Father, 40 years]*

Four out of nine fathers mentioned that being cleaned and having proper clothes were important ways to ensure child growth and development. The following statement by a father gives a succinct summary of what was seen to be important.

*Give food, let them get good food, a good place to sleep, and nice clothes to wear. [Father, 38 years]*

These feelings were similar to those expressed by the mothers we interviewed where 15/16 interviewed felt that the provision of basic needs was an important way to ensure proper child growth and development. About 14/16 mothers indicated an adequate diet, 9/16 indicated cleanliness, and 6/16 thought that proper clothing and health care were most important.

*A child needs good food since this is what makes them grow well. A small child needs vegetables. [Mother, 26 years]*

*You need to clean them, clean their clothes, feed them even if they can eat by themselves, ensure, you check that they have eaten sufficient food. [Mother, 32 years]*

*They need to be healthy, feed them well, and ensure the environment is clean so that the child's health does not deteriorate. [Mother, 23 years]*

*First, you need to be sure they are eating well, their health is good, send them to the clinics for checkup, and when they are sick ensure they are taken to the hospital. [Mother, 32 years]*

- (b) *Education*: a high quality of education was also emphasized in this age group. Provision of quality education was mentioned by most of the fathers we interviewed. Seven out of nine fathers interviewed thought this was a salient requirement for a child to grow up well.

*They should continue studying, and the parent should monitor them when they come from school, the parent should know what the child is doing or how the child is doing, when the child comes from school, the parent should take the book and check if they are doing well or not. [Father, 63 years]*

*First when they reach three years of age then it is time to go to school. [Father, 34 years]*

In some cases, specialized education was considered to be important. Among the specialized learning experiences suggested were health promotion skills and teaching children good manners. Mothers also agreed with the fathers on the salience of education (13/16 mothers pointed this out).

*Educating them. [Mother, 30 years]*

*There is a need for clothes, education, the child needs to be well-brought, that way they will grow up well. [Mother, 28 years]*

*First the child will need good care, food, somewhere to sleep, clothes and when they get to 3 years of age they need to start attending baby class. [Mother, 53 years]*

## What Is the Role of the Fathers?

### Provider of Basic Needs

The most commonly mentioned role of the father was the provision of the family's basic needs. All the fathers we interviewed mentioned this was their key role.

*Father's obligation is to ensure the children get food, clothes and what they need at school. [Father, 38 years]*

*As a father my first duty is to provide for my children's basic need. These are food, somewhere to sleep and clean clothes. Then I need to protect them and I should take them to school. [Father, 33 years]*

The mothers interviewed were in agreement with the fact that the main role of the father was to be a provider to his family:

*The father's main role would be to bring food to the house, ensure kids are educated, take them to school, buy them clothes, those are his duties. [Mother, 32 years]*

*The roles of the father include ensuring the child has slept in a good place, he or she has gone to school and he has paid school fee. [Mother 53 years]*

Other roles mentioned frequently included monitoring the child's whereabouts. Some of the fathers we talked to mentioned that it was important for fathers to know what their children are doing, since that allows them to ensure that their children do not participate in any illicit behavior and that they grow up well. There was a high congruence or agreement in opinion between mothers and fathers interviewed on the role of the father.

## So How Do Paternal Roles Differ from Maternal Roles?

Both mothers and fathers agreed that the most significant role for the mother is caregiving and taking care of the household chores.

*The mother is the one who is concerned with cleaning clothes, washing them and ensuring they eat on time. [Father, 38 years]*

*The mother's roles including cooking, fetching water, washing clothes for the fathers and kids, and for those of us who have less (not financially able) she also has to go and search (supplement family income), you find that she has a hard job more than I and at some point I do feel sorry for her. [Father, 40 years]*

Our pattern of results indicates that there are still strict gender roles with the mothers seen as the nurturing one, while the father is seen as the provider. However, there was also openness to the possibility of role changes, including the mothers contributing more to the financial well-being of the family.

## What Are the Factors that Hinder Fathers from Performing Their Roles?

Three factors were regularly mentioned as hindering the ability of fathers from performing their duties. These factors include alcoholism (4/9), finances (4/9), and poor marital relationship (4/9). These factors were closely followed by infidelity.

*First it is drinking too since it leads to a situation where your family becomes disorganized or lacks guidance. [Father, 38 years]*

*It is up to the father and the mother to ensure they have a good relationship. If they do not have a good relationship they cannot take good care of their children since every time you talk you disagree. [Father, 63 years]*

*You know that also poverty contributes. Because sometimes the parents are employed on a casual basis (seasonal employment), and this can lead to the child missing school since the child may come from school looking for money toward their exams and the parent cannot afford it. Poverty contributes in this.... [Father, 42 years]*

Mothers on this issue closely mirrored a similar pattern. Frequently mentioned factors that hindered men's ability to perform their paternal roles included infidelity/polygamy (6/16), poor marital relationship (4/16), and alcoholism (4/16).

*Friends contribute because you can go to the bar and stay with them and you forget your responsibilities. A friend will tell you to let us go you buy some beer. [Mother, 53 years]*

How is this similar or different from factors perceived to hinder maternal roles? Fathers thought that maternal roles were hindered by alcoholism, poor marital relationship, and finances. This is quite similar to the patterns that were observed with the mothers who thought that their roles were hindered largely by a lack of finances (5/16), then alcoholism (2/16), poor marital relationship (3/16), and ill-health (3/16). A closer look at these factors clearly indicates that what is assumed to hinder the performance of maternal and paternal roles is very similar.

## Perceived Differences Between Modern and Traditional Views on Parenting

Only one of all parents interviewed thought that there were no differences between modern and traditional ways of parenting. Both mothers and fathers thought that a significant change was in the facts that nowadays, people have become more egalitarian. It was noted that contrary to traditional African practices, modern families' women were participating more and more in the job market, which meant that they were increasingly contributing to the family finances.

*Things from the past have now changed. So although there are gender differences when we come to family roles, we find that the roles have become more equal, girls are now equally educated, when the husband buys wheatmeal the wife can also do so, when he pays fees for the child the partner can do so, when he buys a car his wife can also do so. [Father, 32 years]*

*Now it seems there has been a change in roles. These days when it comes to household duties, we help each other. The man can do laundry, or the washing or can look for money, if the wife is employed and I am employed, we will employ someone to do the household work or even the husband can assist in doing this work.*

*The other thing is that women are now given more freedom not like before when they were oppressed 'since you are women, you cannot be employed, so just stay at home,' but now women have come out, and they are working. [Mother, 53 years]*

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## Discussion

We set out to examine the role of fathers in a rural Kenyan setting. To be able to adequately evaluate this role, we started by evaluating the perception of the fathers of factors that contribute to proper growth and development with a focus on children aged 3–6 years. We observed that the basic needs (food, clothing, and shelter) and provision of good quality education were the most emphasized factors thought to optimize growth and development. A high level of agreement was found between the interviewed mothers and fathers on what is most important for child development. A noteworthy point here is the fact the pattern of results noted here is similar to what has been reported in other Kenyan communities. For instance, among the Gusii, Kipsigis, and Abaluhya, fathers largely described their roles as economic which involved providing basic needs such as food, school fees, and paying for medical costs (Fouts, 2012). It is worth noting that while the focus on basic needs and education is important, almost no mention was made of aspects such as stimulation of both cognitive and emotional development, which may form a source of worry. Only one father mentioned that children need the love of their father. Earlier research indicated that lack of stimulation is one of the major reasons for poor cognitive and developmental outcomes among children in low- and middle-income countries (Walker et al., 2007). In a previous study in this community involving mothers, it was found that mothers mentioned the need for stimulation and aspects such as play as ways to enhance child

development (Abubakar et al., 2013). The difference in emphasis may have resulted from the fact that our earlier study involved younger children (1–24 months). Therefore, parents' perceptions of what is important for growth and development may have shifted with their child's age. These observations indicate that programs aimed at sensitizing parents from rural communities in Africa need to look beyond attention for basic needs for the children.

Consistent with what has been reported elsewhere, there is a perception that paternal and maternal roles have evolved over the years from the traditionally defined roles to more egalitarian ones. Lesejane (2006) reports that in Southern African, the notion of fatherhood is changing. Despite these perceived changes, maternal and paternal roles still seem to be very traditionally defined. This traditional and narrow perception of the paternal roles may potentially be problematic since it may limit father's involvement in raising their children.

Suboptimal parenting behavior has been observed to contribute immensely to poor cognitive outcome among children growing up in low- and middle-income countries (Walker et al., 2007). However, few studies have concentrated on understanding antecedents of parenting behavior and factors leading to suboptimal parenting. It is often assumed that poverty is the main reason. However, our study indicates that for the parents themselves, aspects such as quality of marital relations and alcohol abuse are much more salient than previously acknowledged. These findings seem to fit with theoretical suppositions (Belsky, & Vondra 1989; Enger, 1988) and empirical evidence (Chen, 2013; Cummings & Watson O'Reilly, 1997). For instance, in a study on maternal depression, it was noted that mothers whose partners drank much alcohol or whose partners were verbally or physically abusive were more likely to experience depressive symptoms, compared to mothers in a home where the partner did not show these negative traits. Further work trying to link threats to parenting, parenting behavior, and their association with child outcomes may elucidate important points of intervention in sub-Saharan Africa.

In summary, we have highlighted the background literature guiding the associations between paternal involvement and childhood outcomes. It is emphasized that when fathers spend quality time with their children, the children will develop a secure attachment with their fathers which contributes to positive developmental outcomes. Moreover, fathers contribute to positive developmental outcomes in their children by investing social capital in their offspring. This includes financial investments (provision of basic needs) but also aspects such introduction to social networks to provide them with opportunities and teaching them the important sociocultural values, which might lead to better adjustment. Most of what we could review arose from work from Western countries. There is a dearth of empirical evidence of work from African settings.

The qualitative study from Kilifi indicates that the role of the father has changed in line with what has been suggested in the literature. Moreover, it does indicate that the main emphasis is still on the role of the father as a provider and a disciplinarian. Consequently, aspects such as active engagement in raising children are not well articulated.

### Implications for Research and Theory

1. Research on fatherhood in Africa urgently needs to further clarify the role of fathers and their influence in the lives of their children. Although there is a general agreement that the gender roles within the family are slowly changing away from traditional patterns, this evolution and what it means for children in these families are not well documented. Moreover, aspects such as single parent homes, families that are polygamous, and fathers living away from their families are not properly understood, especially concerning its implications for child development.
2. The limited empirical evidence available from sub-Saharan Africa does seem to provide support for some of the most popular theoretical suppositions in Western literature. For instance, fathers confer advantage to child development by providing social capital. These father's investments in their children is perceived as contributing to their well-being. Another example is the effect of marital quality on child development. In our qualitative work, this was clearly mentioned as an advantage in line with the theories from Western cultures. However, not enough in-depth work has been carried out to understand how the various sociocultural contexts of the father in Africa may shape their roles and their influence on child development; the exception here is work from South Africa that addressed the influence of nonresident fathers.
3. Regarding interventions, both empirical and theoretical evidences point to the need for a family-based approach to improve both the lives of the children and the well-being of the family.

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### Conclusions

Fathers play an important role in shaping the outcomes of their children. Paternal involvement in raising children is one of the most important pathways by which children are influenced by their fathers. Evidence from Africa on the influence of the father on child development is scarce. Still, the scarce evidence shows that the role of the father is changing but as of yet traditional roles are still very much adhered too. Moreover, most of what the literature reports on paternal influence and the results from our small qualitative study clearly shows that the patterns of influence closely mirror what is reported from other parts of the world. Yet social, cultural, and ecological factors do shape the way fathers carry out their role. Distinct differences in parenting behavior for fathers from farming communities' vs. those from foragers have been reported. Much more needs to be done to understand the influences of modernization, urbanization, and globalization on fatherhood in the African context.



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# Sibling Caregiving and Its Implications in Sub-Saharan Africa

# 6

Maureen Mweru

The definition of who a sibling is seems to vary from one culture to another. In non-western societies, distant relatives such as cousins may be considered as siblings, while in many western societies, only individuals who share one or both parents are viewed as siblings (Mweru, 2011). Culture therefore seems to determine who should be regarded as a sibling. The expectations of siblings also vary from one culture to another as different cultures have distinct requirements as to how siblings should interact with each other and with other individuals, how they should own resources, and how they should work and sleep (Weisner, 1984; Whiting & Edwards, 1988). The interactions of siblings will therefore tend to differ from one culture to another depending on the roles expected of them.

Understanding sibling relationships is important as 80–85% of children worldwide grow up with at least one sibling, and the sibling relationship is usually the longest-lasting one in a person's life (Conger & Kramer, 2010). The large amount of time siblings spend together especially during childhood (if they are brought up together) most likely results in the siblings having a con-

siderable influence on each other. Understanding sibling relationships is therefore important as it contributes to our understanding of human development. This chapter attempts to make a contribution to the knowledge base on sibling interactions by presenting an overview of sibling relationships. The roles siblings play in social and cognitive development and mental health are described. The chapter also describes sibling caregiving in sub-Saharan Africa and specifically looks at sibling caregiving among the Agikuyu of Kenya. In the conclusion section, some policy implications for child development, learning, and educational processes are presented.

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## Sibling Relationships

### Siblings and Social Development

Extensive research on sibling relationships has been carried out in the western world. The presence of siblings seems to have a positive influence on children's social development; for example, Dunn (1992) noted British children with siblings exhibited more pro-social behaviors such as perspective taking and sharing earlier and to a greater degree than children without siblings. Having siblings may therefore help children learn and practice positive behaviors that are valued in their societies, and siblings may also contribute

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to children learning how to conduct themselves in a manner that makes them accepted by others in their societies.

It has been established that children learn social interaction and behavior first in sibling relationships then later apply this in peer relations (Stauffer & DeHart, 2006). Sroufe, Egeland, Carlson, and Collins (2005) propose that because one cannot easily become completely disengaged from members of one's family, the sibling relationship is well suited for learning to stay involved even when there are emotional conflicts. Siblings therefore help individuals learn how to control their emotions and get along with others; skills are important when interacting with other people. Siblings thus provide children with the opportunity to practice skills they will need when interacting with their peers. In addition, because siblings are usually not the same age, the sibling relationship helps practice leadership as well as following (Sroufe et al., 2005) indicating the sibling relationship also aids in understanding and practicing how to act when one is in charge of others and even how to respect authority.

It is likely that due to the fact that siblings are sometimes almost of the same age, it provides many children with the opportunity to practice essential peer relation skills at home which to many children is a familiar environment before they have to use skills similar to these in less familiar terrain with peers. The importance of siblings in children's learning about the dos and don'ts in social interaction suggests there are gains in social development when one has a sibling and children who do not have siblings may be disadvantaged in their social development.

## Siblings and Cognitive Development

Siblings also have an influence on children's cognitive development. Experiments in laboratories have shown children displaying social and cognitive capacities earlier in interactions with their siblings than with experimenters in laboratories (Weisner, 1989), and this is probably because children will tend to relate better to siblings than

strangers or researchers. This suggests siblings may have a positive impact of enhancing children's cognitive abilities. Infants between 12 and 18 months old have been reported to perform more spontaneous imitative acts than infants without older siblings (Barr & Hayne, 2003), and at 12 months, infants with siblings have been found to produce more gross motor goal-directed actions than infants without siblings (Reid, Stahl, & Striano, 2010) indicating older siblings may serve as a model to younger children. These findings are not surprising given that studies have found younger siblings place more value on interactions with older siblings and report greater admiration for the older siblings (Furman & Buhrmester, 1992; Pepler, Abramovitch, & Corter, 1981).

Siblings might be viewed as unique agents of cognitive development. Azmitia and Hesser (2008) found that children taught by siblings had higher posttest scores than children taught by peers. The younger children were more likely to observe, imitate, and consult their older siblings than older peers, and older siblings were more likely than older peers to provide them with guidance spontaneously. This example shows siblings may be more effective as teachers than unrelated individuals. Siblings also seem to use different teaching styles to impart knowledge to younger children. Perez-Granados and Callanan (1997) observed that older siblings' teaching styles directed younger children to make correct choices in a picture categorization game, while mothers provided information to help the children make their own choices. The end result was that the target children scored higher with siblings than with mothers. These findings suggest parents and siblings may interpret goals of a task differently leading to different teaching styles and differences in performance.

Siblings might also play a critical role in children's cognitive development as their accurate perception of younger children's competence has been found to be uniquely predictive of task performance (Klein, Feldman, & Zarur, 2002). These findings indicate older siblings are moderators of cognitive development; therefore, their

involvement in children's teaching should be encouraged as they might be aware of their younger siblings' competencies.

## Siblings and Mental Health

Apart from playing a crucial role in cognitive development, siblings also play a positive role in individual's mental health. Research (Riggio, 2006) has found that among individuals in their 20s, those from larger families usually have more positive childhood recollections than those with only one sibling. During adolescence, siblings have also been found to provide emotional support (Goetting, 1986), and studies among children during middle childhood have revealed that children who had warm and intimate relationships with their siblings tended to display emotional understanding and self-disclosure (Howe, Aquan-Assee, Bukowski, Lehaoux, & Rinaldi, 2001). In addition, siblings who have close sibling interactions have been observed to show more emotional compassion and empathetic perspective taking than those who have distant interactions with their siblings (Shortt & Gottman, 1997). Close and warm sibling relationships therefore seem to have a positive impact on emotional development which is a crucial aspect in human development.

Longitudinal studies have also demonstrated that positive early sibling relationships enhance mental health in later life challenges (Waldinger, Vaillant, & Orav, 2007). Sibling warmth has been linked to higher levels of competence and reduced risk for internalizing and externalizing symptoms (Kim, McHale, Crouter, & Osgood, 2007). On the other hand, conflict among siblings has been associated with vulnerability to psychological problems (Moser & Jacob, 2002). Therefore, it is not just sufficient to have siblings. Positive interactions with the siblings also play a critical role in achieving good mental health.

The positive impact siblings have on mental health can also be seen in siblings' tightly bonded sibling relations which sometimes serve as a substitute for problematic parent relations (Leavitt, Gardner, Gallagher, & Schamess, 1998). Siblings

show less rivalry and become closer when faced by stressful events such as their parents' divorce (Dunn, Slomkowski, & Beardsall, 1994) revealing siblings' tendency to protect each other against negative trauma impacts. Positive sibling relationships consequently have a protective effect during hardships as these relationships provide a sense of security, assurance, and comfort (Branje, Van Lieshout, Van Aken, & Haselager, 2004; Gass, Jenkins, & Dunn, 2007). Children seem to turn to their siblings for comfort when facing stressful situations revealing the important role they play when families are experiencing difficulties.

Siblings' willingness to protect each other can also be seen clearly in their tendency to legitimize favoritism by their parents of their sibling with disability (McHale & Pawletko, 1992). Siblings seem to be aware of their disabled siblings' special needs and are willing to make sacrifices so that their disabled siblings get the special attention they require. Even in instances where families migrate to other countries, children may be willing to take on caregiving and parenting roles as they overcome linguistic and cultural barriers quickly (Fuligni, Yip, & Tseng, 2002). Doing so is likely to help ease the families' process of settling down in a foreign land.

Family and cultural expectations also seem to contribute to the sense of obligation to assist one another. In South Asia, for example, adult brothers tend to provide services and gifts to their sisters without expecting anything in return, while the adult sisters cook for their brothers and generally take care of them (de Munck, 1993). On the other hand, among Mexican Americans, sisters who had been caregivers for younger siblings may serve as a confidant and advisor to them during the transition to adulthood (Cauce & Domenech-Rodriguez, 2002). Positive sibling relationships therefore seem to continue even into adulthood although some individuals have reported spending less time with their siblings during the transition to adulthood than they did during adolescence (Scharf, Shulman, & Avigad-Spitz, 2005). Sibling social support measured by looking at proximity, contact, and giving and receiving help has also been found to decline

during early adulthood (White, 2001), while during middle adulthood, proximity and contact have been seen to stabilize and after age 70 sibling exchanges of giving and receiving help rise slightly. These changes in sibling relationships can probably be attributed to many individuals having to move away from home and settle in different places where they get jobs during early adulthood, but in their old age and after retirement, many people may have the time to rekindle relationships with their siblings.

### Conflict in Sibling Relationships

Although an abundance of the literature available shows a positive side regarding sibling relationships, unfortunately, the relationship between siblings can sometimes be characterized by conflict especially among early adolescents where conflict is greater than among younger children or older teens (Buhrmester & Furman, 1990). During middle childhood, conflicts usually revolve around sharing of personal possessions (McGuire, Manke, Eftekhari, & Dunn, 2000), while conflict between early adolescents and their older siblings has been attributed to early adolescents seeing older siblings as similar to their parents, therefore the desire to seek autonomy from the older siblings (Furman & Buhrmester, 1985). The siblings' ages therefore seem to influence the conflict they have with early adolescents displaying higher levels of conflict.

There are other factors that have also been blamed for rivalry between siblings. Traumatic events and specifically exposure to military violence, for example, have been linked with intense rivalry in sibling relations (Peltonen, Qouta, Sarraj, & Punamaki, 2010). Differential parental treatment such as providing only one sibling with financial support has also been found to create hurt feelings and lead to conflict between siblings (Conley, 2004; Dunn, 2007). There are therefore numerous causes of conflicts between siblings involving factors both outside and inside the home.

It is important to note that when siblings have negative relations, this can result in adjustment problems (Deater-Deckard, Dunn, & Lussier, 2002), depression (Kim & Cincchetti, 2003; Stocker, Burwell, & Briggs, 2002), and anxiety (Fox, Barrett, & Shortt, 2002; Stocker et al., 2002) both during childhood and in adolescence. In addition, individuals who had quarrelsome and rejecting sibling relations during childhood have been observed to have a higher chance of having psychiatric disorders in adulthood (Waldinger et al., 2007). These findings suggest it is important to establish the cause of negative relations between siblings and if possible curtail the damaging effects.

### Gender and Sibling Relationships

Gender differences also exist in sibling relationships, for example, girls seem to experience more warmth in their sibling relations than boys (Peltonen et al., 2010). The gender composition of the older-younger siblings also seems to influence their actions, for example, same-gender siblings tend to spend more time together (Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005). These findings are not surprising keeping in mind that children of the same gender may have more similar interests, therefore the tendency to spend more time together, for example, sisters may spend their time together doing their hair and nails, a past time that many boys may not be interested in.

The finding that same-gender siblings spend more time together may also explain findings that same-gender siblings tend to show more resemblance in deviant behavior (Slomkowski, Rende, Conger, Simons, & Conger, 2001). During adolescence, siblings spend more time together than with their parents (McHale & Crouter, 1996), and since they are usually together, it is no wonder then that they influence each other. This is not surprising given that siblings tend to have a strong influence on each other during adolescence (Snyder, Bank, & Burraston, 2005). Their influence on each other would probably explain the likelihood of them getting into the same kind of mischief.

## Sibling Caregiving in Sub-Saharan Africa

### Caring for Younger Children

In sub-Saharan Africa, siblings may be left in charge of younger children especially when the younger children start walking (Dawes & Biersteker, 2011). The use of sibling caregiving has been documented by individuals doing research work in sub-Saharan Africa as early as in the 1970s. Leiderman and Leiderman (1974), for example, while carrying out fieldwork in Kenya established that infants cared for in part by older siblings also used them as a secure base, therefore illustrating that these children did not have exclusive attachment to their mothers which is a contrast to earlier findings that had been obtained in developed countries. The attachment to older siblings is not surprising given that in some instances, younger children may actually spend more time with older siblings than with parents and teachers (Nsamenang, 2011). This practice is different from that seen in western countries' child caregiving practices. In the United States, for example, sibling caretaking is not prevalent, and children do not spend as much time together as those in collectivistic societies (Maynard, 1999). In addition, children in the United States are more likely to play together rather than engage in sibling caregiving. The influence on each other and interaction between siblings will therefore tend to vary depending on the culture in which they are reared.

While leaving young children under the care of their older siblings may be frowned upon in western countries, parents in sub-Saharan Africa view it as a means to develop their children's astuteness, for example, Bamileke parents in Cameroon (Tchombe, 2011) and Yoruba parents in Nigeria (Akinsola, 2011) use sibling caregiving as a strategy for the cognitive enrichment of their children. Parental views about the importance of sibling caregiving therefore seem to differ across cultures with parents in sub-Saharan Africa viewing it as a beneficial practice. It is highly likely therefore that parents who view sibling caregiving as

advantageous will encourage the practice, while those who do not may seek the services of a babysitter as is common in western countries.

### Sibling Teaching

Sub-Saharan parents' positive attitude toward sibling caregiving may also be influenced by their observation of siblings playing an important role in educating young children about cultural issues. Among the Bamileke people of Cameroon, for example, siblings play together, dance, share family stories, sing, and hold conversations on topical upcoming traditional events (Tchombe, 2011). This suggests that even when parents are absent or busy, younger children through interactions with older siblings are able to learn various important social issues.

Older siblings therefore play an active role in younger children's lives including teaching younger siblings. In Senegal, for instance, older siblings have been observed teaching values and manners (Barry & Zeitlin, 2011), and among the Yoruba in Nigeria, the *omoluwabi* way of educating children not only involves the child's parents but also includes the siblings and peers (Akinsola, 2011). *Omoluwabi* means "to form a complete human person and to be of good character as shown by the respect of old age, loyalty to parents and local traditions, as well as by honesty, duty, sociability, courage and to be ready to assist and to work" (Dasen, 2011, p. 191).

Sibling teaching during caregiving has also been observed among children in Kenya (Mweru, 2011; Mweru & Murungi, 2013). By use of children's games, songs, stories, and locally available materials, the Kenyan children among others were observed teaching their younger siblings about personal hygiene, how to play various children's games, about various school-related activities, and about the norms and values in their society. The older children took their younger siblings outdoors with them, sang songs with them, and played with them. The children's interactions with their younger siblings displayed socio-emotional caregiving. Socio-emotional caregiving has been



described as including activities that engage children in interpersonal interactions through openness, listening, and emotional closeness (Bornstein & Putnick, 2012). In addition, the children also displayed cognitive caregiving characteristics, for example, they engaged the younger children in naming, counting, and drawing. Cognitive caregiving consists of stimulating children to engage and understand the environment by describing and demonstrating and providing children with opportunities to learn (Bornstein & Putnick, 2012). This demonstrates older siblings are competent teachers and they play a pivotal role in the traditional education of younger children.

Apart from the role older siblings play in both the formal and informal education of younger children, they may also help bridge the gap between peer relationships. In Zimbabwe, for example, older siblings are judges of younger children's acceptability in play groups (Mhaka-Mutepfa & Seabi, 2011). Due to the tendency of children trying to protect their younger siblings from harm (Mweru & Murungi, 2013) and siblings' tendency to provide social support to each other (Gakuba & Passini, 2011), it is probable that during play with peers, they may try to encourage the acceptability of their younger siblings and also protect the younger children in situations where they feel they are vulnerable.

### **Siblings' Negative Influence**

Although practices such as sibling caregiving in sub-Saharan Africa have been found to be beneficial, literature available also shows that sometimes the sibling caregiving can be characterized by negative episodes such as use of both physical and verbal aggression by older children toward younger siblings with younger caregivers tending to use more aggression than the older caregivers (Mweru, 2005). This information is worrying as older siblings could harm younger children if they are aggressive toward them.

Older siblings have also been found to exert pressure on younger siblings to become sexually active, thus making them vulnerable to sexually transmitted diseases such as HIV/AIDS (Zimba, 2011); therefore, they have had negative influ-

ence on younger siblings. These findings are alarming keeping in mind there is no cure for HIV/AIDS. In addition, the fact that older siblings have a tremendous influence on younger siblings means the younger siblings are likely to ape what they do. These findings point to the need to educate older siblings about the important role they play as role models to their younger siblings and the significance of displaying positive behavior that their younger siblings can emulate.

### **Sibling Caregiving Among the Agikuyu of Kenya**

In this section, a description is provided of older siblings caring for younger children. A description of the activities the siblings involve themselves in during caregiving is also provided. The data presented here was collected from a sample of 101 siblings from the Agikuyu community in Kenya. The Agikuyu people are predominantly a farming community found in the central part of Kenya. The siblings included 67 older children and their 34 younger siblings living in a rural part in Kenya. The older siblings were between 4 and 12 years old and included 29 boys and 38 girls. The younger siblings were all aged around 2 years old.

Before data collection commenced, the researchers identified 34 families that had both older siblings and 2-year-old younger siblings. The researchers then paid two visits to each homestead. During the first visit, the families were briefed about the data collection process, while the actual data collection was done during the second visit. A video recorder was used to collect the data after permission to use it was obtained from the families. Data was therefore obtained from 34 homesteads.

Video recording was carried out for 1 hour in each homestead as the older children interacted with their 2-year-old younger siblings. After data collection, a transcription of the videotapes was carried out and a qualitative analysis of the contents of the videotapes done. The analysis of the transcripts revealed that the older children engaged their younger siblings in a variety of activities as they took care of them.

This section contains examples which help illustrate how the older siblings took care of the younger children. In addition, the excerpts show some of the activities the older siblings engaged the younger children in. The transcripts revealed the older siblings involved the younger children in daily activities the Agikuyu people of Kenya engage in. Excerpts from the transcripts are presented in the following section. The nonverbal information has been presented in double parentheses.

### Example 1: Shaking Hands/Greetings

In this excerpt, the focal child is a 24-month-old girl called Klini (T). She is interacting with her 9-year-old brother called Kamau (K) and a neighbor's child called Kimuhu (Kim) who is about 30 months old. The neighbors' child was not initially in the homestead but wandered on to the scene when he came visiting with his mother. This example particularly demonstrates an older child showing his younger sister how to shake hands/greet visitors. The Agikuyu people like many other communities in Kenya usually receive visitors into their homesteads by first shaking hands with them.

((Kamau walks toward one of the houses in the compound and the Toddler follows him. Another Toddler (Kimuhu) who does not realize that a videotaping session is taking place wanders onto the scene. He extends his hand to greet the Toddler but the Toddler keeps on walking))

Kim: ((To Toddler))  
 Klini, greet me  
 K: ((To Toddler))  
 Klini greet him

((Kamau has now stood on an upraised part of the ground, and the Toddler climbs onto the upraised ground and is now standing next to him. Kamau holds the Toddlers' upper right arm so that she is now extending her palm toward Kimuhu))

K: ((To Toddler))  
 Greet him Klini

((Kimuhu is still on the lower ground. Kamau and the Toddler walk toward Kimuhu so that the Toddler can shake hands with him. The Toddler

shakes hands with Kimuhu and Kamau lets go of her hand. He then goes and squats near one of the houses in the compound))

Kim: ((To Toddler))  
 Greet me. Greet me.  
 K: ((To Toddler))  
 Klini come here!

((The Toddler goes and squats next to Kamau. She pats the ground in front of her))

T: ((To Kimuhu))  
 Here (come here)

((Kamau is digging a hole in the ground using a plastic container. The Toddler sits next to him with her back facing the camera. Kimuhu goes and stands next to the Toddler))

This example illustrates how a toddler who does not seem aware of the importance of welcoming visitors to the homestead by shaking hands with them is shown by her older brother how to do so. The older sibling does this by first giving the younger child verbal instructions and then physically showing her what to do by holding her upper right arm so that the palm is extended toward the visitor.

This example serves to illustrate the important role older siblings' play in teaching younger children the acceptable norms in their society. Even in the absence of parents and other adults, older siblings are able to show younger children what is expected of them.

### Example 2: Keeping Underwear Hidden

In this excerpt a 27-month-old girl Vero (T) is interacting with her two sisters: Purity (P) who is 8 years old and Cory (C) who is 4 years old. This example shows how older siblings during caregiving inform younger children on etiquette by specifying the kind of behavior that is expected from them. This extract is obtained from data that was collected as the three children interacted outside their house.

((The children are seated on the ground outside their house eating some popcorn. The Toddler leans back and changes the position she was seated. Her underwear can now be seen))

- C: ((To Toddler))  
Vero, cover your underclothes
- T: ((To Cory))  
What?
- C: ((To Toddler))  
Cover your underclothes  
((The Toddler pulls at her skirt))
- C: ((To Toddler))

Your underwear can be seen. Your underwear can be seen.

((The toddler shifts her legs so her underwear can no longer be seen. The children continue eating the popcorn quietly.))

This example like the first example in this section shows how older siblings inform younger children of what society expects of them demonstrating the important role they play as their younger siblings' teachers in the absence of their parents and other adults.

### Example 3: Performing Household Chores (Sweeping)

In this excerpt, the focal child Kadaya (T) is interacting with her three cousins: Wambui (W), Kajose (K), and Rachel (R). Wambui and Rachel are girls aged 4 years and 21 months, respectively. Kajose the only boy at the scene is 7 years old. The video recording is done as the children interact in their homestead. In this example, a younger sibling observes and imitates an older child who is performing a household chore.

((Kajose, Rachel, and the Toddler are seated in front of one of the houses in the compound. The Toddler is holding a bottle. Wambui walks from the right toward the other children. She is holding a broom made from twigs. She bends down and starts sweeping. The Toddler looks at her, drops the bottle on the ground, gets up, and walks toward her))

- T: ((To Wambui))  
You!

((The Toddler grabs the broom from Wambui and starts using it to sweep the ground. Meanwhile, Kajose has taken the bottle that the Toddler dropped on the ground. The Toddler notices that

Kajose is holding the bottle and she walks toward him and grabs the bottle from his hands))

- T: ((To Kajose))  
This one!

((The Toddler continues sweeping the ground while holding the bottle in one hand. The Toddler is raising a lot of dust as she sweeps. Kajose is seated on the ground and is fiddling with a toy car))

- K: ((To Wambui))  
Give her (the Toddler) water
- W: ((To Toddler))

Kadaya, use a little water when sweeping  
((The Toddler continues sweeping and raising more dust. Wambui points to a spot behind the Toddler))

- W: ((To Toddler))  
Go and sweep that side

((The Toddler turns around and starts sweeping the spot Wambui was pointing at. She is still raising a lot of dust. After a while, she gives the broom to Rachel))

- T: ((To Rachel))  
Take

((Rachel takes the broom and starts sweeping. The Toddler stands by the side watching her))

In this example, an older sibling starts performing a household chore that is sweeping and a younger child shows interest in the task and takes over. Another older sibling namely Jose realizes the younger child is not performing the task correctly and points this out. This example suggests that during caregiving younger children can learn how to perform important chores under the guidance of their older siblings.

### Example 4: Protecting Oneself (From Hens)

In this example, a 21-month-old toddler Rachel (T) is interacting with her 4-year-old cousin, a boy, called Baba (B). In this excerpt, an older siblings'

tendency to protect a younger child is evident. The extract presented here was obtained from video recording done as the children sat on the veranda of one of the houses in their compound.

((Baba and the Toddler are seated on the veranda of one of the houses in the compound. The Toddler is eating some food. The Toddler has poured some of the food on the ground, and some hens are coming near her and trying to peck at this food. Baba chases away a hen that comes near the Toddler. Another hen approaches the Toddler from the left. The Toddler tries to wave it away with her hand. Baba pulls at a sweater that the Toddler is sitting on))

B: ((To Toddler))  
Use this sweater to hit them (hens).  
Have you heard?

((The Toddler stands up and Baba takes the sweater that she had been seated on, and he uses it to chase away the hens. He then places the sweater near the Toddler. The Toddler takes the sweater and places it on her knee. Baba takes the sweater))

B: ((To Toddler))  
Let me hold it (sweater) so I can use it to hit them (hens)

((The Toddler continues eating her food and Baba continues sitting near her))

In this extract, an older sibling can be seen instructing a younger child on how to protect herself. He first chases away the hens himself then verbally instructs the toddler on how she can also do the same herself. This example shows older children's willingness to protect their younger siblings. In addition, it illustrates that older siblings can teach younger children how to protect themselves.

### Example 5: Feeding a Toddler

In this extract, a 33-month-old toddler called Gitau (T) is interacting with his 4-year-old brother Ken (K) and 6-year-old sister Mary (M). This example illustrates how older children as young as 4 years old when left in charge of their younger siblings are able to take care of and feed the younger siblings.

The videotaping presented in this excerpt was done as the children interacted in their homestead.

((Ken, Mary, and the Toddler walk out of one of the houses in the compound. Ken comes out first holding a plate of food. Mary follows. She is holding the Toddler's hand and leading him out of the house. Ken sits on a bench that is near the kitchen. Mary leads the Toddler to the bench and then walks off toward the left and is out of view. Ken uses a spoon to scoop some food from the plate and offers the food to the Toddler))

K: ((To Toddler))  
Take!

((Ken continues scooping food off the plate and feeding the Toddler. Mary returns to the scene and sits on the bench next to the Toddler. Ken continues feeding the Toddler and also using the same spoon to eat some of the food))

K: ((To Toddler))  
Eat!  
((The Toddler repeats after Ken))  
T: ((To Ken))  
Eat! Eat!

((Ken continues feeding the Toddler and also using the same spoon to eat some of the food. Mary gets up and runs off to the left toward one of the houses. After a little while, the Toddler also runs off into this house. Mary walks out of the house))

M: ((To Toddler))  
Gitau come!

((The Toddler also walks out of the house. He is holding a fruit which he is eating. He runs toward Ken and Mary. Ken offers him some of the food on the plate))

K: ((To Toddler))  
Take!  
((The Toddler runs away from Ken))  
T: ((To Ken))  
No!  
K: ((To Toddler))  
Take!  
((Ken follows the Toddler))

K: ((To Toddler))  
Take!

((The Toddler eats from the spoon. Mary walks off toward one of the houses in the compound and is out of view. Ken continues feeding the Toddler until the food on the plate is finished))

K: ((To Toddler))  
We have finished

((Ken walks into the house where Mary is. The Toddler is still outside. He starts running toward the house where Mary and Ken are. Ken comes out holding another plate of food. Mary also walks out of the house. The children walk toward the bench. Ken and Mary sit on it. Ken scoops some food off the plate and starts feeding the Toddler. The Toddler starts walking around as he chews the food))

K: ((To Toddler))  
Take some more! Take more!

((The Toddler continues chewing the food, and then he walks off toward the right and behind the kitchen. He is now out of view))

K: ((To Toddler))  
Take! Take Gitau! Take! Take! Take!

((The Toddler returns to where Ken is standing. Ken and Mary are now looking at someone in the background behind the kitchen. Ken starts feeding the Toddler again))

K: ((To Toddler))  
Eat! Eat!

((Ken continues feeding the Toddler. He calls out to his father who is in the background))

K: ((To Father))  
Father, we have finished eating the other food. We have finished!

((Ken continues feeding to the Toddler the last spoons of the remaining food))

K: ((To Toddler))  
Take! Take!

((The Toddler suddenly walks off to the right and behind the kitchen. He is now out of view. Mary walks off in the opposite direction but still along the kitchen wall))

K: ((To Toddler))  
You! Take! Take!

((The Toddler has walked around the kitchen, and he can now be seen on the extreme right side of the scene, but from where he is seated, Ken cannot see the Toddler. The Toddler is now on the same side of the kitchen wall as Mary))

K: ((To no one in particular))  
He (Toddler) doesn't want it (food)

((Mary puts her hand on the Toddler's shoulder and leads him back to where Ken is. Ken continues feeding him. The Toddler suddenly runs off into the kitchen and is out of view. Ken picks the plate and walks with it toward one of the houses in the compound))

K: ((To no one in particular))  
He (the Toddler) doesn't want (the food)

((Ken enters the kitchen and is also now out of view))

This example shows an older sibling who is 4 years old feeding his younger brother. The older child is very persistent even when the younger child does not sit in one place and waits to be fed. The older child is willing to follow the toddler around the compound and encourage him to finish his food. In addition, the older brother's words "He doesn't want" at the end of the excerpt suggest the older child is intelligent enough to realize when his younger brother has had enough to eat. The example therefore illustrates how children as young as 4 years old can be able to take care of and feed younger children.

## Discussion

The examples presented in this section show how older children are able to look after their younger siblings who are left under their care. The older siblings in these examples not only fed and protected the children, but also provided examples from which the younger children could learn important tasks such as how to perform household chores. In addition, the older siblings informed the younger children about the norms and values in their society such as the importance of shaking hands with visitors and not revealing ones undergarments in public.

The data presented in this section has shown siblings re-enacting daily activities and also teaching adult activities during sibling caregiving. These examples serve to illustrate that older children can be teachers to their younger siblings. The findings also clearly illustrate that older siblings are cultural brokers who introduce younger children to the daily activities found in their communities. These findings are similar to those obtained by other researchers (Maynard, 1999; Mweru & Murungi, 2013) who found that older siblings during caregiving taught younger children important values and skills needed in their society. Older siblings therefore play an important role of informing the younger children about how to carry out important tasks.

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## Policy Implications for Child Development, Learning, and Educational Processes

The literature shows that older siblings teach younger children various concepts and skills suggesting children can be tutors to their younger siblings. Older siblings are aware of the importance of ensuring younger children pay attention to important aspects of what is taught since they are able to draw the attention of younger children to what is to be learned (Dasen, 2011). Empirical research (Mweru & Murungi, 2013) has also revealed that among other things, children teach their younger siblings who have not

yet joined school various school-related activities such as how to count and say the alphabet. This suggests when teachers in schools are not available or few in number as is common in many sub-Saharan African countries, then older siblings can play an important role of introducing younger children to the basic things they are expected to learn in school.

Formal programs already exist in sub-Saharan Africa where older children support the education of their younger siblings, for example, in Botswana the “Little Teacher” program involves sibling care with older competent children assisting preschool children in their preparation for school (Child-to-Child, 2005). In Zambia, the Child to Child movement has also been initiated due to the belief children can be agents of child health promotion. The Child to Child movement was inspired by observations that families in the majority world leave young children under the care of their older preadolescent siblings (Serpell, 2011). Older siblings therefore not only educate younger children about cultural issues but also on important issues concerning their health.

When older children engage their younger siblings in various tasks, they help the younger children achieve tasks which they probably would not have been able to perform if they were alone. The older siblings engage the younger children in activities the younger children are capable of reproducing immediately or a little after observation or long-term memory (Nsamenang, 2011). This finding clearly demonstrates that older siblings have a positive impact on younger children and supports Vygotsky’s (1978) proposition about the zone of proximal development. When children play with more mature caregivers, they are provided with models, stimulants, and opportunities to perform at levels above those they may be able to achieve when on their own (Vygotsky, 1978). Parents and teachers should therefore encourage the interaction between older and younger siblings.

The literature has also shown that during sibling caregiving, older children usually engage their younger siblings in various activities which play an important role in the children’s social,



cognitive, and physical development. For example, children's games which involve movement aid in muscle development thus play an important role in physical development. Songs and stories on the other hand will stimulate cognitive development. These findings therefore indicate it is important to encourage children to spend time together as they benefit from the interaction.

Children should be encouraged to look after their younger siblings as this helps them learn to be responsible (Mweru, 2011). During sibling caregiving, both the caregiver and the recipient benefit as sibling caregiving encourages interdependence and pro-social behavior (Weisner & Gallimore, 1977; Whiting & Edwards, 1988). As they take care of younger children, sibling caregiving may also give older children a sense of achievement and personal pride that they are able to perform important tasks. The tendency to want to protect younger siblings and also the closeness that develops between siblings during sibling caregiving as evidenced by attachment of younger children to the older sibling caregivers imply older siblings can play an important role in caring for and comforting younger siblings if the need arises.

Some of the literature has also demonstrated that older siblings can display negative behavior such as aggression toward younger siblings (Mweru, 2005). In addition, the findings show that it is younger children who tend to display more aggressive behavior. These findings are worrying given that conflict among siblings has been associated with vulnerability to psychological problems (Moser & Jacob, 2002). Leaving young children in the care of minors has also been seen as a risk factor for harm and injury, accounting for approximately 40% of deaths in the developing world (United Nations Children's Fund, 2001). Research in non-western settings has also demonstrated that 2–4 year olds can experience 7.65 disputes per hour with an average length of 10.69 interactions per dispute (Perlman & Ross, 2005), while conflicts between 3- and 9-year-old siblings occur at comparable rates with each lasting around 45 s (Kramer, Perozynski, & Chung, 1999).

These findings suggest there is a need to have supervision of younger children if they are to be given caregiving responsibilities. This

might entail not leaving the children completely alone but have adults in the background who would monitor what the children do when they are together. In addition, the sibling conflicts indicate the importance of assessing not only the frequency but also the content of sibling conflicts. However, it is also important to note that conflict among siblings is not always viewed as being negative. The absence of sibling conflict could also mean an inability to resolve interpersonal difficulties through mutual problem-solving (Furman & McQuaid, 1992), and efforts to eliminate all forms of sibling conflict could lead to impeding children's ability to manage conflicts, solve problems, and regulate emotions.

The literature in this chapter has also demonstrated that older siblings greatly influence younger siblings and provide models that the younger siblings copy albeit they sometimes portray negative role models, for example, by encouraging younger siblings to engage in promiscuous behavior (Zimba, 2011). The influence older siblings have over their younger siblings however could be exploited so the younger siblings benefit; for example, older siblings could be encouraged by teachers and parents to provide positive role models such as by working hard in school. Older siblings who pursue higher education and obtain university degrees can serve as positive role models or even provide financial and social support to younger siblings leading to a likelihood of the latter's educational achievements and strengthening of sibling bonds.

The literature clearly illustrates that siblings play an important role in children's development and this is an important aspect which should be kept in mind especially when doing research on children's development in sub-Saharan Africa. Ignoring the role siblings play could lead to wrong conclusions. Researchers investigating the stimulation Kenyan children receive have already noted that not taking into account the amount of stimulation children receive from other caregivers (including siblings) is likely to lead to incorrect information (Whaley, Sigman, Beckwith, Cohen, & Espinosa, 2002).

It is clear from the literature presented in this chapter that siblings play an important role in individuals' lives and they have both a positive and negative influence. Teachers, parents, guardians, and all individuals who work with and for children should therefore try to identify ways in which they can exploit the positive effects siblings have on each other and minimize the negative influences.

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## **Part III**

# **Biomedical Influences on Child Development**

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# Infections of the Central Nervous System and Child Development in Sub-Saharan Africa

# 7

Amina Abubakar

Children growing up in Sub-Saharan Africa (SSA) carry a disproportionate burden of the world's burden of childhood infectious diseases. This is associated with a significant loss in life. However, mortality is just the tip of the iceberg; these diseases have been associated with a significant loss of cognitive abilities and are a major cause of disability. In this chapter, I am going to review studies documenting the impact of infectious disease on child development, factors that contribute to variability in outcomes, and interventions that show promise to deal with the adverse effects of infections. I concentrate on HIV and malaria as these two conditions have attracted most research attention. In addition, I also review briefly what is known of the psychological impact of meningitis and neonatal jaundice and sepsis.

Organization, 2013). In 2012 an estimated 207 million cases of malaria were reported and this resulted in 627,000 deaths. Ninety percent of malaria-related deaths occur in Africa. The most vulnerable are children less than 5 years of age; they account for 77% of reported deaths (World Health Organization, 2013). While the most commonly cited burden of malaria is mortality, its effects on child development in malaria-endemic regions are huge. Studies from various parts of the world indicate that children exposed to malaria from its mildest form, i.e., having parasitemia but being asymptomatic, to its most severe forms, i.e., getting cerebral malaria, suffer a host of developmental, cognitive, and behavioral problems (Fernando, Rodrigo, & Rajapakse, 2010; Kihara, Carter, & Newton, 2006). In the following sections, I review the evidence on this with a view of highlighting the effects of malaria on child development.

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## Malaria and Childhood Outcomes

**Epidemiology of Malaria** Malaria is an extremely common infectious disease that results from a bite by an anopheles mosquito. In 2013, at least 97 countries across the world had ongoing malaria transmissions (World Health

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## Impact of Malaria on Childhood Outcomes

**Motor Impairments** Multiple studies report motor deficits following a bout of severe malarial infection. For instance, in a study from Uganda, it was indicated that 60% ( $n = 14$ ) of the children in that study presented with motor impairments (Idro et al., 2010). Among the motor-related impairments observed in this study were

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hemiplegia, diplegia, and movement and gait disorders. Idro's study involved a group of children who were attending a special clinic; consequently, the data may be an overrepresentation of the problem. In a separate study where 143 children were followed up several years post malarial discharge, Idro, Carter, Fegan, Neville, and Newton (2006) reported motor impairment in 6% of the children, a much lower rate than reported in the clinical sample.

**Language Impairments** Various studies have reported language impairment following exposure to malaria, especially the severe form which is complicated with seizure or coma. In an extensive set of studies, Carter and colleagues provide an in-depth view of the true extent of the impact of malaria infection on language functioning (Carter et al., 2006; Carter, Murira, Ross, Mung'Ala-Odera, & Newton, 2003; Carter et al., 2005). In a follow-up study of a group of children who had experienced severe malaria infection (defined as malaria prostration, multiple seizures, and severe anemia), approximately 6-year post discharge multiple language impairments were noted. The study further indicated that the pattern and severity of impairments were closely related to disease severity. It was observed that children who experienced severe malaria with complicated seizures presented with deficits in only two areas of language functioning, i.e., pragmatics and phonology. On the other hand, children who suffered cerebral malaria had poor performance in all domains of language which had been evaluated. The domains evaluated included lexical, semantics, pragmatics, and higher language abilities.

**Cognitive Abilities** With a few exceptions, almost all studies have observed cognitive impairments after severe malaria. In a systematic review of the literature on malaria and cognition, it was concluded that the effects of malaria on brain development seem to be diffused affecting various cognitive functions including attention, memory, and executive functions (Kihara et al., 2006). One of the earliest studies following children after malaria infection was carried out in Ghana and

observed that these children who were aged 7–16 years at assessment suffered impairment in multiple domains including visual memory, rule learning, and perceptual abstractions. In a carefully designed study, using measures that had been adapted to the cultural context, cognitive impairments associated with severe malaria diseases were observed (Holding, 1998). In a follow-up analysis, Holding et al. (2004) compared the performance of 87 survivors of severe malaria with impaired consciousness to matched community controls on a wide range of tasks. The study observed patterns of impaired cognitive functioning suggestive of widespread impairment in the domain of executive functions though fewer difference were observed in areas such as information processing. The odds ratio associated with the development of cognitive impairment following severe malaria with impaired consciousness was found to be 4.48 (95% CI 1.22, 16.47). Similar findings have been reported in a recent study in Uganda (Boivin et al., 2007). In a separate study from Uganda, it was reported that even in the case of asymptomatic malaria, children may experience cognitive impairment. In this study, a total of 740 children 6–14 years of age were involved, and a set of measures largely focusing on attention and abstract reasoning were administered (Nankabirwa et al., 2013). Among the enrolled children approximately 30% were found to be asymptotically infected with plasmodium malaria. Analysis indicated that infected children had lower test scores on measures of attention and abstract reasoning compared with uninfected children.

Most of the studies investigating the effects of malaria in the African context have used the traditional paper and pencil approach to examine cognitive deficits, with the exception of the study by Kihara, de Haan, Garrashi, Neville, and Newton (2010). In this study auditory and visual brain event-related potentials (ERPs) were used to compare novelty processing in children exposed to severe malaria with community controls. The study sample consisted of 50 children exposed to severe falciparum malaria and 77 unexposed age-matched children. They reported deficits in both auditory and visual paradigms. Children with previous history of severe malaria

had smaller P3a amplitudes to novelty in both auditory [ $F(3, 119) = 4.545, p < 0.01$ ] and visual paradigms [ $F(3, 119) = 6.708, p < 0.001$ ]. An interesting observation from this study was that “The percentage of children with severe malaria showing impaired performance using ERPs is within the range previously reported using neuropsychological tests” pg 88. The similarity in findings based on paper and pencil neuropsychological measures and those from a neurophysiological measure further emphasizes the validity of the observed effects of infectious diseases.

**Behavioral Problems** Compared to cognitive and language outcomes, behavioral manifestations of malaria have received less attention in the literature. However, there is a body of literature to indicate that children exposed to malaria are at an elevated risk of experiencing behavior problems. Working in a specialized neurological clinic, Idro et al. (2010) present a case series that show that children surviving severe malaria present a host of behavioral problems. The study involved 23 children aged 12–79 months who had been hospitalized with cerebral malaria. Almost 50% of the children ( $N = 11$ ) presented with behavioral problems including hyperactivity, impulsiveness, inattentiveness, and conduct disorders, such as aggression, self-injurious behavior, and destructive behavior. An interesting observation from this study is the fact that teachers found it difficult to cope with behavioral problems portrayed by children following their hospitalization. This implies that some of the cognitive and education effects observed in these children may result from their behavioral problems and teacher’s inability to cope with these problems, thus leading to ineffective education which leads to poor education and cognitive outcomes. Idro’s study which was based in a specialized clinic may present a slightly nonrepresentative sample since these children are likely to be presenting with the most severe sequelae. In a study whose main aim was to evaluate the reliability of the Luganda version of the Child Behavior Checklist [CBCL] (Achenbach & Rescorla, 2001), Bangirana et al. reported various behavioral problems among children who had experienced a bout of severe malaria. These

problems included depression (15.6%), thought problems (12.5%), aggressive behavior (9.4%), and oppositional deficit behavior [9.4%] (Bangirana, Nakasujja, Giordani, Opoka, John, & Boivin, 2009). Although a more recent study report an elevated risk for both internalizing and externalizing behavioural problems (Ssenkusu et al., 2016). In another study in Uganda, Bangirana et al. (2011) reported elevated risk for internalizing but not externalizing behavioral problems. However, Boivin et al. working in Malawi did not observe any significant differences between malaria survivors and controls in both internalizing and externalizing behavioral aspects (Boivin et al., 2011).

**Educational Outcomes** Few studies have investigated the impact of malaria on educational achievement in the African context. The few which have looked at this issue present us with mixed results. A study by Halliday et al. (2012) where the influence of asymptomatic malaria and anemia was investigated as part of a baseline study in a clinical trial to control malaria parasitemia did not find an association between educational outcomes and child malaria status. Bangirana et al., in a follow-up of children 3 months post admission, also failed to find any significant differences in academic scores (Bangirana et al., 2011). However, two clinical trials from Africa indicate that providing malaria prophylaxis for children who are asymptomatic improves their academic performance (Jukes et al., 2006).

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### **Mediators: Severity of Diseases, Coma, Seizures, and Nutrition**

The impact of malarial infection is mediated by various factors mainly those associated with disease severity. Although a symptomatic malarial infection associated with poor childhood outcomes, its effects are relatively small compared to the impact of severe malarial infection. The depth and duration of coma, presence of multiple seizures, and hypoglycemia are among the disease-specific symptoms associated with persistent impairments post admission (Bangirana, Idro, John, & Boivin, 2006; Idro et al., 2006; Kihara et al., 2006).

Other malarial-specific disease risk factors such as nutritional status may also contribute to poor cognitive and neurodevelopmental outcomes. Children experiencing severe malaria have also been observed to be at higher risk of malnutrition compared to peers (Friedman et al., 2005). Malnutrition has been independently associated with poor childhood outcomes (Laus, Duarte Manhas Ferreira Vales, Braga Costa, & Sousa Almeida, 2011; Nyaradi, Li, Hickling, Foster, & Oddy, 2013). There is evidence to show that the presence of malnutrition among children admitted with severe malaria contributes independently to persistent neurocognitive deficits especially language impairments (Idro et al., 2006). In another study a path analytic model was used to evaluate the influence of malaria in the context of malnutrition, and evidence was found for a complex relationship where malaria influences developmental outcomes. The influence of malnutrition in the context of malaria was both from direct and indirect pathways (Olney et al., 2009). These findings emphasize the need for sophisticated analytic and conceptual models to quantify both direct and indirect effects of infectious diseases.

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### **Moderators: Home Environment, SES, and Schooling**

Compared to the field of HIV (see below), relatively little has been done to understand how psychosocial risk factors may contribute to poor outcomes among children who have experienced severe malaria. This is despite early observations that malaria-related factors could not fully account for the variability observed in the outcomes of children who have survived malaria (Boivin, 2002). In a recent effort to expand the study of pediatric malaria, Holding and Boivin (2013) have carried out a reanalysis of data from four African countries to investigate the potential role of psychosocial aspects alongside nutritional factors in explaining the variability for outcomes. What Holding and Boivin were able to illustrate is that regardless of how “SES” was conceptualized, it has an independent and additional influ-

ence on cognitive functions among survivors of severe malaria. Their measure of SES varied across contexts but mostly included material possessions at home, quality of home environment, parental education, nutritional resources, and in some cases the inclusion of anthropometry. This presents an interesting start at studying the problem of childhood malaria and its impact on outcome. Additionally, various other studies have shown that schooling and educational attainment explain some of the variability in outcomes among children surviving an episode of severe malaria (Holding et al., 2004; Kihara et al., 2009).

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## **HIV/AIDS and Child Development**

### **Epidemiology**

Worldwide an estimated 3.3 million children are HIV infected (UNAIDS, 2012). Approximately 90% of all HIV-1-positive children in the world live in sub-Saharan Africa (SSA) (UNAIDS, 2006). Vertical transmission is the main mode of infection among young children (Wiktor, Ekpini, & Nduati, 1997). With increased longevity of the HIV-infected children, the focus on morbidity including the potential adverse effects of HIV on neurocognitive outcomes has become more salient. In the following section, I highlight the impact of HIV on various neurodevelopmental domains and then discuss some of the potentially moderating and mediating factors.

### **Effects of HIV**

The literature indicates that HIV negatively impacts on various neurodevelopmental domains. Below, I provide a brief overview of these results.

**Motor** The impact of HIV on motor development has been illustrated by various studies from Africa. Studies such as those by Msellati et al. (1993) and Drotar et al. (1997) observed lower levels of motor development for HIV-infected compared to uninfected infants. In both studies

motor development was observed to decline over the 24 months follow-up periods. Both cohort studies were carried out during the pre-ARV era; however, things are not much different in the ARV era with numerous studies indicating motor delays in infants currently on ARVs. Moreover the motor impairments have been also been reported among older children. In Uganda small patterns of motor delays (Cohen's  $d = 0.31$ ) were observed among children aged 6–12 years (Ruel et al., 2012).

**Language** In Africa language functioning among HIV-infected children is poorly understood. Compared to other areas of functioning, we have the least amount of data on language development of HIV-infected children in Africa (Abubakar, Van Baar, Van de Vijver, Holding, & Newton, 2008). However, existing research indicates that consistent with what has been reported in other parts of the world, HIV-positive children experience language impairments. For instance, in a study from South Africa involving children aged 18–30 months, 82.5% also reported language impairments. The study reported global language delay in 82.5% of the children. However, the use of imported norms may have grossly overestimated the extent of the problems since also a large number of controls were also observed to have a delay (Baillieu & Potterton, 2008).

**Cognitive** The use of varied, often incomparable measures of cognition and difference in definition and composition of control groups and in some cases small sample sizes make it difficult to evaluate the true pattern, incidence, and severity of neurocognitive impairments among HIV-infected children in Africa. However, despite this shortfall, there is a general observation of cognitive impairments among HIV-positive children. Cognitive impairments have been reported among preschool children even when they have been stabilized medically. One of the earliest studies to investigate the impact of HIV infection in school-going African children was carried out in Uganda. Bagenda et al. (2006) carried out the first study with school-aged HIV-positive chil-

dren in Africa. The sample in this study consisted of 28 HIV-positive children, 42 seroreverters, and 37 controls. The age range in this sample was 6–12 years. A battery of tests including the Kaufman Assessment Battery for Children (Kaufman & Kaufman, 1983), Wide Range Achievement-Third Edition (WRAT-3), and a neurological exam were administered. Results indicated that the HIV-infected children performed within the normal range both in cognitive and neurological tests. These results are contrary to what has been reported from other parts of the world and what has been observed in more recent studies. As noted by the authors, sample particulars may have contributed to these unique observations. The children in Bagenda's study were born at a time when there was limited HIV care, especially for children in sub-Saharan Africa. Their survival to middle childhood without care may indicate that they represent subgroup of HIV-infected children for whom disease progression was less aggressive. This characteristic of the sample may imply they were especially resilient and suffered minimal central nervous system damage, hence the lack of neurobehavioral deficits. Later studies looking at HIV-infected school-aged children have observed that they do suffer multiple developmental delays. For example, in a 2011 study among HIV-infected, ARV-naive Ugandan children aged 6–12 years, impairments in multiple developmental domains were reported (Ruel et al., 2012). In this study 93 HIV-positive children were compared to 106 HIV-uninfected children. HIV-infected children presented with impairments in measures of reaction time, processing planning/reasoning, and global IQ. Similar findings have been reported in South Africa even when dealing with children who were on ARVs (Smith, Adnams & Eley, 2008).

**Mental Health** In comparison to the cognitive domain, relatively little is known of the impact of HIV on social, emotional, and behavioral functioning especially in the early years of life. The few that have done so pointed to adverse effects though the evidence is scant and lacks methodological rigor. Among older children and adolescents, there has been much more attention for the

mental health outcomes of HIV-infected children. However, there have been inconsistent findings related to this. Menon, Glazebrook, and Ngoma (2009) have reported one of the earliest studies on HIV-infected adolescents in sub-Saharan Africa. In this study mental health outcomes of HIV-infected adolescents (a significant majority of 73.2% were vertically infected) were compared to that of normal school-going children in Lusaka (HIV status and other risk factors unknown). Menon et al. did not observe any statistically significant differences between HIV-positive adolescents and their peers in school in terms of mental health functioning. This is in contrast to what has been reported in Uganda by Musisi and Kinyanda (2009). According to Musisi and Kinyanda (2009), HIV-positive adolescents presented with significant mental health problems. In their study 51.2% of the subjects had significant psychological distress (SRQ-25 scores of 6 or higher), and 14 (17.1%) had attempted suicide within the last 12 months. Specific psychiatric disorders observed (based on ICD-10 criteria (World Health Organization, 2010) were anxiety (45.6%), depression (40.8%), somatization (18.0%), seizures (8.4%), bipolar disorder (1.2%), and HIV-associated progressive encephalopathy (4.8%). Various methodological shortfalls make it difficult to evaluate which of the two studies best presents the potential effects of HIV among the youth in the African context. Specific methodological limitations including the use of a measure that was not validated in the context and not controlling for potentially confounding factors (e.g., HAART and home environment) have been observed. These methodological shortfalls limit our ability to generalize the findings and reach firm conclusions on presence, pattern, and extent of the adverse effects of HIV on mental health outcomes.

**Educational Outcome** The impact of childhood HIV infection on educational outcomes remains relatively unknown. Few studies have actually investigated educational outcomes of infected children systematically. However, in the few studies where educational outcome (including achievement, performance, school attendance,

and grade achieved) has been examined, there is evidence to show that HIV-infected children perform significantly worse than their uninfected peers. In the first report on educational achievement of HIV-infected school-aged children, Bagenda et al. (2006) reported a lack of difference in achievement tests between infected pupils and controls. However, later studies show that children who are HIV infected are likely to experience poorer educational outcomes compared to uninfected children. In Malawi it was observed that HIV-infected children attended school less frequently, lagged behind their peers in grade achieved, and showed lower grades than their uninfected peers (Devendra, Makawa, Kazembe, Calles, & Kuper, 2013). Similar pattern of results was reported by Kamau, Kuria, Mathai, Atwoli, and Kangethe (2012) in a Kenyan study where it was observed that 49% of HIV-infected adolescents in their study were at least two grades below the expected grade for their age.

## Potential Pathways

The effects of vertically transmitted HIV on a child's neurodevelopment can range from mild to severe impairment. Many studies among HIV-infected children indicate that there is a wide range of performance in this group with some presenting with developmental delays/impairments, while others do not present these impairments (Sherr, Croome, Parra-Castaneda, Bradshaw, & Herrero-Romero, 2014). This observation makes it important to understand factors that may influence outcome among children who are infected. There are two potential pathways to impairments: a biomedical and psychosocial pathway. I first discuss the biomedical factors before moving on to discuss the psychosocial environment.

## Biomedical Factors

**Antiretrovirals (ARVs)** The positive impact of antiretrovirals (ARVs) on mortality and virological and immunological functioning



among HIV-infected children has been consistently reported. Prior to the large-scale availability of ARV, the estimated mortality rates for HIV-infected children were very high. Access to ARVs has been associated with a drastic reduction in mortality rates (Sutcliffe, van Dijk, Bolton, Persaud, & Moss, 2008). However, the evidence on the effects of HAART on neurocognitive outcomes among infected children is inconclusive. In Africa, the study of potential impact of ARVs has just started. The few studies that are available present us with inconsistent findings.

One of the earliest published works to report outcomes among children on ARVs comes from South Africa. The study aimed at describing the neurological and neurocognitive deficits in HIV-infected children and the influence of short effects of highly active antiretroviral therapy (HAART) on the observed deficits. It was observed that between 33% and 81% of the participants had subnormal scores on various cognitive tests (Smith, Adnams, & Eley, 2008). Moreover at follow-up (6 months after the start of ARVs), no statistically significant differences were observed on the mean scores. This was a prospective study; 39 children (15 females) were evaluated before the start of HAART and 30 reassessed 6 months later. A noteworthy point is that at enrolment, 92% of the participants had severe immunosuppression. The lack of positive effects may be related to various factors including delayed initiation of ARV treatment. Recent results show the plausibility of this hypothesis. For instance, in a study in South Africa, it was suggested that the timing of the initiation of ARVs may have a significant impact on the pattern of deficits. In this study where 29 HIV-infected infants were involved, it was observed that the children on ARVs did not show improvement in their neurodevelopmental outcomes after initiation of ARVs. The authors also noted that the children's neurodevelopmental level did not deteriorate (Whitehead, Potterton, & Coovadia, 2013) which led the authors to conclude that their results could indicate that ARVs can stop further neurological damage but may be unable to reverse the neurological damage done prior to the treatment. In a study among school-going chil-

dren in Nigeria, Boyede et al. report that HIV-infected children on ARVs performed significantly better on an IQ test than those not on ARVs yet on the same disease stage (Boyede, Lesi, Ezeaka, & Umeh, 2013a, 2013b), thus suggesting that ARVs may potentially benefit neurocognitive outcomes. Future work involving long-term follow-up will help elucidate the influence of ARVs on neurocognitive functions.

**Timing of Infection** The question of late versus early infection has only been studied once in the African context. McGrath et al. (2006) carried out a study in Tanzania to determine the association between the timing of mother-to-child transmission and neurodevelopment among children born to HIV-infected mothers. The analysis involved 327 children seen longitudinal at 6, 12, and 24 months. Results from this study indicated that children who tested HIV-1 positive at birth had significantly higher decreases per month in motor and mental test scores compared to those who tested HIV positive later on and those who tested HIV negative. The authors concluded that the risk of being developmentally delayed was highest among those who are already HIV-1 infected at birth.

**Severity of HIV Disease** The severity of HIV infection whether assessed as disease stage or CD4 counts has been observed to increase the risk of neurodevelopmental and cognitive impairments. For instance, Ruel et al. (2012), in a study of HIV-positive 6–12-year-old Ugandan children, observed that those with low CD4 count demonstrate significant cognitive and motor deficits that correlate with HIV plasma RNA levels.

**Nutrition** In the pre-ARV era HIV-infected children experienced severe anthropometric impairments (Berhane et al., 1997). Recent studies have observed that children on ARVs have better growth outcomes, yet they still show marked delay compared to their uninfected peers. The literature shows that poor nutrition is independently associated with neurodevelopmental delay and cognitive impairments among African children. Studies looking at the relationship between HIV, growth



failure, and neurodevelopment outcomes have observed that in the context of HIV, poor nutritional status exacerbates the adverse effects of HIV infection. For instance, Abubakar, Holding, Newton, van Baar, and van de Vijver (2009) in Kenya in a study involving more than 370 children observed that HIV-infected children who were also underweight had a significantly poorer performance on a psychomotor test compared to those who were infected and not underweight. Additionally, intervention studies involving maternal micronutrient supplementation provide further support for the significance of nutritional status in shaping neurodevelopmental outcomes of children in the context of HIV. One intervention study from Tanzania reported that maternal multivitamin supplementation had the potential to significantly reduce the risk of neurodevelopmental delay among children born to HIV-infected mothers (McGrath, Bellinger, et al., 2006).

**Disease Clade** To the best of our knowledge, Boivin, Ruel, et al., (2010) are the only ones who have investigated the association between disease clade and neurocognitive outcomes among African children. In this study the authors aimed at investigating the performance of children with HIV subtypes A, B, and D. This study was informed by the observation that different disease subtypes have different patterns in terms of impact on CNS and neurobehavioral manifestation. The study involved 102 HIV-infected antiretroviral therapy (ART)-naïve Ugandan children 6–12 years old (mean 8.9). Results from the study indicated that children with HIV subtype A demonstrated poorer neurocognitive performance than those with HIV subtype D.

### Psychosocial Risk Factors

Children infected with HIV live in a multiple-risk environment such as exposure to unstable or multiple caregivers, suboptimal caregiving patterns, poverty, stigma, parental illness, and multiple losses through death (Stein et al., 2005). These psychosocial risk factors have been observed to independently lead to poor developmental out-

comes in children, and in the context of HIV infection, they have been observed to exacerbate the impact of HIV infection. In the following section, I highlight the association between childhood outcomes, HIV, and the psychosocial environment. These factors are organized around four major topics: SES, parenting behavior, orphanhood, and stigma. While the topics are discussed in separation, it is worth noting that in most of the studies, these factors are examined concurrently since they are highly interrelated. The organization of the factors is mainly used to guide the discussion.

**Socioeconomic Status** Low SES among HIV-infected children has been associated with poorer neurocognitive and mental health outcomes in various studies in Africa. For instance, in a study among school-aged children in Nigeria, Boyede, Lesi, Ezeaka, and Umeh observed that HIV-infected children performed significantly worse in the Raven Progressive Matrices (Raven, Court, & Raven, 1977), a measure of nonverbal intelligence (Boyede, Lesi, Ezeaka, & Umeh, 2013a, 2013b). However, other than HIV status, it was also observed that various demographic risk factors including poor socioeconomic status and low level of maternal education were significantly associated with low cognitive function in this sample, thereby indicating that low SES was associated with increased risk factors for poor outcomes among infected children.

**Parenting Behavior** The potential impact of parenting behavior on child outcomes has been investigated in the earliest studies aimed at examining the neurodevelopmental outcomes associated with HIV infection among children in Africa. In Uganda, Drotar et al. (1997) and Drotar et al. (1999) reported a study involving measures of parenting behavior. In one of the measures, family caretaker–child interactions were assessed in home visits at 6 and 12 months of age. In this measure there is an assessment of the frequency of mother–child and caretaker–child, including touch, vocalization, and physical care. In the second measure, an adapted version of the Home Observation for the Measurement of the

Environment (HOME) (Caldwell, 2001) was administered. In this measure the quality of home environments, such as caretaker responsiveness and organization, was observed. The authors observed that there were no differences in the parenting behavior of HIV-infected mothers and HIV-negative mothers. Since no significant group differences were observed, no further analysis was carried out to investigate the potential of within-group variability resulting from parenting behavior. More recent studies have focused on these aspects. For instance, in a recent study from Uganda, Busman, Page, Oka, Giordani, and Boivin (2013) investigated the role of various psychosocial factors in shaping outcome among HIV-infected children. The study involved 119 children aged 1–5 years of age. The main measure of the caregiving environment administered was the HOME. The study observed that the caregiving context, i.e. the quality of the home environment, was associated with the children's reported externalizing behavioral problems.

Moreover, various psychosocial issues such as parental illness, parental depression, and experience of stigma are known to negatively influence parenting behavior. This in turn influences childhood outcomes. Adults infected with HIV experience these negative factors more compared to HIV-uninfected adults. Although these relationships have not been studied much among HIV-infected children, it is expected that these negative experiences are likely to contribute to adverse impact in HIV-infected children. Studies among HIV-affected children (children of HIV-positive parents) already indicate that these psychosocial factors are likely to contribute to poor outcomes (Cluver, Orkin, Gardner, & Boyes, 2012; Cluver et al., 2013).

**Orphanhood** Parental HIV infection significantly increases the risk of orphanhood. For instance, in a 2005 study in Rakai, Uganda, it was reported that the overall prevalence of orphanhood was higher among children of HIV-infected parents (22.7%) compared with children of uninfected parents (7.9%) (Makumbi et al., 2005). In a further analysis where pre- and post-ARV era results were compared, it was observed that “the prevalence of orphanhood significantly declined;

17.2% during Pre-HIV care roll-out, 16.0% at HIV care transition and 12.6% at expanded HIV care period ( $X^2$  trend,  $p < 0.0001$ )” (Makumbi et al., 2012, p. e94). So while the rates of orphanhood are decreasing, there is still a large population of children who are orphaned or continue to be orphaned. It is estimated that around 17 million children in Africa have been orphaned by HIV. Children orphaned by HIV have been observed to experience poor mental health outcomes compared to those who are orphaned by other diseases or those who are non-orphaned. There are few analyses where the potential role orphanhood in shaping outcomes of HIV-infected children is examined. However, if it is examined, the independent contribution of being an orphan to poor developmental outcomes is clear.

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## Other Infectious Diseases

As noted earlier, African children are exposed to a significant number of infectious diseases with the potential to harm neurocognitive functioning. Although the literature concentrates on the impact of HIV and malaria, these other infectious diseases do contribute significantly to neurodevelopmental impairments. In this section I highlight some of the neurodevelopmental problems associated with common infectious diseases in the African context. Table 7.1 next summarizes the prevalence of neurodevelopmental sequelae in children exposed to these infectious diseases in the first 90 days of life. The table is adapted from the review published by Mwaniki, Atieno, Lawn, and Newton (2012). As can be seen from that table, exposure to these infectious diseases contributes to significant, neurodevelopmental, behavior, and motor impairments. Next, I will highlight some of the studies related to the cognitive impact of these infectious diseases in African children.

## Meningitis

In a review of the literature, Chandran, Herbert, Misurski, and Santosham (2011) aptly noted that the burden of meningitis remains largely

**Table 7.1** A summary of the adverse neurodevelopmental outcomes following intrauterine and neonatal insults

| Insult                  | Neonates assessed ( <i>n</i> ) | Type of sequelae ( <i>n</i> ; % of total with impairment) |                              |                     |
|-------------------------|--------------------------------|---|------------------------------|---------------------|
|                         |                                | Neurodevelopmental <sup>a</sup>                           | Gross motor and coordination | Behavioral problems |
| Sepsis (5 studies)      | 2442                           | 720 (74%)   | 5 (1%)                       |                     |
| Meningitis (11 studies) | 501                            | 209 (100%)  | 10 (5%)                      | 3 (1%)              |
| Jaundice (20 studies)   | 7212                           | 985 (75%)   | 36 (3%)                      | 57 (4%)             |
| Tetanus (4 studies)     | 109                            | 28 (100%)   | 4 (14%)                      | 6 (21%)             |

<sup>a</sup>In the original table, this covers cognition, general developmental delay, or learning difficulties

unappreciated. The literature on the impact of meningitis is very sparse especially so in the African region. In their review Chandran et al. (2011) identified two studies from Africa looking at sequelae of meningitis compared to North America ( $n = 7$ ), Europe ( $n = 9$ ), Australia ( $n = 4$ ), and another two from Asia. This is despite the fact that African countries have one of the highest burdens of childhood meningitis.

In the next section, I review some of the studies that addressed long-term sequelae of meningitis in African children. Kihara et al. (2012) have investigated the impact of pneumococcal meningitis using a neurophysiological measure, ERPs in Kenya. The study involved 65 children aged 4–15 years with a history of PM and an age-matched control group of 93 children. The results indicated that children with a history of pneumococcal meningitis process novelty differently than do unexposed children, with slower latencies and reduced or absent components. Deficits in processing novelty tasks were observed both for auditory and visual tasks. The authors suggested that the pattern of poorer auditory attention and/or cognitive slowness and poorer visual attention orienting were results of disruption in the functions of the lateral prefrontal and superior temporal cortices. Edmond et al. (2010), in a study in Dakar, Senegal, examined 132 children (66 cases and 66 controls) to investigate the disabling sequelae and quality of life in children with bacterial meningitis in sub-Saharan Africa. The study administered standardized tools to classify disabling sequelae (Global Burden of Disease classification system) and quality of life (Pediatric Quality of Life Inventory tool). Results from the study indicated that children who had suffered meningitis were three times more likely

to experience major sequelae compared to community controls. According to the authors, *hearing loss was the most common major sequelae in the cases (51.8%, 29/56), followed by cognitive deficit (40.0%, 26/65), seizures (21.2%, 14/66), and motor deficit (21.2%, 14/66). Of these cases, 34.9% (23/66) had multiple impairments.*

### Neonatal Jaundice and Sepsis

Wolf and colleagues in a series of studies among Zimbabwean neonates investigated the effects of extreme hyperbilirubinemia on neurodevelopmental outcomes among 50 Zimbabwean neonates (Wolf, Beunen, Casaer, & Wolf, 1997, 1998; Wolf, Wolf, Beunen, & Casaer, 1999). In the first study, the neonates were followed up when they were 4 months and administered to a neurological exam alongside the Infant Motor Screen (IMS) (Nickel, Renke, & Gallenstein, 1989). The IMS consists of 25 items that assess muscle tone, primitive reflexes, automatic reactions, and asymmetry of motor skills. On the neurological exam, 27 out of 50 (54%) babies classified normal, 11 (22%) suspect, and 12 (24%) abnormal. Six out of 45 (13.3%) infants scored abnormal on the IMS, 6 (13.3%) scored suspect, and 33 (73.3%) scored normal at 4 months of age. In a one-year follow-up of the same cohort, the children were administered the Bayley Scales of Infant Development (Bayley, 1993) to evaluate motor and mental outcomes. In this study, 11 (26%) scored abnormal on the Bayley Scales of Infant Development; a cautionary note is that the examiner used American-based norms to categorize the children as having abnormal scores. The use of Western norms that

have not been locally validated may contribute to either Type 1 or Type 2 to errors in diagnosis.

A study in Kilifi, Kenya, involving 86 children (23 children with neonatal jaundice (NJ), 23 with neonatal sepsis (NS), and 40 community controls) aged 18–32 months was one of the earliest to look into details the neurodevelopmental impact of these infections on childhood outcomes (Barlow, Mung'ala-Odera, Gona, & Newton, 2001). The study carried out a broad-based analysis including looking at neurological and developmental outcomes. Results indicated both NJ and NS were associated with neurodevelopmental sequelae although the patterns in these two conditions differed. The NJ subjects had significantly more neurological, motor, and developmental difficulties compared to both NS and CCs groups. For instance, 48% of the children in the NJ group were unable to stand unassisted compared to 16% of those with NS and none among the community controls.

There are hardly any long-term follow-up study on the impact of neonatal sepsis and jaundice. However, the few studies looking at the risk factors of neuroimpairments and neurodisabilities at the community level have observed that neonatal insult is an important risk factor for long-term poor outcomes. For instance, Mung'ala-Odera et al. (2006) in a large epidemiological study observed that neonatal insults were a main risk factor for neuroimpairments. According to the authors in *both the univariate (odds ratio (OR) 1.70; 95% CI 1.12–2.47) and multivariate NI (OR 1.30; 95% CI 1.09–1.65), neonatal insults were found to have a significant association with moderate/severe NI*. The pattern of results observed indicates that neonatal infectious diseases contribute to the burden of neurocognitive impairments in the African context.

### **Potential Interventions to Prevent and Rehabilitate Against Cognitive Delays**

In this book several chapters are dedicated to interventions for at risk children in Africa. Consequently, I will not go into great details on

the intervention processes that have been shown to either prevent or rehabilitate against the impact of infectious diseases on neurodevelopmental outcomes. However, I will highlight some of those that have been shown to have potential as a way to conclude the chapter in a more positive way with a special focus on psychological once given the theme of the book.

**Parenting Programs** A few recent studies have investigated the degree to which parenting/caregiving programs can help ameliorate against the negative effects of central nervous system infections. The studies have been carried out especially in the context of HIV and have provided evidence that indeed parenting programs can improve outcomes. In the first non-biomedical study aimed at enhancing outcomes among HIV-infected children, this longitudinal, randomized controlled trial aimed at examining the potential impact of a psychosocial stimulation program (Potterton, Stewart, Cooper, & Becker, 2010). The study involved a total of 122 children who had been assigned to either a comparison or an experimental group. Children in the experimental group were given a home stimulation program that was updated every 3 months. Children in the experimental group were given individual home programs by a qualified physiotherapist. The stimulation program was structured around activities of daily living and developmentally appropriate play that could be incorporated into the family's daily routine (e.g., bathing, feeding, and dressing). The home program included activities to promote motor, cognitive, and speech and language development. Children in the comparison group received no developmental intervention. Additionally, caregivers in the experimental group were provided with a picture book which they were instructed to use with their children daily by looking at the pictures together and talking about the pictures. At baseline a significant proportion of the children suffered cognitive and motor delays (52% and 72%, respectively). Results indicated that children in the experimental group showed significantly greater improvement in cognitive ( $p = 0.010$ ) and motor ( $p = 0.020$ ) development

over time than children in the comparison group, thus providing support for its efficacy.

In another study, Boivin et al. (2013) evaluated the potential of a caregiving training program to improve cognition among HIV-infected children. In this study the mediational intervention for sensitizing caregivers (MISC; see Chap. 16 for a full description of the program) was implemented. The study involved 120 child/caregiver dyads with HIV (60 experimental and 60 controls) who were randomly assigned to either group. Results from the study indicated that children with caregivers who received the mediational intervention showed significant improvement in their cognitive performance and their caregivers showed fewer depressive symptoms. These two studies indicate that caregiver training and psychosocial stimulation have the potential to ameliorate against the negative impact of infectious diseases.

**Cognitive Rehabilitations Using Computerized Programs** Work by Boivin and colleagues in Uganda has started to provide initial evidence that a computerized program aimed at rehabilitating cognitive deficits may potentially enhance cognitive functions in both HIV-positive children and children exposed to malaria (Boivin, Busman, et al., 2010). In a pilot study aimed to evaluate this computerized program, Boivin et al. recruited 60 children and randomly assigned them to an experimental or a control group. The experimental group was exposed to ten sessions of Captain's Log computerized cognitive rehabilitation therapy (Sandford, 2007) training specifically aimed at enhancing attention and memory skills. Results from the study indicated that children in the intervention group showed greater improvement on cognitive tasks, thus providing support for its usefulness. See Chap. 15 for a more detailed discussion on the potential of computerized programs.

### **Implications for Research and Practice**

Existing evidence base is sufficient to allow for the conclusion that infectious diseases contribute to a significant amount of neurocognitive impairment

and mental health problems. However, the pathways from disease to poor outcomes are poorly understood. Research in which both the impact of psychosocial and biomedical factors are investigated are urgently needed. Advanced statistically approaches such as path analytic and multilevel models are an important avenue for understanding pathways to poor outcomes. Additionally the neurocognitive burden of some of the infectious diseases remains largely understudied. There is a need to pay more attention to the impact of infectious diseases such as neonatal jaundice and sepsis.

From a practice point of view, most of the care practices for children who are affected by infectious diseases take a very biomedical approach. Our review indicates a strong contribution of psychosocial factors in shaping the neurodevelopmental outcomes of infected children. There is therefore a need for the adoption of an integrated approach to address the needs of children who have experienced the adverse impact of infectious disease.

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### **Conclusion**

The current chapter indicates that infectious diseases lead to multiple impairments among exposed children. These impairments do not only result from the disease factors but also from the interaction with psychosocial aspects such as the home environment, familiar SES, and parenting behavior. Many African children live in multiple-risk environments which exacerbates the negative impact of infectious diseases. As a consequence, infectious diseases are only the risk factors jeopardizing a child's development. In addition, from the literature it is clear that there has been an overemphasis on certain infectious diseases at the expense of lesser studied diseases such as neonatal jaundice and sepsis. There is a need for more studies to elucidate important points of intervention and to better understand how to influence development that is impaired by multiple risk factors. Also efforts toward evaluating the efficacy of psychosocial interventions need to be intensified to ensure that we have evidenced-based approaches for remediating against adverse effects of these infectious diseases.



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# The Impact of Helminth Infections on Developmental and Educational Outcomes

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Margaret Nampijja

Worldwide, over 200 million children under the age of 5 years fail to attain their physical, cognitive, or socio-emotional developmental potential as a result of cumulative effects of poverty, disease, malnutrition, and deficient care (Grantham-McGregor, Cheung, & Cueto, 2007). This loss of potential is likely to be carried into later childhood, limiting their educational achievements, and may in turn have significant implications for their employment success later in life. If effective interventions are not provided, the offspring of these individuals are also likely to suffer the same problems hence propagating poverty, ill-health, and malnutrition from generation to generation. Of note, worms, cerebral malaria, HIV/AIDS, and nutrient deficiencies are reported to impair children's mental functioning (Alcock & Bundy, 2001) particularly in the developing world. Worms in particular affect more than 90 million children worldwide with the majority living in impoverished communities in sub-Saharan Africa in whom they are believed to impair cognitive functioning and affect school performance (Dickson, Awasthi, Williamson, Demellweek, & Garner, 2000; Taylor-Robinson, Jones, & Garner, 2007).

Worms in childhood have been reported to impair cognitive function of children although findings have not been consistent regarding the cognitive domains affected and whether deworming reverses these effects (Boivin, Giordani, & Nganda, 1993; Ezeamama et al., 2005; Jukes et al., 2002; Nokes et al., 1992, 1999; Sakti et al., 1999; Simeon, Callender, Wong, Grantham-McGregor, & Ramdath, 1994; Sternberg, Powell, McGrane, & Grantham-McGregor, 1997; Taylor-Robinson et al., 2007). However, a thread of consistency through these studies seems to suggest that a set of related functions (executive function) might particularly be susceptible to impairment by worms, but this is yet to be established. The current chapter evaluates the impact of worm infections on cognitive and educational performance of children in the African context. The chapter begins with an overview on cognitive effects of worms using empirical evidence from various populations. I then focus on a recent trial, the Entebbe Mother and Baby Study (EMaBS), which has investigated effects of worms on executive functioning in Ugandan children. We conclude the chapter with a general discussion, conclusion, and policy implications of the findings for Africa and other parts of the world affected by worms.

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## Global and African Burden of Worms

Soil-transmitted worms are widely distributed across the tropics, and the highest burden is found in children and pregnant women living in low-income settings (Cabrera, 1984; Leonardo, Acosta, Olveda, & Aligui, 2002). Various species of worms have been isolated from different populations, and these occur in variable prevalence rates. Hookworm and *Ascaris lumbricoides* (round worm) are each estimated to infect about 1.3 billion people worldwide, while *Trichuris trichiura* (whipworm) and schistosomiasis (*Bilharzia*) affect 900 and 200 million people, respectively (Bundy, 1994). In Africa, more than a third of the continent's population are infected with these parasites, of which about 89.9 million are school-age children (Brooker, Clements, & Bundy, 2006). Children are particularly susceptible to being infected with worms since they often lack footwear and have not learnt hand and food hygiene. In Uganda, at least a quarter of the population is at risk for worm infection, but rates can be as high as 80% in fishing communities where certain worm types such as schistosomiasis are highly prevalent. Until recently about 60% of Ugandan children were infected with intestinal nematodes, most commonly hookworm (Alderman, Konde-Lule, Sebuliba, Bundy, & Hall, 2006), but due to regular school-based deworming, the prevalence has reduced. Poor hygiene and sanitation, overcrowding, and illiteracy are some of the risk factors associated with worms (De Silva et al., 2003). Intestinal nematodes such as hookworm are easily treated with inexpensive single-dose albendazole; others such as *Trichuris* and *Strongyloides stercoralis* need multiple doses of the drug. Schistosomiasis is also not eliminated by one dose of praziquantel although intensity can be reduced (Bundy & Guyatt, 1996; Stephenson, Latham, Adams, Kinoti, & Pertet, 1993). Due to high prevalence in some populations, poor sanitation, crowding, and warm and wet climates that favor transmission, reinfection is bound to occur within a short time. In such settings, worms are still endemic, and efforts for controlling or eradicating them still meet with only limited success.

Worms are also common in pregnant women in whom they have been associated with maternal anemia and poor birth outcomes in some studies (Christian, Khattry, & West, 2004; De Silva, Sirisena, Gunasekera, Ismail, & de Silva, 1999) but not all (e.g., Larocque, Casapia, Gatuzzo, & Gyorkos, 2005; Muhangi et al., 2007; Ndibazza et al., 2010). We have explored whether maternal worms might also be detrimental for fetal neurocognitive development, as discussed later in the chapter (Nampijja et al., 2012).

Generally, worm infections are linked with malnutrition, impaired growth, and iron-deficiency anemia and are thought to reduce educational achievements (Bundy, 1994; Del Rosso & Marek, 1996; Drake, Jukes, Sternberg, & Bundy, 1999; Stoltzfus et al., 1997), but it is important to note that different species may be expected to have different effects based on their life cycles and pathogenesis. For example, hookworm, which causes blood loss directly, is most likely to cause anemia. These parasites are also believed to negatively affect motor and cognitive functioning. A critical review of early and recent findings of worms/deworming and cognition in Africa and elsewhere in the world follows.

## Previous Studies on Cognitive Effects of Worms in Childhood

The biggest burden of worm infections is reported to be in children in whom they are associated with impaired growth and development. Previous studies of worms have demonstrated that various worm species contribute to depletion of iron and other nutrients from the body, and in so doing, they (worms) affect growth. For instance, hookworm infection in children is associated with iron-deficiency anemia (Crompton, 2000; De Silva, 2003; Stoltzfus et al., 1996, 1997), and correlations between infection intensity and severity of anemia have been demonstrated (Crompton, Torlesse, & Hodges, 2003). *Ascaris lumbricoides*, hookworm, and *Trichuris trichiura* are associated with impaired

growth (e.g., De Silva, 2003) and iron-deficiency anemia in children (Stoltzfus et al., 1997). *Trichuris trichiura*, through diarrhea and impaired nutrient absorption, has also been reported to affect child nutrition (Capello, 2004).

Several researchers have reported associations between worms and cognitive impairment (e.g., Boivin et al., 1993; Dickson et al., 2000; Ezeamama et al., 2005; Jukes et al., 2002; Nokes et al., 1992, 1999; Sakti et al., 1999; Simeon et al., 1994; Sternberg et al., 1997 for a review). Boivin et al. (1993), in an observational analysis, compared performance of Zairian schoolchildren on the Kaufman Assessment Battery for Children based on intestinal worm infection status. Children positive for intestinal worms performed significantly more poorly than children without worms on the sequential processing portion and the mental processing composite of the battery although only the effect on number recall remained significant after controlling for all confounders. Tied together with improvements following treatment, the results of Boivin and colleagues' study suggested that auditory and spatial short-term memory might particularly be sensitive to effects of intestinal worms.

In another study, Nokes et al. (1999) examined effects of *Schistosoma japonicum* in Chinese schoolchildren using a randomized placebo-controlled design. They found improvements due to deworming in performance on Fluency, Picture Search, and Free Recall, and they concluded that *S. japonicum* is associated with impairments of working memory.

However, looking at the cognitive measures that were affected, it would not be accurate to conclude that working memory was the underlying ability that was assessed by all these measures. Rather, it would be more accurate to say that attention control as measured by Picture Search and Verbal Fluency and memory as measured by Verbal Fluency and Free Recall were affected by worms. By definition, working memory is the function of the executive system that allows for temporary storage of information in memory and at the same time using the information for ongoing cognitive processing (Baddeley, 1986). Working memory tasks

therefore must have this dual-task feature of temporary storage and active processing. Although Picture Search and Free Recall load attention and memory, respectively, and both aspects are part of working memory, it would be inaccurate to conclude that individual measures represent working memory. Verbal fluency requires a participant to recall as many items in a specified category as possible, so it is presumed to load the central executive and may be considered as a measure of working memory. However, the measure does not require dual-task feature, and performance on this measure appears to depend on the ability to recall items making it more of a measure of memory than of working memory.

Likewise, Picture Search and Free Recall do not typically exhibit the dual-task characteristic of working memory tasks, so they are better classified as measures of attention task and memory, respectively, rather than working memory. In summary, it appears that *Schistosoma japonicum* may be associated with impairments in distinct functions including memory, attention, and probably a component of working memory and that treatment of *S. japonicum* improves these functions.

Impairments in other cognitive functions due to childhood worm infection have been reported in other studies making the inconsistency more obvious. Associations have been observed with verbal short-term memory and speed of information processing (Jukes et al., 2002), phonological memory and inhibitory control (Sakti et al., 1999), and working memory and language (Ezeamama et al., 2005). Unmeasured confounding due to adverse socioeconomic factors was a limitation to many of the observational studies of worms and might underlie some variability in findings. Moreover, in some studies of worms, global measures of cognitive functioning were used, and in the absence of a hypothesis, it was difficult to work out which exact function was affected. As recommended by Wainwright and Colombo (2006), it is important that researchers ensure that their choice of tasks is based on specific hypotheses of the cognitive systems expected to be altered and on an understanding of which



test would be expected to be sensitive to a given disruption.

Furthermore, researchers examined effects of certain types of worms and not others probably because worm species have variable geographical distributions. For example, Nokes et al. (1992) investigated effects of *Trichuris trichiura* in Jamaican children, whereas Jukes et al. (2002) looked at *Schistosomiasis* in Tanzanian children, and the two studies reported different effects. It is possible that different worms induce specific physiological or immunological changes in the host and which may affect different components of the cognitive system differently.

In summary, although cognitive effects of worms in children have been investigated extensively, it is still not clear which functions are affected. It may be that worms affect a wide range of structurally, functionally, or developmentally related cognitive skills representing a higher cognitive skill. Looking at the measures that were sensitive, it might be that attention as was detected by Picture Search, working memory as measured by Verbal Fluency and Digit Span Forward, inhibition as measured by the Stroop task, general cognitive ability which may have been described as processing speed are selectively impaired. These cognitive functions may generally be regarded as high-level skills; they (attention, working memory, and inhibition) fall under the umbrella term “executive functions” (Rabbitt, 1997; Roberts, Robins, & Wiskrantz, 1998; Stuss & Knight, 2002); it is therefore possible that various components of executive functioning may be the cognitive domain affected by worm infections. By definition, executive functions are mental processes necessary for modulation of other cognitive processes in order to achieve purposeful and goal-directed behavior (e.g., Bell, 1998; Lyon & Krasnegor, 1996; Miyak et al., 2000; Stuss, 1987; Zelazo, Carter, Reznick, & Frye, 1997). They include the ability to shift from one concept to another, modify behavior particularly in response to new or modified information about task demands, synthesize and integrate isolated details into a coherent whole, manage multiple sources of information and, finally, make use of relevant acquired knowl-

edge (Stuss, 1987). Early executive functions are critical for children’s behavior and learning (e.g., Bruininks & Mayer, 1979; Cooper & Farran, 1988; MacClelland et al., 2007; Monette, Bigras, & Guay, 2011; Rohde & Thompson, 2007), and their impairment (e.g., by worms) would therefore negatively affect children’s academic performance, educational achievements, and success later in life.

### **Does Deworming Improve Cognitive Function and School Performance?**

Because worm infections are distributed worldwide and have been associated with widespread morbidity especially in children, aggressive interventions such as deworming and improving hygiene and sanitation are justifiable. However, to what extent impaired cognitive functioning among children in disadvantaged societies is amenable to deworming deserves more investigation. The World Health Organization (WHO, 2002) recommends three different treatment options for populations based on prevalence rates. Selective deworming or treating individuals found to be infected as detected by stool microscopy is recommended for low prevalence low intensity communities. For moderate prevalence low-intensity community, targeted deworming for school-age children once a year is recommended. Finally, in communities where worms are highly prevalent and in heavy intensity levels, the WHO recommends targeted treatment of school-age children 2–3 times a year. Deworming in schools has therefore been implemented in communities with moderate to high worm infection rates, and deworming drugs have been made available at relatively affordable costs. Albendazole and mebendazole given in correct doses effectively treat hookworm, *Ascaris lumbricoides*, *Trichuris trichiura*, and *Strongyloides stercoralis*, although albendazole is preferred because it is a single dose and more efficacious for hookworm. Praziquantel is used to treat all types of schistosomiasis in adults and children.

Benefits of deworming on growth and development have been evaluated; significant



improvements in height, weight, and mid-upper arm circumference were reported in some studies (Alderman et al., 2006; Beach et al., 1999; Fox et al., 2005; Koroma, Williams, de la Hay, & Hodges, 1996; Stoltzfus et al., 1997, 2001) although these results were not replicated in others (e.g., Hadju, Abadi, & Stephenson, 1997; Kloetzel, Merluzzi-Filho, & Kloetzel, 1982; Michaelsen, 1985; Simeon, Grantham-McGregor, Callender, & Wong, 1995), and in some studies treatment was found to be negatively associated with height and weight (Greenberg et al., 1981; Roushman & Mascie-Taylor, 1994). A Cochrane review found evidence of a possible benefit for growth in some settings (Taylor-Robinson et al., 2007). It is likely that deworming may improve growth and nutrition, although there is a need for conclusive evidence.

Studies of cognitive effects of anthelmintic treatment on cognitive function have yielded mixed findings, and hence these are not conclusive. For example, Nokes et al. (1992) compared performance of Jamaican children aged 9–12 years on Digit Span Forward, Digit Span Backward, Matching Familiar Figure Test, arithmetic, listening, comprehension test, Verbal Fluency, and coding (from Wechsler Intelligence Scale for Children). They found significant effects of a single dose of albendazole on Fluency, Digit Span Forward, and Digit Span Backward.

In another study (Nokes et al., 1999), Chinese schoolchildren aged 5–16 years who had *Schistosoma japonicum* infection were randomized to albendazole or placebo treatment and praziquantel or placebo treatment. They were assessed on cognitive functions before treatment and 3 months after treatment using measures including Fluency, Free Recall, Picture Search, Digit Span Forward, and Corsi block. Results of this study showed significant improvements associated with praziquantel treatment on Fluency, Picture Search, and Free Recall in younger children (5–7 years).

Boivin et al. (1993) assessed a sample of Zairian schoolchildren aged 8 years on the Kaufman Assessment Battery for Children before treatment with levamisole and 4 weeks after treatment. Intestinal worms were associated with

low scores on number recall; treatment, however, was associated with improvements on performance on spatial memory subtests but not on number recall which had exhibited sensitivity to worms. It is possible that some of the effects of treatment were missed due to the short posttreatment follow-up period. On the other hand, observed improvements might have been due to practice effects (rather than cognitive improvement) given the short-time interval. Longer follow-up periods might have allowed for substantial recovery of ability (e.g., on verbal recall), and a placebo-controlled trial would have been a better design.

Other researchers have not found benefits of deworming on cognitive functioning. For example, Watkins, Cruz, and Pollit (1996) compared performance of Guatemalan children aged 6–12 years on the Picture Vocabulary Test, the Inter-American Vocabulary Test, and the Inter-American Reading Test. They did not find significant differences in performance between children who were treated with multiple doses of albendazole and those who received a placebo. In Zanzibari children aged between 3–56 months, multiple doses of mebendazole did not have an effect on language and motor development (Stoltzfus et al., 2001) although in this study, scores on the outcomes were based on parental reports. Simeon et al. (1995) examined effects of deworming on various measures including Digit Span, Verbal Fluency, Visual Search, Corsi Block, Silly Sentences, as well as reading and arithmetic tests in Jamaican children aged 6–12 years, but they too did not find significant effects of albendazole. More recent studies have also not found benefits of deworming on cognitive functioning (e.g., Awasthi, Pande, & Fletcher, 2000). In summary, based on findings of these and more studies (Dickson et al., 2000; Taylor-Robinson et al., 2007, for reviews), it appears that deworming may improve children's growth and nutritional status in some settings, but whether cognitive functioning and school performance improve with treatment is yet to be established.

In general, findings of earlier studies indicate that worms may have negative effects on the cognitive system, with the executive functions

appearing more susceptible; this is yet to be established. Moreover, mechanisms by which worms affect the cognitive system are not yet clear. Possible mechanisms have been proposed to explain reported associations. These are discussed briefly below.

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### **Mechanisms of Possible Cognitive Effects of Worms**

General pathways as well as those specific to a worm species have been suggested to explain the possible link between worm infections and cognitive impairment. Intestinal worms live in the gut and feed on gastrointestinal contents, and their effects on growth and nutrition are thought to be mediated through reduced appetite, impaired digestion, reduced nutrient absorption and utilization, and increased losses (De Silva, 2003; Stephenson, Latham, & Ottesen, 2000).

Mechanisms by which worms might impair cognitive functioning are more complicated. It could be that effects of worms on cognition are mediated by their effect on nutrition and growth, but it is also possible that alternative mechanisms such as changes in certain host immune responses might mediate these effects. There is evidence for associations between worms and undernutrition (Capello, 2004; De Silva, 2003) and iron deficiency in children (Crompton, 2000; De Silva, 2003; Stoltzfus, et al., 1996, 1997) and pregnant women (e.g., Dreyfuss et al., 2000). Consistent with this, improvements in hemoglobin levels, very low birth weight, growth, and nutrition as a result of deworming have been demonstrated (Alderman et al., 2006; Beach et al., 1999; Koroma et al., 1996; Stoltzfus et al., 2004; Torlesse & Hodges, 2001), although in some studies, these improvements were not found (e.g., Larocque et al., 2005; Muhangi et al., 2007). Moreover, several studies have shown that undernutrition and iron-deficiency anemia are associated with poor growth, motor and cognitive impairment, and poor school achievement although mechanisms are still not well understood (e.g., Drewett, Wolke, Asefa, Kaba, & Tessema, 2001; Johnson, Low, Baessa, & Macvean, 1987;

Lozoff & Teal, 2004; Mendez & Adair, 1999; Mooock & Leslie, 1986; Webb, Horton, & Kartz, 2005). It is therefore possible that cognitive effects of worms are mediated by undernutrition and iron deficiency. Plausible neurocognitive theories related to brain development could explain the association between cognitive impairment and iron deficiency and undernutrition in early development. Wainwright and Colombo (2006) propose that availability of some neurotransmitters can be influenced by dietary supply of their amino acid precursors. For instance, tryptophan is the dietary precursor of serotonin and tyrosine is that of dopamine and norepinephrine (Fernstrom, 1990). Dopamine in particular influences the frontal cortex which is involved in short-term memory, planning, and other executive functions. Wainwright and Colombo (2006) therefore propose that changes in the availability of nutrient supply of the different amino acids may result in disturbances of specific brain and behavioral functions. Intestinal worms depend on the host's digestive contents for tyrosine (Moran, 2005), and therefore prolonged infestation of worms may deprive the body of this nutrient resulting in dopamine depletion and hence impairment of executive functioning.

Furthermore, malnutrition, particularly protein-energy depletion, is associated with inadequate supply of glucose which manifests as lack of energy and reduced or slowing of motor activity. Indeed, studies of malnutrition have shown that children who were malnourished had low scores on tests of motor abilities (e.g., Grantham-McGregor, Powell, Walker, Chang, & Fletcher, 1994; Siegel et al., 2005). Moreover, studies of worm infections also showed that infected children performed poorly on measures of psychomotor skills like the pegboard task (Jukes et al., 2002; Sakti et al., 1999) and bead threading (Sakti et al., 1999). Given that lack of energy would directly affect motor activity, it is possible that some of the effects seen on cognitive tasks may be due to the reduced motor activity. Performance on speeded tests and performance tests would in that case be more susceptible to effects mediated by motor dysfunction.

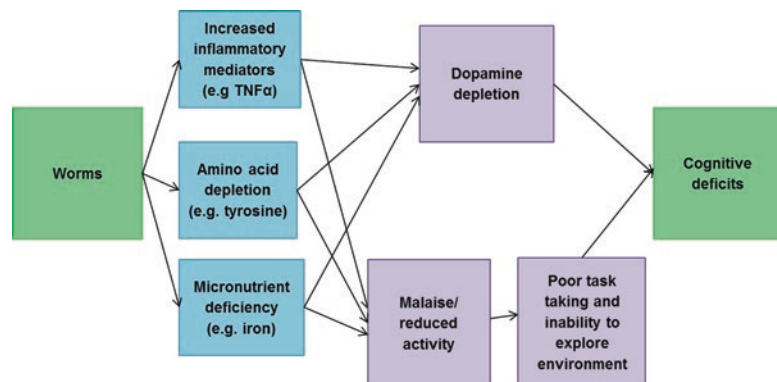
Ezeamama et al. (2005) demonstrated associations between *Schistosoma japonicum* and *Ascaris lumbricoides* and memory and learning after adjusting for both nutritional status and hemoglobin status implying that these factors were unlikely to be primary mediators of the observed cognitive deficits. Alternative mechanisms were proposed one of which was through immunological changes due to worms and their effect on the dopaminergic system. Worms have a complex interaction with the human immune system, with both pro- and anti-inflammatory effects, depending on the species. Infections that cause significant inflammation leads to increased levels of circulating cytokines such as tumor necrosis factor-alpha (TNF-alpha), interleukin-1, interleukin-2, and interleukin-6. Elevated levels of serum TNF-alpha have particularly been observed in schistosomiasis infection (Azim, Sedky, el Tahawy, Fikry, & Mostafa, 1995; Mwatha et al., 1998). This cytokine has been implicated to interfere with the dopaminergic system and hence could have an influence on the frontal cortex, limbic system, and basal ganglia. As a result, cognitive functions which depend on these structures including executive function, movement, emotion, and motivated behavior may be impaired (Reichenberg et al., 2001).

Worms such as *Ascaris lumbricoides*, *Schistosoma japonicum*, and *Trichuris trichiura* cause malaise and abdominal pain and in turn reduced physical activity which if severe or frequent enough may interfere with children's ability to explore and learn from their environment and also distract them from the cognitive tasks

(Ezeamama et al., 2005). This pathway would imply that these worms would show a general impairment of cognitive function in affected individuals. However, in all the studies of worm effects, some but not all functions were affected by worms, making malaise and abdominal discomfort an inadequate explanation. Despite their plausibility, the proposed mechanisms are based on many assumptions and therefore warrant further scrutiny and investigation. The proposed mechanisms are represented in a framework shown in Fig. 8.1.

In summary, literature indicates that worms may be associated with developmental deficits and poor educational achievements. However, so far findings have not been consistent with regard to which functions are impaired, and it is not clear whether deworming would reverse these effects. The Entebbe Mother and Baby Study (EMaBS) sets out to resolve the question of which cognitive domains are susceptible to the effect of helminth and whether these effects are reversible by treatment using a randomized placebo trial which deployed a large sample of participants. EMaBS aimed to examine (1) effects of maternal worms and treatment in pregnancy on developmental outcomes in infancy and (2) effects of children's own infections in the first 5 years of life on cognitive performance. We hypothesized that worm infections in mothers during pregnancy and in childhood would negatively affect executive functions of children and that deworming treatment would reverse these effects. The following section summarizes the design, methodology, and

**Fig. 8.1** Mechanisms by which worms may impair cognitive function



results of the EMaBS research, which has also been reported in detail elsewhere (Elliott et al., 2007; Nampijja et al., 2012).

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## **Cognitive Effects of Worm Infections in Uganda: Findings of the EMaBS Study**

### **Aim 1: Effects of Maternal Worms and Treatment in Pregnancy on Developmental Outcomes in Infancy**

Unlike in children where effects of worms have been extensively studied, nothing was known about developmental effects due to exposure in the mother. We know that worms infect about a third of pregnant women in sub-Saharan Africa (Bundy, Chan, & Savioli, 1987) in whom they are associated with maternal undernutrition and maternal iron-deficiency anemia (e.g., Dreyfuss et al., 2000) and that they might be associated with low infant hemoglobin, low birth weight, low Apgar score, prematurity, and infant mortality. We hypothesized that through depletion of iron and other nutrients available to the growing fetus, maternal worms during pregnancy might interfere with processes such as myelination and the development of neurotransmitter systems such as dopaminergic systems which are vital for neurological and cognitive functioning (Beard et al., 2007). Dopamine influences the limbic system and frontal cortex; disruptions in the dopamine system would interfere with functioning of those structures such as movement, short-term memory, emotion, planning, motivated behavior, and other executive functions (Goto & Grace, 2005; Smith & Kieval, 2000). Moreover, interventional studies involving pregnant women have demonstrated benefits of iron and other micronutrient supplementation on infants' physical and mental development (e.g., Li et al., 2009). Previous studies suggested that deworming during pregnancy might reduce the frequency of maternal anemia in some settings (e.g., Atukorala, de Silva, Dechering, Dassenaeike, & Perera, 1994; Torlesse & Hodges, 2001), low birth

weight infants (De Silva et al., 1999), and infant mortality (Christian et al. 2004) although these benefits were not observed in our study (Muhangi et al., 2007). However, effects of deworming pregnant women on cognitive functioning of the offspring were until recently not investigated. There was no empirical evidence for developmental effects of maternal worm infections, but based on findings from Beard's studies in animals, and on research on worm infections in childhood (e.g., Boivin et al., 1993; Ezeamama et al., 2005; Jukes et al., 2002; Nokes et al., 1992), we considered it possible that maternal worms may affect infant development. Neurodevelopmental effects of maternal worm infections and their treatment were examined in a large cohort of pregnant women and their infants in Uganda.

### **Design and Participants**

This research was part of the ongoing EMaBS study, utilizing a double-blind randomized placebo-controlled design (Elliott et al., 2007). Between 2003 and 2005, 2507 pregnant women were enrolled and randomized to receive albendazole or its matching placebo and praziquantel or its matching placebo in a 2 × 2 factorial design, of which 983 women and their infants were assessed on developmental measures at age 15 months. Details of design and participants are described in an earlier publication (Elliot et al., 2007; Nampijja et al., 2012).

### **Motor and Cognitive Assessments**

We employed two executive function measures, the A-not-B task and a self-control task, which were translated and used in rural Kenya (Abubakar, Holding, Van de Vijver, Bomu, & Van Baar, 2010; Abubakar et al., 2013). In addition, infants' skills on language, self-care and recognition of self, and others were determined using parental reports (Abubakar et al., 2010). Infants' fine motor and gross motor functioning were assessed using the Kilifi Developmental

Inventory (Abubakar, Holding, Van Baar, Newton, & Van De Vijver, 2008). Infants' non-task behavior (mood, interaction, and activity) was also assessed. We assessed 983 Ugandan infants aged 15 months on these measures. Key exposures were maternal worm infections and anthelmintic treatment during pregnancy. Effects of other health and social factors were controlled for statistically.

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## Results

Five major worm species were found in the pregnant women, two showed associations with the developmental measures: maternal *Mansonella perstans* and *Strongyloides stercoralis* infections showed negative associations with the A-not-B task and language, respectively. Performance on other psychomotor and cognitive measures was associated with illnesses during infancy and infants' behavior during assessment but not with maternal worm infections. There were no positive effects of maternal anthelmintic treatment on infant abilities. Based on these results, it appears that *Mansonella perstans* and *Strongyloides stercoralis* infection during pregnancy seem associated with impaired early executive function and language, respectively, but single-dose anthelmintic treatment during pregnancy was not beneficial. One possible explanation is that neither of these species was likely to be successfully treated by single-dose albendazole. However, given the number of comparisons made, it is also possible that these associations arose by chance and confirmation of the results in further studies would be desirable. Details of these results are available in an earlier publication (Nampijja et al., 2012).

### **Aim 2: Cognitive Effects of Worm Infections and Treatment during Childhood**

Following the initial psychological assessment at 15 months, the participants continued to be followed up in order (1) to investigate the impact of

childhood worms and deworming on motor and cognitive abilities and whether developmental effects of maternal worms in pregnancy would persist into early childhood, (2) to measure the role of the home environment on performance on motor and cognitive abilities, and (3) to study the relationships between various cognitive constructs. These investigations yielded interesting findings, but for the purpose of this chapter, only procedures and results related to developmental effects of childhood worms and deworming are presented.

### **Design and Participants**

A total of 2077 infants born to women participating in EMaBS were still under follow-up at age 15 months. These infants were randomized to receiving quarterly doses of albendazole (200 mg) or matching placebo, and like the randomization in the mothers, treatment allocation in the infants was blinded to both the participants and investigators. Doses of the study drug were swallowed in the clinic, observed by a trained nurse for any immediate side effects, or delivered by study field workers to their home where treatment was taken under observation. Mothers were requested to bring the children back for the next dose after 3 months; return dates were indicated on the study cards.

### **Child Health and Growth Monitoring**

Illnesses suffered by children over the period of 5 years were recorded. Common illnesses recorded included malaria, pneumonia, measles, diarrhea, and septicemia. These illnesses were diagnosed at the clinic based on clinical symptoms and laboratory tests as necessary. HIV status of 300 infants who were born to infected mothers was established at 6 weeks by PCR and at 18 months by ELISA. Infants who were positive continued with daily septrin for prophylaxis against the opportunistic *Pneumocystis carinii* pneumonia, and depending on their CD4 counts, they were started on antiretroviral treatment.



Extending from the growth monitoring that was done in the first year of life, routine anthropometric measurements including weight, height, mid-upper arm circumference, and head circumference were taken for every child at ages 2, 3, 4, and 5 years. On every annual visit, parents/guardians were interviewed on the illnesses the child had suffered in the past year and about any immunizations, deworming, and other medications received by the child from clinics other than the study clinic. This information was used to supplement the illnesses recorded at the clinic. Annually, children's stool and blood samples were collected and examined for worms and for hematological profiles relevant to the study. For ethical reasons, children who were found to have worms in their annual stool sample were given anthelmintic treatment regardless of whether they were in the treatment or placebo arm of the trial. Data on schooling of participants (children) was also collected at ages 3, 4, and 5 years.

## Motor and Cognitive Assessments

### The Assessment Battery

Motor and cognitive abilities were assessed using measures of working memory, attention, shifting, inhibition, general ability, planning, and motor functioning. A battery of 13 measures was used of which nine had been prepared earlier on in the study (Nampijja et al., 2010), and four extra measures of executive function were added later. Measures of the various abilities are listed in Table 8.1 below; the original battery has been described in an earlier publication, and extra measures are described in this section.

### Additional Measures of Executive Function

#### Counting Span

The task was originally developed by Case, Kurland, and Goldenberg (1982) to measure total processing and storage space (M-space) for working memory in children aged 6–12 years. Similar versions (paper card as well as computer-

**Table 8.1** Measures of motor and cognitive abilities

| Measure  | Ability assessed                               |
|--|--|
| <i>Initial battery</i>                           |  |
| Sentence repetition                              | Phonological loop of working memory            |
| Verbal fluency                                   | Supervisory attention system of working memory |
| Block design                                     | General cognitive ability (nonverbal)          |
| Picture vocabulary scale                         | General cognitive ability (verbal)             |
| Picture search                                   | Selective attention                            |
| Wisconsin card sorting task                      | Executive function (mental flexibility)        |
| Tap once tap twice                               | Executive function (inhibition)                |
| Coin box   | Fine motor function                            |
| Balancing on one leg                             | Gross motor function                           |
| <i>Additional measures of cognitive function</i> |  |
| Counting span                                    | Working memory (the central executive)         |
| Running memory                                   | Working memory (phonological)                  |
| Shapes task                                      | Executive function (inhibition)                |
| Tower of London (TOL)                            | Executive function (planning)                  |

ized) have successfully been used for assessing children on working memory span (e.g., Towse & Hitch, 1995; Towse, Hitch, & Hutton, 1998). A simpler modification of the counting span task was constructed and used to assess working memory in our participants. It consists of eight arrays of cards which the child counts and has to note the picture on the target card (first card). At the end of counting the cards in each array, the child is required to recall and say the picture on the target card. The first trial comprised an array of three cards, the second trial four cards, and so on up to the eighth trial which had ten cards. Pictures used in this study were hand drawn black and white line drawings. They were of relatively equal in size. The experimenter initially reviews all the pictures on the cards with the child to ensure that the child knows all their names. Trials are preceded by a demonstration example. One



point is awarded for a correct response and a zero for an incorrect response, and feedback is given for each trial done. There is therefore a maximum possible score of eight on this measure. Using this paradigm, novel pictures were compiled; these were selected based on the objects common in the environment and which young children are familiar with. Children were asked to name the items in Luganda; however, responses given in English were acceptable provided they were correct. The shapes and pictures were piloted, and those that were found to be strange (difficult to name) were replaced with more familiar items.

### **Running Memory**

This measure was adapted from a running memory task version (Kramer, Larish, & Strayer, 1995) to measure working memory span. The version devised for this study consisted of ten strings of common unrelated two-syllable Luganda words which were read out to the child at a regular speed of one word per 2 s. The child is required to repeat each string verbatim immediately without changing the word order, omitting, or inserting a word. The running memory task has often been used as a measure of working memory although some psychologists argue that this and similar tasks such as digit span forward, word repetition, and sentence repetition simply measure storage capacity (e.g., Hutton & Towse, 2001). Two points are awarded if no error is committed, one point if not more than two errors are committed, and no point (zero) if three or more errors are committed on a particular string.

### **Shapes Task**

This measure was originally developed by Kochanska, Murray, and Coy (1997), utilizing the Stroop paradigm (Rothbart, Deryberry, & Posner, 1994) to measure inhibition. A modification of the Shapes Task was constructed to assess inhibitory control of children participating in this study. This consists of 24 8 × 11 in. pictures representing large shapes (animals, fruits, household items). Each shape is cut out of paper covered with a design that depicts much smaller shapes. Geometric figures, numbers, and letters present in the original version were excluded since most

of the children have not yet learnt these concepts at the age of 5 years. In 12 trials (consistent), the small shapes are consistent with the large shape (e.g., a large moon made up of small moons), and in the other 12 trials (inconsistent), the shapes are inconsistent (e.g., a large cat made up of small bunnies or a large cow made up of small balls). The experimenter initially reviews all of the shapes with the child to ensure that he/she knows their names. The pictures are then presented one by one, and the child is to name as fast as possible the small shape in each picture. To prime the child's focus on the global shape rather than the smaller design, the inconsistent pictures are interspersed with the consistent ones. Scoring is done concurrently, and scores were a pass for a correct response and a zero for an incorrect response. Scores on the 12 inconsistent trials were used for analysis.

### **Tower of London**

This measure was adapted from Shallice's version of Tower of London (Shallice, 1982) to test planning or problem solving. The task requires moving differently colored balls across three equal-sized pegs in order to duplicate a prespecified target configuration. Three constraints apply: the child must not place more than the permitted number of balls on one peg, must not place the balls anywhere other than the peg, and only one ball is moved at a time. The TOL used in this sample comprised ten trials altogether. Five of the trials were tower configurations in which a single tower was presented as the target, and the other five were of mixed configurations in which the design to be duplicated was spread over two or more pegs. The tower configurations were alternated with the mixed configuration trials. The first four trials required three moves, the next four trials four moves, and the last two trials required five moves. Participants had to attempt all the trials although some children gave up before completion of the ten trials. For a given trial, the child was asked whether they had finished constructing the configuration, and if they said yes that trial was scored, and they proceeded to the next trial. The score was the number of correct configurations out of the ten completed trials,

hence a maximum possible score of ten. Children who failed to complete the ten trials were not included in the analysis for this measure. Original scoring includes timing to the target configuration and the number of moves made. In this sample, however, timing and moves were excluded because pilot data showed that children did not differ greatly in terms of the time spent on the trials; therefore, time was not a discriminating factor.

## Motor and Cognitive Testing Procedure

Testing was done at the study clinic by a team of six assessors trained in administering these measures. All participants were assessed on the original battery of nine measures. Two hundred children did all the 13 tests. Children were assessed within a window of 3 weeks before to 3 weeks after their 5th birthday. A physical examination was done to establish the health status of the child; testing was postponed for sick children until they were well provided that this did not go beyond 3 weeks after their fifth birthday. History of speech, hearing, or sight problems was obtained from the mother and established by the examining doctor; children (three) with sensory deficits were not tested. Children routinely visited the toilet before the session to avoid interruptions. These measures were administered in Luganda, the language used and understood by the majority of participants. The tests were administered in a fixed order starting with Sentence Repetition, Verbal Fluency, Block Design, Picture Vocabulary Scale, Picture Search, WCST, the Tap Game, Coin Box, and Balancing on One Leg except for children who were difficult to engage. A Latin square procedure was implemented for the sample of children who were assessed on all 13 measures (including Counting Span, Running Memory, Shapes Task, and Tower of London). The order was that the first child started with Sentence Repetition, the second child with Verbal Fluency, and so on through to the 13th child who started with Tower of London. The

14th child started with Sentence Repetition, the 15th with Verbal Fluency, and so on. Assessments were made interactive and interesting to yield maximum participation from the participants. Breaks were given as was judged by the assessor, but a break was mandatory before the TOL except if the measure was done first testing. Sessions lasted about 45–60 min for the short battery and 60–90 min for the long battery.

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## Results

### Participant Characteristics

A total of 871 (427 males, 49%; 444 females, 51%) children (mean age, 60 months 15 days) were assessed on the motor and cognitive measures described above, and their data were used for various analyses. First, demographic and clinical characteristics of these children were examined. The variables of interest were sex, birth weight, mid-upper arm circumference, hemoglobin, weight, height, malaria, diarrhea, lower respiratory tract and upper respiratory tract infection illness episodes, HIV exposure, schooling, family SES, and maternal sociodemographic characteristics including age of the mother, education, occupation, income and marital status as well as father's education and occupation, and worm status during pregnancy. Worm infection status of each child from ages 1 to 5 years was the primary exposure. These characteristics are summarized in Table 8.2. Children's mean birth weight, weight, height, mid-upper arm circumference, and hemoglobin level at age 5 years were generally within the ranges recommended by WHO; only 6.8% were underweight (weight < 13.8 kg), 12.5% were stunted (height < 95 cm), and 5% were anemic (Hb < 10 g/dl); hence this sample was representative of a normal population. The majority (742, 85.2%) of children were enrolled in schools. Seven hundred and twenty-three (97.5%) of these were in kindergarten, and 19 (2.5%) had enrolled into the first grade of primary school. During the period from birth to age 5, more than half the children had suffered at least two episodes of malaria, diarrhea, and upper respiratory tract infection. The majority (811: 93.2%) of participating children

**Table 8.2** Demographic and clinical characteristics of participating children at age 5 and their parents

|                    | Child's nutritional parameters |             |             |            | Maternal factors |                      |                    | Childhood infections |                |                |            |            |            |
|--------------------|--------------------------------|-------------|-------------|------------|------------------|----------------------|--------------------|----------------------|----------------|----------------|------------|------------|------------|
|                    | Bwt (kg)                       | Height (cm) | Weight (kg) | MUAC (cm)  | Hb (g/dl)        | Mother's age (years) | Family size (pple) | Events               | Malaria N (%)  | Diarrhea N (%) | LRTI N (%) | URTI N (%) | HIV* N (%) |
| Mean               | 3.21                           | 103.86      | 16.37       | 16.47      | 12.13            | 24.24                | 4                  | None                 | 367 (45.1)     | 104 (12.8)     | 550 (67.6) | 3 (0.4)    | 730 (89%)  |
| SD                 | 0.48                           | 5.67        | 2.06        | 1.22       | 1.16             | 5.66                 | 2.10               | 1                    | 158 (19.4)     | 159 (19.5)     | 165 (20.3) | 7 (0.9)    | 90 (11%)   |
| Min                | 1.52                           | 84          | 11          | 11         | 6.50             | 14                   | 1                  | 2+                   | 289 (35.5)     | 551 (67.7)     | 99 (12.2)  | 804 (98.8) |            |
| Max                | 5.50                           | 121         | 26          | 20         | 18.50            | 47                   | 19                 |                      |                |                |            |            |            |
| Parental education | Parental occupation            |             |             | SES        |                  | Mother's income      |                    |                      | Marital status |                | Parity     |            |            |
|                    | Level                          | Mother      | Father      | Level      | Mother           | Father               | N (%)              | Amount               | N (%)          |                | N (%)      | Level      | N (%)      |
| None               | 20 (2.4)                       | 4 (0.2)     | 4 (0.2)     | None       | 44 (5.4)         | 5 (0.6)              | 1                  | <30 K                | 53 (6.6)       | 667(84.4)      | Single     | 1          | 193 (23.5) |
| Primary            | 413 (50.5)                     | 154 (18.8)  | 154 (18.8)  | Farmer     | 48 (5.9)         | 109 (14.1)           | 2                  | 30–60 K              | 56 (6.9)       | 71(9.0)        | Married    | 2–4        | 468 (57.1) |
| Senior             | 320 (39.1)                     | 333 (40.8)  | 333 (40.8)  | Unskilled  | 42 (5.1)         | 254 (32.9)           | 3                  | 60–100 K             | 250 (31)       | 31 (3.9)       | Widowed    | 5+         | 159 (19.4) |
| Tertiary           | 65 (7.9)                       | 163 (20)    | 163 (20)    | Bar        | 498 (61)         | 8 (1.0)              | 4                  | >100 K               | 235 (29.1)     | 21 (2.7)       | Divorced   |            |            |
| NA                 |                                | 163 (20)    | 163 (20)    | Business   | 118 (14)         | 114 (14.8)           | 5                  |                      | 157 (19.5)     |                |            |            |            |
|                    |                                |             |             | Student    | 20 (2)           | 16 (2.1)             | 6                  |                      | 56 (6.9)       |                |            |            |            |
|                    |                                |             |             | Profession | 49 (6.0)         | 266 (34.5)           |                    |                      |                |                |            |            |            |

MUAC denotes mid-upper arm circumference, *hb* denotes hemoglobin, \*perinatal exposure to HIV infection (all children born to HIV-positive women), LRTI lower respiratory tract infection, URTI upper respiratory tract infection, SES socioeconomic status. K = 1000

spoke Luganda as their first language and about 6.8% ( $N = 50$ ) were bilinguals (used Luganda plus English or another local language), but they too were fluent in Luganda. Maternal education, occupation, income, and marital status varied considerably across the sample as shown in the different categories. In general, mothers were less educated than fathers, and the majority of parents earned their living from unskilled labor. Family SES was rated on a six-point scale based on possession of items like a bicycle, TV, phone, and bed. Even though the majority of participating families were living in town, they were generally poor as evidenced by the low income (less than 30,000 Uganda shillings-£10 per month) and the low SES status. In general, we were working with a typically developing sample of children from poor socioeconomic, less affluent families, who have suffered common tropical infections. Baseline characteristics of participating children and their parents were used as either categorical or continuous variables.

### Descriptive Statistics for Performance on the Motor and Cognitive Measures

Distributions of scores on cognitive and motor measures were explored. As shown in Table 8.3, scores on the various measures generally

exhibited nearly normal distributions. Two measures were positively skewed: Leg Balancing in which balancing time represents the score, and the Tower of London (TOL) which is generally a difficult task even for older age groups. The majority of children passed the first three trials of TOL, but fewer children passed subsequent trials because the level of difficulty increased with the trials. The numbers of participants who completed individual tasks were variable as not all children completed all the tasks, and a smaller sample ( $N = 200$ ) was assessed on the extended battery: Counting Span, Running Memory, Shapes Task, and Tower of London.

### Prevalence of Worm Infections in Children from Ages 1 to 5 Years

When the participants were 1 year old, only 3% were found to have worms. However, over the period of 4 years, more children became infected with worms, and by age 5 years up to 158 (20%), children were infected. Parasites isolated were *Schistosoma mansoni* ( $n = 34$ , 4.4%), hookworm ( $n = 23$ , 3%), *Trichuris trichiura* ( $n = 80$ , 10%), *Ascaris lumbricoides* ( $n = 48$ , 6.2), *Trichostrongylus* ( $n = 8$ , 1%),

**Table 8.3** Descriptive statistics for performance on the 13 measures

| Measure                  | $N$ | Min | Max. (Max. possible) | $M$   | SD    | Skewness | Kurtosis |
|--------------------------|-----|-----|----------------------|-------|-------|----------|----------|
| Sentence repetition      | 843 | 2   | 34 (34)              | 19.91 | 4.43  | -0.12    | 0.30     |
| Verbal fluency           | 806 | 0   | 40 (N/A)             | 14.04 | 8.00  | 0.20     | -0.85    |
| Block design             | 855 | 0   | 16 (16)              | 8.84  | 3.39  | -0.28    | -0.87    |
| Picture vocabulary scale | 862 | 1   | 19 (24)              | 17.61 | 3.16  | -0.68    | -0.28    |
| Picture search           | 862 | 0   | 7.67 (10)            | 3.99  | 1.40  | 0.03     | -0.21    |
| Wisconsin card sort task | 858 | 0   | 12 (12)              | 6.34  | 3.98  | 0.00     | -1.13    |
| Tap once tap twice       | 856 | 0   | 12 (12)              | 6.01  | 4.67  | -0.12    | -1.62    |
| Coin box                 | 857 | 3   | 18.50 (20)           | 9.80  | 1.86  | -0.35    | 1.76     |
| Balancing on one leg     | 853 | 1   | 60 (60)              | 15.21 | 11.43 | 1.38     | 1.23     |
| Counting span            | 185 | 0   | 8 (8)                | 3.59  | 2.10  | -0.26    | -0.82    |
| Running memory           | 186 | 3   | 20 (20)              | 12.13 | 2.71  | -0.37    | 1.07     |
| Shapes task              | 187 | 0   | 12 (12)              | 5.80  | 3.64  | -0.05    | -1.22    |
| Tower of London          | 179 | 0   | 10 (10)              | 2.46  | 3.08  | 1.26     | 0.33     |

*Strongyloides stercoralis* ( $n = 7$ , 0.9%), and other worms ( $n = 3$ , 0.4%), and 20% ( $n = 158$ ) of children were found to be infected with any of the worm species. Worm prevalence in this sample was slightly lower than that reported in an earlier survey of school-age children in the country (Alderman et al., 2006). Only species with a prevalence of at least 3% were considered in subsequent analyses.

### **Associations Between Childhood Worm Infections and Performance on Motor and Cognitive Measures at Age 5 Years**

#### **Correlations Between Exposure Variables and Outcomes**

First, Pearson correlations were conducted to explore zero-order associations between worms and the outcomes and to identify other factors that might be related to performance on the measures and might therefore confound the effect of worm infections. The main exposure factors were the four common childhood worm infections, i.e., *Schistosoma mansoni*, hookworm, *Trichuris trichiura*, and *Ascaris lumbricoides*. Other exposures examined were childhood nutritional parameters (height, weight, mid-upper arm circumference, and hemoglobin), illness episodes over the 5 years of follow-up (malaria, diarrhea, respiratory infections, and HIV (infected or not)), and sociodemographic factors (sex, schooling (schooling or not schooling), family SES, family size, maternal age, marital status, maternal education, maternal income, maternal occupation, father's education, and occupation).

Worms and other factors were found to correlate variably with the outcomes, and all were in the expected direction. Specifically, hookworm, *Schistosoma mansoni*, *Ascaris lumbricoides*, and *Trichuris trichiura* correlated negatively with the measures, whereas nutrition and socioeconomic factors correlated positively with the measures.

### **Regression Analysis for Effects of Childhood Worm Infections on Performance on Motor and Cognitive Measures**

Following zero-order correlations, hierarchical linear regressions in which childhood worm effects were adjusted for potential confounding factors were conducted. Worms together with the other exposures were entered in a single model as independent variables, and the 13 measures of motor and cognitive function were the dependent variables. Only exposures that correlated with at least one of the measures were included in the linear regressions. Independent variables were entered in the regressions in two blocks: the first block consisted of child's birth weight, child schooling, height, weight, diarrhea, malaria, upper respiratory infections, lower respiratory tract infections, mother's parity, income, education, occupation, father's occupation, family size, and SES, and the second block contained the four childhood worm infections, i.e., hookworm, *Schistosoma mansoni*, *Trichuris trichiura*, and *Ascaris lumbricoides*. Nonsignificant factors (beginning with the least significant) were then deleted from the model one at a time until only the significant factors remained, thereby obtaining a model that best predicted performance on each outcome and that was statistically significant. Each outcome was examined separately, but the same list of background factors (independent variables) were used as control variables for each of the outcomes. Regression statistics are summarized in Table 8.4 (significant ones are highlighted), and each measure is described in turn.

#### **Sentence Repetition**

Performance on this measure was found to be positively associated with height of the child at age 5 and schooling. These were the only factors whose effects remained significant in the model that described performance on sentence repetition ( $R^2 = 0.02$ ,  $F(2, 745) = 8.69$ ,  $p < 0.001$ ). None of the worms had a significant effect on this measure.

**Table 8.4** Regression analysis for effects of childhood worm infections and other health and sociodemographic factors on performance on the measures of motor and cognitive functioning

| Measure                         | Childhood worm/other exposures           | Unstandardized coefficients ( <i>b</i> ) | Standardized coefficients ( $\beta$ ) | Std. error of <i>b</i> | <i>p</i> value   |
|---------------------------------|--|--|---------------------------------------|------------------------|------------------|
| <i>Sentence repetition</i>      |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.065                                    | 0.097                                 | 0.02                   | 0.008            |
|                                 | Schooling                                | 1.38                                     | 0.11                                  | 0.46                   | 0.003            |
| <i>Verbal fluency</i>           |  |  |                                       |                        |                  |
| Block 1                         | Birth weight                             | 1.41                                     | 0.08                                  | 0.70                   | 0.044            |
|                                 | Gravidity                                | -1.35                                    | 0.11                                  | 0.51                   | 0.009            |
|                                 | Schooling                                | 4.66                                     | 0.20                                  | 0.96                   | <0.001           |
| Block 2                         | <i>Ascaris lumbricoides</i> <sup>a</sup> | -3.55                                    | -0.10                                 | 1.45                   | 0.015            |
| <i>Block design</i>             |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.09                                     | 0.17                                  | 0.02                   | <0.001           |
|                                 | Mother's education                       | 0.44                                     | 0.09                                  | 0.19                   | 0.018            |
|                                 | SES                                      | 0.33                                     | 0.12                                  | 0.11                   | 0.002            |
|                                 | Family size                              | -0.16                                    | -0.10                                 | 0.06                   | 0.012            |
|                                 | Schooling                                | 1.51                                     | 0.16                                  | 0.35                   | <0.001           |
| Block 2                         | Schistosomiasis <sup>a</sup>             | -1.27                                    | -0.08                                 | 0.60                   | 0.036            |
| <i>Picture vocabulary scale</i> |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.08                                     | 0.17                                  | 0.02                   | <0.001           |
|                                 | Father's occupation                      | 0.14                                     | 0.12                                  | 0.05                   | 0.003            |
|                                 | SES                                      | 0.29                                     | 0.11                                  | 0.09                   | 0.002            |
|                                 | Schooling                                | 1.82                                     | 0.20                                  | 0.32                   | <0.001           |
| <i>Picture search</i>           |  |  |                                       |                        |                  |
| Block 1                         | URTI episodes                            | -0.85                                    | -0.10                                 | 0.32                   | 0.008            |
|                                 | Mother's education                       | 0.24                                     | 0.12                                  | 0.08                   | 0.002            |
|                                 | SES                                      | 0.08                                     | 0.07                                  | 0.04                   | 0.050            |
|                                 | Schooling                                | 0.66                                     | 0.17                                  | 0.14                   | <0.001           |
| Block 2                         | Hookworm <sup>a</sup>                    | -0.81                                    | -0.09                                 | 0.32                   | 0.011            |
| <i>Wisconsin card sort task</i> |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.09                                     | 0.15                                  | 0.02                   | <0.001           |
|                                 | Father's occupation                      | 0.17                                     | 0.10                                  | 0.06                   | 0.005            |
|                                 | Schooling                                | 1.75                                     | 0.15                                  | 0.42                   | <0.001           |
| <i>Tap once tap twice</i>       |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.10                                     | 0.14                                  | 0.03                   | <0.001           |
|                                 | Mother's education                       | 0.70                                     | 0.10                                  | 0.25                   | 0.005            |
|                                 | Schooling                                | 2.50                                     | 0.19                                  | 0.48                   | <i>P</i> < 0.001 |
| <i>Coin box</i>                 |  |  |                                       |                        |                  |
| Block 1                         | SES                                      | 0.12                                     | 0.08                                  | 0.06                   | 0.036            |
|                                 | Schooling                                | 0.59                                     | 0.10                                  | 0.21                   | 0.004            |
| <i>Balancing on one leg</i>     |  |  |                                       |                        |                  |
| Block 1                         | Schooling                                | 2.91                                     | 0.09                                  | 1.78                   | 0.014            |
| <i>Counting span</i>            |  |  |                                       |                        |                  |
| Block 1                         | Height                                   | 0.06                                     | 0.23                                  | 0.02                   | 0.003            |
| Block 2                         | Schistosomiasis <sup>a</sup>             | -1.48                                    | -0.17                                 | 0.70                   | 0.036            |
| <i>Running memory</i>           |  |  |                                       |                        |                  |
| Block 2                         | <i>Trichuris trichiura</i> <sup>a</sup>  | -1.60                                    | -0.18                                 | 0.67                   | 0.02             |

(continued)



**Table 8.4** (continued)

| Measure                | Childhood worm/other exposures | Unstandardized coefficients ( <i>b</i> ) | Standardized coefficients ( $\beta$ ) | Std. error of <i>b</i> | <i>p</i> value |
|------------------------|--------------------------------|--|---------------------------------------|------------------------|----------------|
| <i>Shapes task</i>     |                                |  |                                       |                        |                |
| Block 1                | Height                         | 0.09                                     | 0.22                                  | 0.03                   | 0.008          |
| <i>Tower of London</i> |                                |  |                                       |                        |                |
| Block 1                | Weight                         | 0.36                                     | 0.22                                  | 0.12                   | 0.004          |
|                        | SES                            | 0.38                                     | 0.16                                  | 0.19                   | 0.045          |

*Hb* hemoglobin, *SES* household socioeconomic status

<sup>a</sup>Worm infections significantly related with the outcomes

### Verbal Fluency

Significant associations were observed with birth weight, parity status of the mother, schooling (block 1), and childhood *Ascaris lumbricoides* infection (block 2). As expected, birth weight and schooling had a positive effect, whereas *Ascaris lumbricoides* infection was negatively associated with this measure. Together, the four factors constituted a model that predicted performance on this verbal fluency ( $R^2 = 0.07$ ,  $F(4, 550) = 10.37$ ,  $p < 0.001$ ). This model accounted for more variance than the model without *Ascaris lumbricoides* ( $\Delta R^2 = 0.01$ ).

### Block Design

Performance on this measure was positively associated with child's height, schooling, mother's education, household SES, and was negatively associated with family size and *Schistosoma mansoni* infection ( $R^2 = 0.11$ ,  $F(6, 689) = 14.55$ ,  $p < 0.001$ ). The model with *Schistosoma mansoni* accounted for more variance than the model without the worm ( $\Delta R^2 = 0.005$ ) although the difference was small.

### Picture Vocabulary Scale

Height, schooling, household SES, and father's occupation were positively associated with performance on picture vocabulary scale ( $R^2 = 0.12$ ,  $F(4, 705) = 24.36$ ,  $p < 0.001$ ). None of the worms were associated with this measure.

### Picture Search

Significant predictors of performance on this measure were child's schooling, mother's education, and SES. These were positively associated with the outcomes. In addition upper respiratory

tract infection episodes and hookworm were negatively associated with the measure. Hence four factors from the first block and one worm (second block) were associated with performance on picture search ( $R^2 = 0.08$ ,  $F(5, 697) = 11.85$ ,  $p < 0.001$ ). The model with hookworm accounted for more variance than the model without hookworm ( $\Delta R^2 = 0.008$ ), but the difference here was small.

### Wisconsin Card Sorting Task

This measure was positively associated with child's height, schooling, and father's occupation ( $R^2 = 0.07$ ,  $F(3, 710) = 16.67$ ,  $p < 0.001$ ). None of the worms were associated with this outcome.

### Tap Once Tap Twice

Child's height, schooling, and mother's education were positively associated with performance on this measure ( $R^2 = 0.08$ ;  $F(3, 754) = 20.92$ ,  $p < 0.001$ ). No significant associations with worms were observed.

### Coin Box

Among the exposures that were measured, only child schooling and household SES were significantly related to this measure ( $R^2 = 0.02$ ,  $F(2, 749) = 6.96$ ,  $p < 0.01$ ). Both had positive effects. None of the worms were found to affect performance on this measure.

### Balancing on One Leg

Only schooling was observed to be significantly associated with performance on balancing on one leg. Schooling was positively related to this measure ( $R^2 = 0.008$ ,  $F(1, 758) = 6.10$ ,  $p < 0.01$ ).

None of the worms were associated with performance on this measure.

### Counting Span

Performance on this measure was negatively associated with childhood *Schistosoma mansoni* infection and positively associated with the child's height ( $R^2 = 0.07$ ,  $F(2, 158) = 6.85$ ,  $p < 0.01$ ). Addition of *Schistosoma mansoni* to the model improved the variance explained considerably ( $\Delta R^2 = 0.026$ ).

### Running Memory

*Trichuris trichiura* infection during childhood was negatively related with performance on running memory ( $R^2 = 0.03$ ,  $F(1, 161) = 5.47$ ,  $p < 0.05$ ). No other factor was associated with this measure.

### Shapes Task

Among the many exposures that were measured, only height of the child was found to have a significant association (positive) with performance on this measure ( $R^2 = 0.05$ ,  $F(1, 145) = 7.31$ ,  $p < 0.01$ ).

### Tower of London

This was associated with only two variables, i.e., child's weight at age 5 and household SES. Both factors were positively related to the outcome ( $R^2 = 0.08$ ,  $F(2, 159) = 7.14$ ,  $p < 0.01$ ). Childhood worm infections did not show significant associations with the outcome.

In summary, certain childhood worm infections were associated with lower scores on some measures of cognitive function: *Ascaris lumbricoides* on Verbal Fluency, *Schistosoma mansoni* on Block Design and Counting Span, hookworm on Picture Search, and *Trichuris trichiura* on Running Memory. However, in each case, the amount of variance accounted for by worm infection was small. Childhood worm infections did not have effects on performance on measures of motor function. In addition to childhood worms, preschooling and height at age 5 consistently showed a positive influence on the majority of

the outcomes. Other health and sociodemographic factors had significant effects on the motor and cognitive outcomes in the expected directions; these were birth weight, weight at age 5 years, mother's parity, maternal education, father's occupation, SES, family size, and repeated upper respiratory infections.

### Effects of Childhood Worms Adjusted for Effects of the Home Environment

A total of 163 (80 males, 49%) children who participated in the home observations using the Home Observation for Measurement of Environment (HOME) (Caldwell & Bradley, 1984) also had complete data on the extended battery of executive function measures. Their data were analyzed to measure effects of childhood worms on performance on the measures of executive function adjusting for the effect of the home environment. The same exposure variables used in the main sample were used in this sample, but in addition, a third block comprising the eight subscales of the HOME (learning materials, language stimulation, physical environment, responsiveness, academic stimulation, modeling, variety, and acceptance) was added. These exposures were entered in a single regression, and nonsignificant variables were deleted one at a time until only those that contributed significantly to the model that significantly predicted performance on the outcome remained. When the effect of the home environment was adjusted for, effects of hookworm on Picture Search ( $b = -1.46$ ,  $p = 0.055$ ) and schistosomiasis on Counting Span ( $b = -1.55$ ,  $p = 0.049$ ) were still present although these were of borderline significance. Effects of worms on other measures of executive function were no longer significant ( $p > 0.05$ ) indicating a stronger effect of the home environment. Effects of other health and sociodemographic factors and the HOME on the executive functions were in the expected direction.

## Effects of Quarterly Albendazole During Childhood on Cognitive and Motor Performance at Age 5 Years

Effects of treatment with albendazole in childhood were examined using a series of *t*-tests. First, treatment effects were examined across the entire sample (irrespective of the worm status of children). Mean scores of children on the various measures were compared between those who received albendazole and those who received the placebo. No differences were found in performance between children who were treated and those who were not (all *p*-values > 0.05). Next, effects of treatment were examined in only children who suffered individual worm infections, i.e., *Trichuris trichiura*, hookworm, and *Ascaris lumbricoides*. No significant differences in performance were seen between children who were treated and those children who received placebo (all *p*-values > 0.05) for any of the three common species of worms. There was no clear direction for the relationship between treatment and the outcomes.

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## Discussion

As was predicted, childhood worms were found to be associated with poor performance on measures of executive functioning. Specifically, effects were observed between *Ascaris lumbricoides* and Verbal Fluency, *Schistosoma mansoni* and Counting Span; hookworm and Picture Search, and *Trichuris trichiura* and Running Memory. In addition to the executive function measures Block Design, a measure of general ability was associated with *Schistosoma mansoni* infection. These effects remained significant when schooling, socioeconomic status, nutrition, and other factors were controlled for. However, associations with Verbal Fluency and Running Memory appeared to diminish when the home environment was controlled for implying that the home environment had a relatively stronger effect than worms. However, this was a much smaller sample which may not necessarily be representative of the general study population.

Overall, the results of this study show some evidence (though weak) for negative associations

between worms and cognitive function. These results are consistent with findings of earlier studies of cognition (e.g., Boivin et al., 1993; Ezeamama et al., 2005; Jukes et al., 2002; Nokes et al., 1992, 1999; Sakti et al., 1999; Simeon et al., 1994; Sternberg et al., 1997). In particular, these findings are consistent with those of Nokes et al.'s (1992) study in which Verbal Fluency, Picture Search, and a measure of free recall (similar to Running Memory) were reported to be affected by childhood worms even though different species of worms were examined. Other studies including those of Ezeamama et al. (2005) and Sakti et al. (1999), using different measures, reported effects on working memory. The current study directly investigated worm effects on executive function both due to exposure in utero and early in childhood. In keeping with the research hypothesis, executive functions as measured by respective measures were found to be sensitive to the negative effect of worms.

However, it should be noted that effects of worms on cognitive performance in this sample of Ugandan children were generally small. The small effects were not surprising given the low prevalence of worms that was found; studies involving heavily infected populations are likely to provide more conclusive results. Nevertheless, given that a large proportion of children in sub-Saharan Africa are affected by worms, it can be presumed that even small effects of worms on individuals would be of great public health concern. Moreover, worms occur in populations where children's developmental potentials are already held back by effects of other infections, poverty, malnutrition, and environments that lack cognitive stimulation. Therefore, even a small contribution (additive effect) due to worms can have considerable implications for overall cognitive capacities.

With respect to treatment, results show that overall there were no significant differences in performance between children who received quarterly doses of albendazole and those who received the placebo. These results are consistent with findings of those studies in which anthelmintic treatment did not lead to significant improvements in cognitive performance of chil-

dren (Awasthi et al., 2000; Nokes et al., 1999; Simeon et al., 1995; Stoltzfus et al., 2001; Watkins et al., 1996). It might be that anthelmintic treatment clears the infections but does not necessarily reverse the damage already caused on cognitive function. This is consistent with an observation made by Hall (2007) that deworming treatments may reduce the burden of acute disease especially among children in sub-Saharan Africa, but this alone does not lead to recovery from stunting, underweight, anemia, and impaired mental development. Hall thus proposes that energy, proteins, and micronutrients losses need to be compensated through relevant interventions. In other words, children who are anemic will require iron and other micronutrients for hemopoiesis, and those who have lost education will require remedial teaching and psychosocial stimulation. Because loss of cognitive potential in the African and other low-income settings is due to effects of multiple adverse exposures, combined interventions (as opposed to an individual intervention) are more likely to yield better developmental outcomes.

## Research and Policy Implications

Our findings and those of previous studies suggest that a big proportion of African children may be at risk for poor cognitive performance due to worm infections if indeed worms have an important effect on cognition. Moreover, executive functions which are critical for behavior and academic performance may be particularly susceptible. This threatens children's future educational achievements, their employment success later in life, and human capital of the continent at large. However, so far the results are inconclusive. More research is still needed, involving adequately powered, placebo-controlled studies in populations with a high prevalence and intensity of infection if the question of effects of worms, and benefits of their treatment, for cognitive development are to be properly resolved. Important to note is that, even with heavy infections, not very large effects may not be expected since the link between worm infections and psy-

chological outcomes is indirect and can be mediated by many factors.

In the same vein, it is plausible that worms will often be associated with global cognitive impairment, and therefore interventions should target such broad functions as the executive function. Absence of treatment effects (also observed in previous studies) indicates that deworming is crucial, yet it is not sufficient to make up for the multiple adversities children in the African context face. In addition to deworming, there is need for combined or parallel interventions addressing other infections, malnutrition, and unstimulating environments to enable children realize their developmental potential.

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# Diabetes in Sub-Saharan African Children: Risks, Care, and Challenges

# 9

Given Hapunda and Frans Pouwer

The aim of this chapter is to increase our understanding of the prevalence and consequences of diabetes in sub-Saharan Africa (SSA) by summarizing the literature. The questions that are addressed in this chapter include: What is the prevalence of diabetes in children, in SSA? What are the consequences and risk factors for diabetes and what is the quality of diabetes care in SSA? To place this chapter into context, a general synopsis of the etiology of diabetes will be discussed followed by the prevalence of diabetes in African children. Consequences or risks (acute and chronic, psychological and social) of diabetes in patients with diabetes will be discussed. This will be followed by implications in terms of preventative measures and care in Africa and future directions that can be taken into account for diabetes management.

The World Health Organization (WHO, 1999) defines diabetes mellitus as a metabolic disorder of multiple etiologies that is characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting

from defects in insulin secretion, insulin action, or both. Our bodies require glucose which mainly comes from the food we eat. Through the small intestine, glucose is absorbed by the capillaries into the bloodstream, and it is then ready as a source of energy for body cells. In order for glucose to be transferred from the blood into the body cells, the hormone insulin is a requisite, which is produced by the beta cells in the pancreas. In individuals with diabetes, this process is impaired. This disorder can be inherited and/or acquired (Raiz, 2009).

Diabetes mellitus can be classified into different types (WHO, 1999). These include type 1 diabetes, type 2 diabetes, gestational diabetes mellitus, and other specific types of diabetes such as latent autoimmune diabetes in adults (LADA) and maturity onset diabetes of the young (MODY). Mbanya and Ramiaya (2006) distinguished the different types of diabetes; the onset of type 1 diabetes mellitus (T1DM) can occur at any age but is generally before the age of 40 and results from autoimmune destruction of the pancreatic beta cells, causing a complete loss of insulin production. Patients with this type of diabetes require insulin therapy (i.e., insulin injections or insulin pump therapy) for survival (WHO, 1999).

Type 2 diabetes mellitus (T2DM) is the most common type of diabetes, affecting approximately 90% of the diabetes patients. This type of diabetes often has its onset after the age of 50

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(but can also develop before the age of 50) and is characterized by a relative lack of insulin, caused by insulin resistance (cells are less sensitive for insulin) and insufficient insulin secretion (beta cell dysfunction), either of which may predominate but both of which are usually present. The specific reasons for the development of these abnormalities are not yet fully known (Mbanya & Ramiya, 2006) although obesity, inactivity, composition of diet, and heredity seem to play an important role. T2DM can remain unrecognized for many years, as the first symptoms are often ignored: frequent urination, increased thirst, fatigue, and weight loss. Many people seem to attribute these symptoms to “old age.” Still the diagnosis of type 2 diabetes is often made when microvascular or macrovascular diabetes complications are diagnosed and the patient is checked for diabetes.

Pregnant women can develop gestational diabetes mellitus (GDM). GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy (Mbanya & Ramiya, 2006). Other specific types of diabetes include MODY and LADA. MODY is a rare type of diabetes resulting from a genetic mutation and can be genetically acquired, while LADA is a form of type 1 diabetes that can occur in adults with the autoimmune process that destroys cells in the pancreas. These last types of diabetes are very uncommon and often misdiagnosed.

Diabetes was less common centuries ago. However, in 1552 BCE the Egyptian physician Hesy-Ra of the Third Dynasty was the first known person to describe a patient with diabetes on the Ebers Papyrus. In 250 BC, diabetes was described as the “melting down” of flesh and limbs into urine (Canadian Diabetes Association, 2012). Sattley points that in the first century AD, a Greek, Aretaeus of Cappadocia, described the destructive nature of the affliction which he named “diabetes” from the Greek word for “siphon” (Sattley, 2008). In the seventeenth century, a physician from London, Dr. Thomas Willis, determined whether his patients had diabetes or not by sampling their urine. If it had a sweet taste, he would diagnose them with diabetes mellitus—“honeyed” diabetes. In 1889, the

German physiologist Oskar Minkowski and the physician Joseph von Mering showed that if a dog’s pancreas was removed, the animal got diabetes. In 1921 in Ontario, Canada, a surgeon Frederick Banting and his assistants Charles Best and John McLeod, biochemist/physiologist, made a major discovery. They isolated insulin from dogs or cattle and used it to keep a diabetic dog alive for 70 days by injecting the insulin (Sattley, 2008). In 1923, Banting and McLeod won the Nobel Prize in Physiology or Medicine for the discovery of insulin.

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## Etiology of Diabetes

### Type 1 Diabetes Mellitus

There is growing literature on genetic susceptibility to diabetes. Alleles or genetic variants associated with T1DM provide either susceptibility or protection from acquiring the disease (Devendra, Liu, & Eisenbarth, 2004). Evidence for hereditary influence can be deduced from twin studies. The concordance for T1DM is approximately 50% for monozygotic twins, and the risk to a first-degree relative is approximately 5% (Redondo et al., 1999). These findings suggest that there are genes that make certain individuals susceptible to developing diabetes mellitus. For instance, Bennett and Todd (1996) argued that more than 90% of patients who develop T1DM have DR3, DQ2, or DQ8 haplotypes. They further argued that DR3–DR4 heterozygosity is highest in children who develop diabetes before age 5 (50%) and lowest in adults presenting with type 1 diabetes accounting for about 20–30%. Equally one nonhuman leukocyte antigen (HLA) gene has been identified on chromosomes to contribute about 10% of the familial aggregation on T1DM (Bennett & Todd, 1996). This locus is a polymorphic region that maps to a variable number of tandem repeat (VNTR) 5’ of the insulin gene, and different sizes of this VNTR 5’ of the insulin gene are associated with risk of type 1 diabetes. On the contrary, a long form of the VNTR ( $\geq 100$  repeats, class III) is associated with protection from diabetes (Vafiadis et al., 1997).

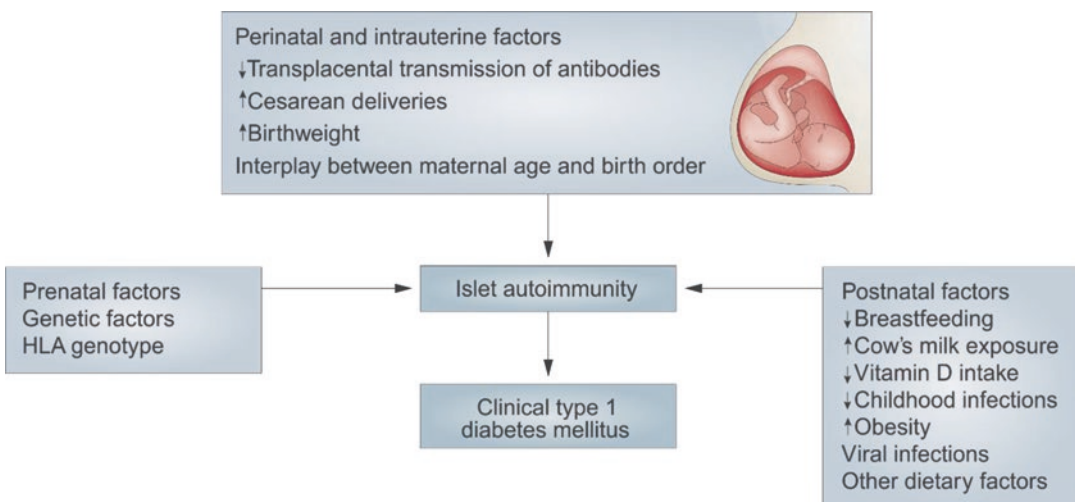
T1DM is considered a multifactorial disease in which the environmental risk factors trigger an immune-mediated destruction of the pancreatic beta cell in genetically susceptible individuals (Kyvik et al., 2004). Environmental agents such as viruses may play a role in the development of T1DM (Devendra et al., 2004). Studies suggest that certain viruses and some aspects of early childhood diet may influence T1DM and even T2DM for the later. Enterovirus, mumps, rubella, rotavirus, chicken pox, cow milk, some common child vaccine, and nitrates have been associated with T1DM (Devendra et al., 2004). Further, environmental factors can inhibit the development of autoimmunity. The environments for young infants are far too clean, leading to a deficiency in immunoregulation such as the “Th2” diseases, e.g., asthma, and the “Th1” diseases, e.g., T1DM, which are increasing dramatically (Gale, 2002). Figure 9.1 depicts hypothesized causes of T1DM.

### Type 2 Diabetes Mellitus

T2DM is considered by diabetes physicians as a complex and heterogeneous disease with a poorly understood etiology, apart from the fact that there is a strong genetic propensity that becomes overt when exposed to a typical westernized diet

(Astrup & Finer, 2000; Hu, 2011). A meta-analysis found that there is a 26% risk of developing T2DM for those who consume 1–2 servings per day of sugar-sweetened beverages (Malik et al., 2010). Santé Diabète, a nongovernmental organization working in the area of diabetes in Africa, points out that in recent years, there has been an overweight problem in Africa especially with the sharp increase in the consumption of food that contains more saturated fat and an increasing number of people with a sedentary lifestyle, as a result of rising income and urbanization in Africa (Santé Diabète, 2011). Urban lifestyle in Africa is characterized by changes in dietary habits involving an increase in consumption of refined sugars and saturated fat and a reduction in fiber intake (Sobgnwi, Mauvais-Jarvis, Vexiaux, Mbanya, & Gautier, 2001). These changes will probably further increase the risk of obesity and death. Obesity in turn is particularly associated with an increased risk of developing T2DM (Astrup & Finer, 2000). Among the environmental factors that are hypothesized in the etiology of diabetes is the gut microbiota which may play a critical role in development of T2DM (Cani, Osto, Geurts, & Everard, 2012).

Data on the levels of obesity in sub-Saharan Africa is scarce, but it varies between 3 and 44% of the population, depending on ethnicity and



**Fig. 9.1** Some possible causes of type 1 diabetes mellitus. *Source:* Ma and Chan (2009) (reprinted with permission)



urban or rural location (Motala & Ramaiya, 2010). Autoimmunity, physical inactivity, obesity, and genetic factors may all contribute to the increasing young age onset of T2DM (Ma & Chan, 2009). Emerging risk factors in Africa include age and ethnicity as confirmed by increasing prevalence in age and in the differences between people from India, blacks, and Caucasians in South Africa. The greatest prevalence was found in Indian community of Durban (13%) and elderly colored community of Cape Town (29%) (Rheeder, 2006).

## Epidemiology of Diabetes

The 2012 International Diabetes Federation (IDF) Diabetes Atlas estimated that there were about 15 million people living with diabetes in sub-Saharan Africa (SSA), a sharp increase from 12.1 million in 2010 (Hall, Thomsen, Henriksen, & Lohse, 2011). In 2011, the number of people with diabetes in Africa was expected to increase to 28 million people by 2030 (IDF, 2011). This figure is enormous for a continent with a population of approximately 876.8 million (World Bank, 2011).

Data by the International Diabetes Federation (IDF) indicates that there are approximately 36,000 children with diabetes in Africa and that nearly 5900 children are diagnosed every year (IDF, 2012). T1DM is more prevalent in girls than boys as documented by studies in Ethiopia, Nigeria, Liberia, and Sudan (Majaliwa et al., 2008). Type 2 diabetes accounts for over 90% diabetes cases in SSA; although estimates for children are not yet known, there is growing evidence that it is now also affecting African children (Santé Diabète, 2011). Type 1 diabetes accounts for less than 10% of diabetes cases. T1DM is still a lethal condition in many parts of Africa and the mortality rates are high. There is evidence that the 10% prevalence rate for T1DM is probably an underestimation of the true prevalence and potential care needed (International Insulin Foundation, 2004). Surveillance and proper records are lacking in most cases in many African countries to document the prevalence

and incidence of diabetes in children and adults. The International Diabetes Federation (IDF) estimated that about 12 million people in Africa live with undiagnosed diabetes, accounting for 81% of cases (IDF, 2012).

The incidence of T1DM and T2DM in children and adults varies greatly from country to country, and many estimates so far have excluded children, because comprehensive statistics for children are still lacking. Estimated prevalence of diabetes in SSA is described in Table 9.1. In SSA, the highest prevalence estimate for diabetes is in the islands of Reunion with 16% prevalence, followed by the Seychelles with approximately 3056 (12%) people with diabetes (IDF, 2012). SSA countries with relatively large populations also seem to have large numbers of people with diabetes with Nigeria at approximately three million (5%) followed by South Africa at two million (7%). Ethiopia is reported to have an estimated 1,386,660 (3%) of people with diabetes, while Angola has approximately 192.61 (3%), Benin approximately 62,090 (2%), Botswana approximately 96,420 (11%), Cameroon approximately 517,860 (6%), Comoros approximately 24,300 (9%), Congo approximately 97,670 (6%), Cote d'Ivoire approximately 421,030 (5%), Democratic Republic of Congo approximately 737,090 (3%), Kenya approximately 720,730 (5%), Madagascar approximately 477,470 (5%), Zambia approximately 268,000 (5%), and Zimbabwe at approximately 568,680 (10%) as estimated by IDF (2012).

As indicated above, there is a paucity of data on the prevalence of diabetes in African children, but there is evidence that it is an important medical problem in most African countries. For instance, Elamin and colleagues in Sudan reported a survey of nearly 43,000 school-going children (age 7–11 years) and found a prevalence rate of approximately 1 per 1000 (Elamin, Omer, Zein, & Tuvemo, 1992). This rate is comparable to a reported prevalence rate of approximately 0.3 per 1000 in Nigeria (Afoke et al., 1992). The reported incidence was approximately 10 per 100,000 children per year in Sudan (Elamin et al., 1992) and approximately 2 per 100,000 per year in Tanzania (Swai, Lutale, & McLarty,



**Table 9.1** Prevalence of diabetes in sub-Saharan Africa as estimated by the IDF Diabetes Atlas 2012. These figures excluded people below the age of 20. Country populations as reported by the World Bank

| Country/territory           | Diabetes cases (20–79) in 1000s with total country population in parentheses | Diabetes comparative prevalence (%) WHO standards | Diabetes-related deaths (20–79) | Mean diabetes-related expenditure per person with diabetes (USD) | Number of people with undiagnosed diabetes (20–79) (in 1000s) |
|-----------------------------|--|---|---------------------------------|--|---|
| Angola                      | 192.61 (15,957,460)  | 2.91  | 4154                            | 276.70   | 154.09  |
| Benin                       | 62.09 (7,397,985)  | 1.68  | 1162                            | 59.95  | 51.29   |
| Botswana                    | 96.42 (1,852,243)  | 10.80   | 2962                            | 814.16   | 77.13   |
| Burkina Faso                | 182.44 (13,789,736)  | 2.95  | 4826                            | 68.64  | 150.71  |
| Burundi                     | 97.87 (7,039,534)  | 2.72  | 2781                            | 34.84  | 80.85   |
| Cameroon                    | 517.86 (17,165,267)  | 6.15  | 14,588                          | 109.04   | 414.29  |
| Cape Verde                  | 13.65 (466,784)  | 5.43  | 139                             | 242  | 10.92   |
| Central African Republic    | 57.09 (3,952,281)  | 3.05  | 1850                            | 34.31  | 47.16   |
| Chad                        | 189.94 (9,474,792)   | 3.61  | 5569                            | 86.40  | 156.91  |
| Comoros                     | 24.30 (625,876)  | 8.39  | 281                             | 45.64  | 20.07   |
| Congo (Brazzaville)         | 97.67 (3,445,765)  | 5.52  | 2254                            | 142.67   | 78.13   |
| Congo (Democratic Republic) | 737.09 (55,754,885)  | 3.03  | 16,355                          | 25.03  | 608.91  |
| Cote d'Ivoire               | 421.03 (17,731,840)  | 4.93  | 10,263                          | –  | 336.82  |
| Djibouti                    | 26.89 (–)  | 6.30  | 502                             | 131.09   | 21.51   |
| Equatorial Guinea           | 14.57 (589,794)  | 4.21  | 326                             | 923.62   | 11.65   |
| Eritrea                     | 94.62 (4,318,343)  | 3.41  | 1182                            | 17.12  | 78.17   |
| Ethiopia                    | 1386.64 (72,526,620)   | 3.32  | 23,869                          | 24.91  | 1145.50   |
| Gabon                       | 69.96 (1,344,171)  | 10.19   | 1378                            | 388.20   | 55.97   |
| Gambia                      | 12.79 (1,460,493)  | 1.97  | 201                             | 45.63  | 10.56   |
| Ghana                       | 354.2 (21,119,911)   | 3.16  | 69,973                          | 114.76   | 292.45  |
| Guinea                      | 187.14 (8,889,321)   | 4.36  | 3459                            | 36.98  | 154.59  |
| Guinea-Bissau               | 19.39 (1,340,814)  | 3   | 490                             | 30.35  | 16.01   |
| Kenya                       | 720.73 (34,702,176)  | 4.66  | 17,733                          | 57.58  | 595.40  |
| Lesotho                     | 29.96 (2,047,006)  | 3.46  | 2133                            | 101.09   | 23.97   |
| Liberia                     | 50.23 (3,092,721)  | 3.12  | 1036                            | 47.20  | 41.49   |
| Madagascar                  | 477.47 (17,357,913)  | 5.09  | 6857                            | 37.64  | 394.44  |
| Malawi                      | 363.94 (12,472,794)  | 5.63  | 12,776                          | 31.27  | 300.65  |
| Mali                        | 89.30 (12,772,264)   | 1.67  | 2083                            | 70.47  | 73.77   |
| Mauritania                  | 53.27 (2,964,526)  | 3.64  | 948                             | 47.91  | 44.01   |
| Mauritius                   | 141.64 (1,233,386)   | 14.76   | 1664                            | 478.18   | 72.34   |
| Mozambique                  | 305.05 (20,246,287)  | 3.14  | 11,325                          | 36.82  | 252   |
| Namibia                     | 75.73 (2,043,339)  | 7.68  | 1727                            | 469.48   | 60.58   |
| Niger                       | 293.93 (12,546,945)  | 4.15  | 5333                            | 38.54  | 242.82  |
| Nigeria                     | 3165.31 (136,399,438)  | 4.83  | 88,681                          | 129.17   | 2532.25   |
| Réunion                     | 95.03 (–)  | 16.01   | –                               | –  | 76.02   |
| Rwanda                      | 131.21 (9,009,655)   | 3.12  | 3220                            | 82.32  | 108.39  |
| Sao Tome and Principe       | 3.75 (150,311)   | 5.54  | 51                              | 162  | 3   |
| Senegal                     | 160.11 (10,581,316)  | 3.26  | 2430                            | 109.52   | 132.27  |

(continued)

**Table 9.1** (continued)

| Country/territory | Diabetes cases (20–79) in 1000s with total country population in parentheses | Diabetes comparative prevalence (%) WHO standards | Diabetes-related deaths (20–79) | Mean diabetes-related expenditure per person with diabetes (USD) | Number of people with undiagnosed diabetes (20–79) (in 1000s) |
|-------------------|--|---|---------------------------------|--|---|
| Seychelles        | 5.56 (82,500)  | 12.13   | 38                              | 589.33   | 2.85  |
| Sierra Leone      | 73.01 (4,952,134)  | 3.07  | 2300                            | 82.80  | 60.31   |
| Somalia           | 172.25 (8,170,899)   | 3.87  | 3567                            | 20.03  | 142.30  |
| South Africa      | 1978.25 (46,664,771)   | 7.04  | 63,061                          | 695.05   | 1582.60   |
| Sudan             | 1824.67 (30,101,696)   | 9.12  | 29,966                          | 150.50   | 1016.98   |
| Swaziland         | 14.20 (1,016,094)  | 3.07  | 856                             | 246.31   | 11.36   |
| Tanzania          | 492.95 (37,786,946)  | 2.81  | 15,156                          | 40.26  | 407.22  |
| Togo              | 140.13 (5,288,273)   | 5.21  | 2583                            | 6288   | 115.76  |
| Uganda            | 319.73 (27,521,632)  | 2.85  | 11,296                          | 83.61  | 264.13  |
| Western Sahara    | 18.47 (–)  | 5.08  | –                               | –  | 15.28   |
| Zambia            | 268 (11,192,422)   | 5.13  | 10,535                          | 124.96   | 221.39  |
| Zimbabwe          | 568.68 (12,597,877)  | 9.75  | 29,987                          | 55.58  | 468.79  |

Source: IDF Atlas (2012) and World Bank (2011)

1993). Other studies indicate that the age of onset in South Africa and Ethiopia was later than elsewhere (Kalk, Huddle, & Raal, 1993; Lester, 1984) and the peak age of onset of type 1 diabetes in sub-Saharan Africa was a decade later than in the West (Afoke et al., 1992; Kalk et al., 1993; Swai et al., 1993). Ethnic differences in the peak age of onset have also been reported in some African countries. For instance, in South Africa it has been reported that the peak age of onset was about 13 years in the white South Africans (similar to Europeans) but about 23 years in the black South Africans (Kalk et al., 1993). In addition it affects more girls than boys (Kalk et al., 1993).

As alluded to earlier, although little is documented on the prevalence of type 2 diabetes in children, it is believed to be increasing in African children (Sobgnwi et al., 2001). A few African studies that include adolescents reviewed in a systematic review gave insight into the prevalence of T2DM in African adolescents (Hall et al., 2011). The prevalence in the general population of T2DM (i.e., both adolescents and adults) as recorded in these studies ranges from approximately 6.06 in Cameroon, 4% in Kenya, 3% in Nigeria, 4% in South Africa, 7% in Tanzania, and 1% in Uganda as indicated in cross-sectional surveys of children and adults in sub-Saharan Africa

from 1999–2011 (Hall et al., 2011). The exact figures of children with T2DM are yet to be established.

These figures combined suggest that diabetes mellitus is a huge medical problem in Africa which needs attention and more research focusing on its prevalence, incidence, demographics, and clinical characteristics especially in SSA where there is a dearth of proper and valid records of the disease epidemiological data.

## Consequences and Risks of Diabetes in Children

The consequences and risks associated with diabetes in children can be categorized into acute and chronic complications.

### Acute Complications

In sub-Saharan Africa, diabetes ketoacidosis (DKA), hyperosmolar nonketotic coma, and hypoglycemia are acute conditions that have been reported. DKA has been found in the range of 7–80% in newly diagnosed patients and 25–90% in children who have already been diag-

nosed with diabetes (Majaliwa et al., 2008). Mbanya and Ramiaya (2006) reported that diabetes ketoacidosis in patients ranges from 25% in Tanzania to 33% in Kenya per year and that it is the most common diabetes emergency which carries high mortality. Though little is known about the mortality associated with hypoglycemia, it is one of the leading reasons for hospitalization of children with diabetes. For instance, in a study in South Africa with 43 patients that were admitted at Baragwanath Hospital in Soweto, a total of 51 episodes of hypoglycemia in a 5-month period were recorded (Gill & Huddle, 1993). Hypoglycemia has been observed to range between 25 and 55% in Sub-Saharan African diabetes patients (Majaliwa et al., 2008). The other complication associated with diabetes is hyperosmolar nonketotic coma which has been reported to be associated with T1DM and less common in T2DM, and it accounts for 10% of all hypoglycemic emergencies (Mbanya & Ramiaya, 2006).

## Chronic Complications

As early as prepubertal age, most Sub-Saharan African children with diabetes will have developed chronic complications of diabetes (Majaliwa et al., 2008). According to Dowshen (2007), people with diabetes have a greater risk of developing eye problems including cataracts, retinopathy, and glaucoma. A multi-ethnic cohort study indicated that Africans are 55% more at risk than Indians and Caucasians of retinopathy (Dowshen, 2007). In sub-Saharan African children, retinopathy prevalence ranges from 10 to 30% (Majaliwa et al., 2008). It was estimated that by 2010, 4510 people in Africa with diabetes had eye complications and a number of 423,500 were blind due to diabetes complications (Motala & Ramiaya, 2010).

Diabetes nephropathy is also common among those diagnosed with diabetes accounting for approximately 2,230,000 people needing dialysis because of kidney problems in Africa (Motala & Ramiaya, 2010). The prevalence rate of nephropathy ranges between 14 and 33% in children (Majaliwa et al., 2008). Another complication

that people with long-time diabetes may develop is diabetic neuropathy (Dowshen, 2007). People with diabetes are also prone to develop cardiovascular diseases with problems such as heart attack, stroke, and blockages of blood vessels. It is estimated that 907,500 people have cardiovascular diseases in SSA (Motala & Ramiaya, 2010) although heart attacks, strokes, and blockages of blood vessels are more likely to be experienced by adults with diabetes (Dowshen, 2007). People with diabetes are also susceptible to gum disease (dental problems) and foot problem. About 169,400 people with diabetes have lost a foot because of amputation (Motala & Ramiaya, 2010), and foot ulcer is a major cause of hospital admission and bed use for diabetes in some countries, for example, Cameroon (Kengene et al., 2009). Diabetes can also cause poor growth among children (Kalk et al., 1997). Overall, it is important to note that diabetes comes in different types with the effects, infection rates, and disease development varying from one to another and from country to country.

## Neurocognitive Risks

There is growing evidence indicating that children with diabetes mellitus compared to control subjects are at risk of developing neurocognitive difficulties (Gaudieri, Greer, Chen, & Holmes, 2008). Children with diabetes are at risk of neurocognitive problems given the vulnerability of the young brain to hypoglycemia and hyperglycemia (Naguib, Kulinskaya, Lomax, & Garralda, 2009). Using magnetoencephalography (MEG) to assess functional brain connectivity in T1DM patients, compared with sex and education matched with T1DM and control subjects, T1DM had decreased functional connectivity (Van Duinkerken et al., 2009). There is also a positive relationship between cognitive functioning and functioning connectivity. Specific cognitive domains that are affected in children with T1DM include slowed information processing, psychomotor efficiency, attention, memory, learning, problem-solving, motor speed, vocabulary, general intelligence, visuoconstruction,

somatosensory examination, motor strength, mental flexibility, and executive function. In T2DM, cognitive domains affected by diabetes include verbal memory, visual retention, working memory, immediate recall, delayed recall, psychomotor speed, executive function, processing speed, complex motor function, verbal fluency, and attention (Kodl & Seaquist, 2008).

Meta-analytic studies show moderate to high effects of diabetes on most of these domains in children. For instance, children with T1DM have been found to perform significantly worse on tasks assessing visual spatial abilities, motor speed and writing, and sustained attention and writing (Naguib et al., 2009) and have slightly low performance ( $d = -0.13$ ) in overall cognitive domains, except learning and memory (Gaudieri et al., 2008; Brands, Kappelle, Biessels, Kessels, & de Haans, 2005), although other studies have shown that children with diabetes perform better in math than matched controls (McCarthy, Lindgren, Mengeling, Tsalikian, & Engvall, 2002).

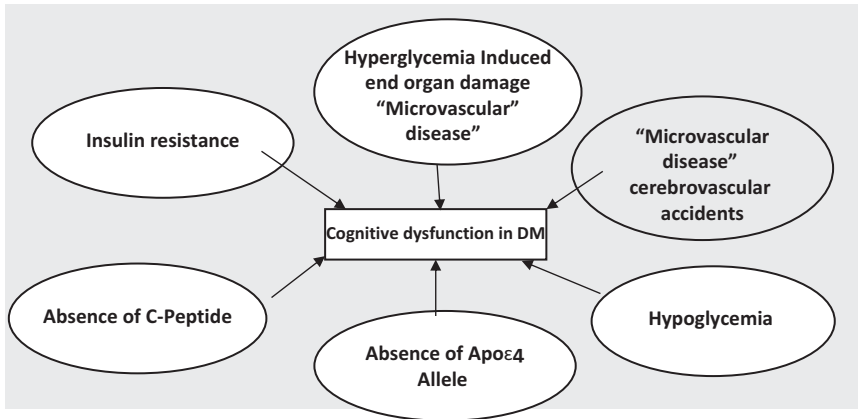
The risks of developing cognitive difficulties have been linked to early illness onset and illness duration, recurrent hypoglycemic episodes, and hypoglycemia (Naguib et al., 2009). Elsewhere, they have been associated with the presence of microvascular complications and not with the occurrence of severe hypoglycemic episodes or metabolic control (Brands et al., 2005). The risks associated with cognitive difficulties have been shown graphically in Fig. 9.2.

## Psychosocial Risks

Some psychosocial issues in children with diabetes have been found to be associated with the diagnosis of diabetes. For instance, children with diabetes have often shown adjustment problems at the onset of diagnosis after the “honeymoon” period has finished (Delamater, 2009; Silverstein et al., 2005). Diabetes can also interfere with the daily routine and participation in activities children previously enjoyed doing the following diagnosis. The notion of having a life-threatening illness, complex care, and management of diabe-

tes is daunting and can be also a source of stress and depression (Hapunda, Abubakar, Pouwer, and van de Vijver (2015a, 2015b); Lloyd, Roy, Nouwen, & Chauhan, 2012). The worst part is that high levels of stress in children have been associated with poor glycemic control and that prolonged problems with psychosocial adjustments affect diabetes management in early childhood (Delamater, 2009). Immediately following diagnosis, children report mild depression and anxiety, which fluctuates over the years between boys and girls (Silverstein et al., 2005). In a Zambian study, depression was common (28%) in adolescents with T1DM than health control (17%). In same study, the authors reported 8% of females were more likely to report depressive symptoms than female health controls (Hapunda et al., 2015a). However, in a recent systematic review, it was not clear that depression was high among adolescents with T1DM compared with control, although there was evidence of the association between depression and worse glycated hemoglobin (HbA<sub>1c</sub>) level and other health outcomes (Johnson, Eiser, Young, Brierley, & Helle, 2013). People with impaired glucose metabolism (IGM) or undiagnosed type 2 diabetes are not at increased risk for depression compared with the general population with normal glucose metabolism (Nouwen et al., 2011). However, when compared with T2DM, individuals with IGM have a significantly lower risk of having depressive symptoms.

Children and adolescents with diabetes also report diabetes emotional-related distress. In a Zambian study by Hapunda et al. (2015b), diabetes emotional distress was common and high in both boys ( $49 \pm 24$ ) and girls ( $49.5 \pm 23$ ). The common problem areas in diabetes that were distressing to adolescents were feeling diabetes was taking too much of their mental and physical energy [62% boys vs. 50% girls], feeling guilty/anxious when they got offtrack with their diabetes management [66% boys vs. 41% girls], feeling depressed when the adolescents thought about living with diabetes [55% boys vs. 54% girls], feeling that family and friends were not supportive of their diabetes management efforts [55% boys vs. 41% girls], and worrying about the



**Fig. 9.2** Possible mechanistic contributors to cognitive dysfunction in diabetes mellitus. *Source:* Kodl and Seaquist (2008) (reprinted with permission)

future and possible complications [55% boys vs. 61% girls] (Hapunda, Abubakar, van de Vijver, & Pouwer, 2016). It was not surprising that girls worried more about the future than boys given that qualitative data has shown that girls with diabetes worry more about future adaptation, reproductive fitness, and possibility of finding romantic partners (Hapunda et al., 2015b).

A systematic review with studies mainly from the USA and Western Europe showed that there are minimal differences in quality of life (QoL) between children and adolescents with T1DM and the health controls (Nieuwesteeg et al., 2012). However, there are indications that boys report better generic QoL than girls and also that older children report better generic QoL than younger children.

## Comorbidity

Comorbidity is becoming common in an already disease-inflicted population; more and more people now have more than one disease in SSA (Bischoff, Ekoe, Perone, Slama, & Loutan, 2009; Rothman & Wagner, 2003). For instance, a study in Ghana found that 46% of patients with type 2 diabetes mellitus also had a plasmodium falciparum (malaria) infection (Danquah, Bedu-Addo, & Mockenhaupt, 2010). In a study conducted in Malawi, out of 482 patients with diabetes, 14%

were seropositive with the HIV, 35 out of 475 had had stroke, 46% reported foot numbness, and 25% had sight-threatening eye diseases in type 2 diabetes patients in Ghana (Cohen et al., 2010; Danquah et al., 2012). Psychosocial issues such as depression and stress are also common in children and adults with diabetes (Kakleas, Kandyla, Karayianni, & Karavanaki, 2009). The burden of having to manage this disease, the knowledge that the illness is chronic, and the potential for the illness to disrupt normal childhood activities could certainly pose psychological difficulties for children and indeed adults with diabetes as shown in a recent meta-analysis (James, Morakinyo, Eze, Lawani, & Omoaregba, 2010).

## Mortality

There have been relatively few structured mortality studies in Africa, making quantification of outcome difficult (Mbanaya & Ramiaya, 2006). However, it is estimated that a child in sub-Saharan Africa that is newly diagnosed with type 1 diabetes has a short life expectancy (on average less than 5 years if not properly treated), and it is projected that diabetes deaths will increase by over 80% in upper-middle-income countries between 2006 and 2015 (IDF, 2006). The high death rate, especially among children, is often due to a lack of diagnosis or misdiagnosis and

the nonavailability of insulin because of high prices (Santé Diabète, 2011). Evidence shows that more than twice as many deaths occur in females with diabetes than males (IDF, 2012). A study in Mali which followed up 20 children with T1DM for 8 years showed that half of the children had deceased after 8 years (Santé Diabète, 2011). In Tanzania, for the period 1981–1987, the 5-year survival rates (95% confidence intervals) for patients with diabetes requiring and not requiring insulin therapy were 71% (62–80%) and 84% (80–89%), respectively, for known deaths and 60% (51–69%) and 82% (77–86%), respectively, for known plus probable deaths 49 (3.9%) (McLarty, Kinabo, & Swai, 1990; Swai, Lutale, & McLarty, 1990). The 2012 data by IDF indicate that the number of diabetes-related deaths in populated countries like Nigeria was approximately 88,181, South Africa approximately 63,061, Zimbabwe approximately 29,987, Sudan approximately 29,966, and Ethiopia approximately 23,869 (IDF, 2012). Other countries like Kenya recorded approximately 17,733, Congo DR approximately 16,355, Tanzania approximately 15,156, Cameroon approximately 14,588, Mozambique approximately 11,325, and Zambia approximately 10,535 deaths (IDF, 2012). Table 9.1 indicates diabetes-related deaths in SSA.

### Socioeconomic Burden

Sub-Saharan African countries have the lowest per capita income compared to the rest of the continent, and chronic conditions engender increasingly serious economic and social consequences in the region and threaten healthcare resources (Bischoff et al., 2009). Diabetes not only has lifelong costs of treatment and care but also has negative effects on the productivity of an already financially threatened population. The economic burdens are related to healthcare costs incurred by society in managing the disease, indirect costs resulting from productivity losses due to patient disability and premature mortality, time spent by family members accompanying patients when seeking healthcare, and intangible costs

(Hapunda et al., 2015b; Kirigia, Sambo, Sambo, & Barry, 2009). At the time of the analysis, the grand total indirect cost was about US\$ 8.1 billion (32%) in WHO African countries that is US\$ 1154.15 per diabetes patient. In East African patients, the annual cost for care was US\$ 229, of which two third was for purchase of insulin as of 2005 (Beran, Yudkin, & de Courten, 2005). In Khartoum, Sudan, of the total family expenditure on health, 65% was used for the child with diabetes (Elrayah et al., 2005). It is estimated that the direct cost of treating diabetes in the year 2000 ranged from US\$ 2302 to 3207 per person (Hall et al., 2011), in a continent with the per capita for expenditure on health in the same year pegged at US\$ 86 (World Health Organization, 2011). About 7.02 million cases of diabetes recorded by African countries in the year 2000 resulted in a total economic loss of US\$ 25.51 billion that is US\$ 3633 per patient with diabetes (Kirigia et al., 2009). More details on the economic details of diabetes mellitus in the region and a full picture of the expenditure on diabetes as estimated by IDF in 2012 (IDF, 2012) can be seen in Table 9.1.

### Challenges in Care and Treatment

More than three quarters of a century after the discovery of insulin in 1922, insulin is still not available on an uninterrupted basis in many parts of Africa as indicated in a survey by Beran, Yudkin, and de Courten (2006). Of course there are variations from country to country or from urban setting to rural setting. Insulin is generally available in urban health settings. For instance, in Zambia the differences are due to diagnostic infrastructure, distance to health facilities, and insulin selling points, and difficulties are often faced by those living in rural areas across the provinces (International Insulin Foundation, 2013).

The other problem that hampers adequate health care for children with diabetes is lack of adequately trained health personal in SSA healthcare systems. The World Health Organization indicated that there were 2 physicians per 10,000 persons in Africa (World Health



Organization, 2011). Even when healthcare personnel were available, they often lacked knowledge on how to diagnose and treat chronic illnesses such as diabetes (Beran et al., 2005). In Zambia, there was no qualified diabetologist for children at the time of the inquiry, and care and treatment were received from pediatricians who had interest or had been assigned to attend to diabetes cases. The situation is not very different in many SSA countries. This explains why most children with diabetes in Africa are undiagnosed. Table 9.1 indicates cases of people with undiagnosed diabetes in Africa.

The prevailing situation regarding high-tech medical products and equipment is poor, for instance, there were 9 hospital beds per 10,000 population in Africa as of 2000–2009 (World Health Organization, 2011). Health information, research, and patient record keeping are often poor, making it difficult to access health services and advance health knowledge through research and development (World Health Organization, 2011). Even the number of published studies on diabetes in sub-Saharan Africa leaves more to be desired, at 84 as of 2010 (Holmes et al., 2010).

There are also problems with access to medical instruments and materials such as syringes in most sub-Saharan African countries. A survey in Mozambique and Zambia found that patients in rural areas had the most difficulties in accessing syringes, while in urban areas there were problems with quantification of syringes and trips, which were often in short supply (Beran et al., 2005). Furthermore, only the wealthy patients possessed their own glucometers, and the majority of poor children relied on their blood sugar being monitored once in a while for free in public hospitals (Beran et al., 2005). In some cases, public health facilities did not have medical essentials for caring and treating patients. For instance, only 6% of health centers in Mozambique had facilities for blood glucose testing compared with 25% in Zambia (Beran et al., 2005). Countries like Zambia have not even decentralized treatment and care in small- and medium-sized health facilities, making children travel long, costly, and laborious distances to major central hospitals.

In most Sub-Saharan African countries, diagnosis is a problem, hence a large number of undiagnosed diabetes patients in Africa as already indicated above. Knowledge and familiarity of diabetes symptom presentation are the major reasons for problems with diagnosis. Health workers in countries like Zambia and Mozambique rarely encounter patients with diabetes, and because of this lack of familiarity and tools for proper diagnosis, as a consequence, many patients are missed or misdiagnosed with cerebral malaria or HIV and AIDS (Beran et al., 2005). In sub-Saharan African countries, most of the children who suffer from type 1 diabetes are actually diagnosed when they go into a ketoacidotic coma (Santé Diabète, 2011).

The increase in the levels of obesity poses another challenge to children and adolescents with diabetes. Regulating and managing weight is a challenge in adolescents especially that body fat and body mass index (BMI) have been shown to be linked to insulin resistance in Western adolescents (Wedin, Diaz-Gimenez, & Convit, 2012). Being overweight and obese is increasingly challenging health practitioners more so that being thin in the African context is associated with poverty. As such, it is prestigious to be fat because it is seen as being attractive and a sign of wealthy (Santé Diabète, 2011). In some countries like Mauritania, girls are forced to eat and become fat so as to be attractive and attract more bridal price. Linked to this are the difficulties of a suitable diet in most SSA children with diabetes. In most African countries, establishing a suitable diet is problematic due to cost of food, family size, and seasonal availability of food (Santé Diabète, 2011). Misconceptions about diet and low levels of understanding regarding insulin use is a challenge and leads to poor diabetes management and frequent complications (Beran et al., 2005). In Zambia, qualitative data revealed that in some cases parents asked their adolescents with diabetes especially the girls to stop injecting themselves with insulin because jabs were damaging their bodies. Insulin jabs are recommended on the thighs, abdomen, buttocks, and shoulders all cosmetic body parts important to females (Hapunda et al., 2015b).

## Role of Traditional Healers

Another challenge is the role of traditional medicine and beliefs when it comes to treatment and care for diabetes in African children. There are many problems linked with the use of traditional medicine in chronic diseases like diabetes (Santé Diabète, 2011). Some traditional healers claim that they can cure diabetes. This has dangerous and perverse effects on attracting a great number of patients who have been told by modern medicine that they will live with diabetes for the rest of their life. People have faith in them, and they are very accessible to the extent that patients shun modern medicine. WHO estimated that in Africa more than 80% of the population consult traditional healers (World Health Organization, 2010). Associated with this are certain beliefs of parents and girls who have diabetes: many hold the opinion that living with the diseases affects childbearing which is crucial in African marriages. A retrospective study in Zambian woman who had given birth between 2006 and 2011 showed that there were 4717 macrosomic and 187,117 normal birth weight out of 219,780 newborns who were analyzed. In this study, macrosomia was defined as a birth weight of 4000 g or more and normal birth weight as 2500–3999 g. The strongest predictors of macrosomia were high BMI (adjusted odds ratio [AOR] = 2.88; 95% confidence interval [CI] 1.95–4.24), prior macrosomic newborn (AOR, 7.60; 95% CI 6.81–8.49), and history of diabetes (AOR = 3.09; 95% CI 1.36–6.98). Macrosomic newborns were at increased risk for cesarean delivery (AOR = 1.63; 95% CI 1.35–1.96), fresh stillbirth (AOR = 2.24; 95% CI 1.56–3.21), Apgar score of under 7 at 5 min (AOR = 2.03; 95% CI 1.33–3.11), and neonatal intensive care admission (AOR = 2.07; 95% CI 1.32–3.23) (Lui et al., 2013). Although studies have documented the relationship between maternal glucose levels and macrosomic babies or congenital malformation, if glucose levels are well managed, macrosomia and other birth defects can be prevented (Jovanovic, 2001; Sacks, 2010). As such, claims from traditional healers sometimes give hope to patients with such beliefs.

Education on diabetes is also limited among children with diabetes in SSA. In SSA, consultation times are short, resulting in little or no time for patient education and mental health care (Mbanya & Ramiaya, 2006). Knowledge on prevention, care, and how to stay healthy is critical for children with diabetes; however, lack of resources for education programs, skilled manpower, and adequate consultation times are all bottlenecks to diabetes education activities in SSA.

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## Implications

To begin with, there is a need for epidemiological studies on children with diabetes in SSA. Lack of such studies thwarts knowledge on the extent, characteristics, and nature of diabetes in Africa. There must be annual screening for acute and chronic complications associated with diabetes in order to prevent the occurrence of acute and chronic complications of diabetes in future. This will need increasing funding to noncommunicable diseases, training skilled manpower, adequate medical essentials and equipment, and developing policies that support these issues.

There is also a need for dialogue and partnership with the private sector to make treatment and care for children with diabetes accessible and affordable. This is important especially in countries where the private sector plays a crucial role in the health system. For instance, Beran et al. (2005) found that the private sector (private wholesalers) in Zambia sold insulin 85–125% more expensive than in the public sector. This situation is also true for syringes and glucometers in most SSA countries. Therefore, involving different stakeholders in health care can improve health service delivery for children in Africa.

Santé Diabète (2011) suggest working in partnership with traditional healers regarding the management of chronic diseases by getting them to collaborate in a healthy and active way. One way of doing this is to pass a set of ideas about diabetes, its complications, and treatment. By doing so, traditional healers all over Africa could become useful partners for diabetes education

and advocacy since they are already involved in diabetes management although using methods not recommended.

The American Diabetes Association (ADA) recommends that ultimately every child newly diagnosed with diabetes mellitus should be evaluated by a diabetes team consisting of a pediatric endocrinologist, a nurse educator, a dietitian, and a mental health professional qualified to provide up-to-date pediatric-specific education care and support (Silverstein et al., 2005). The psychological health needs of children with physical chronic illness are virtually nonexistent in most sub-Saharan African countries (Bakare, Omigbodun, Kuteyi, Meremikwu, & Agomoh, 2008). Linked to this is the need for SSA countries to develop comprehensive care programs integrating both physical and psychosocial needs, families and schools in the care and management processes of diabetes, as well as understanding the period of childhood especially physical development and the increased sense of autonomy and independence in young people. Further, because family diabetes-related behavior patterns have been documented to affect glycemic control, there is a need to assess both the risk factors and the strength of the child and family at the time of diagnosis, with the hope of intervening (Silverstein et al., 2005). This proposition may not suffice in most SSA countries given the struggle to meet priority needs by patients and governments. SSA countries could look for relative cheap but effective ways to meet the psychosocial needs of children with diabetes. In addition, guided by Maslow's need model, children should have insulin, good housing, and healthy diet in order to optimize their psychosocial needs (Maslow, 1954). This is not to say that the later needs are not important, but this proposition makes sense given the prevailing situation in most African contexts.

### Prevention Programs

We recommend investing in diabetes prevention programs is essential. Lifestyle interventions

have been documented to prevent or delay onset of diabetes in individuals with impaired glucose tolerance (IGT). A community healthy lifestyle intervention in a high-risk indigenous Maori rural community of New Zealand showed a 10% decrease in insulin resistance prevalence and associated changes in a group who actively participated in a lifestyle intervention (Coppell et al., 2009). In the USA, a lifestyle intervention to 1079 participants significantly resulted in a 58% reduction in the incidence of diabetes (The Diabetes Prevention Program Research Group, 2002), and a systematic review showed that lifestyle interventions were successful in reducing the incidence of T2DM (Barker, Simpson, Lloyd, Bauman, & Singh, 2011).

### Future Developments

Studies have demonstrated the efficacy of using text messaging via cell phone in diabetes patients. For instance, patient confidence in diabetes management significantly improved using their text messaging-based diabetes program in an African American population (Dick et al., 2011). Sixty-eight percent of African population was expected to have a mobile phone within 5 years (Rao, 2011) at the time of the review. For example, in 2014, the Zambia Information and Communication Technology Authority (ZICTA) reported that there were 10.1 million mobile phone subscribers in Zambia out of the approximately 14 million population (ZICTA, 2014). Moreover, most mobile phone service providers in Zambia have a portal on their SIM card which contains health tips, entertainment, sport, etc. Therefore, diabetes-specific education can be delivered through such portal or dial free numbers. A successful example of the use of mobile phones in the health sector is a study in Southern province of Zambia on early infant diagnosis of HIV infection through mobile phone texting of blood test results which showed that the mean turnaround time for delivery of test results to relevant health facilities from test laboratories fell from 44.2 days at pre-implementation to 26.7 days at post implementation (Seidenberg

et al., 2012). Therefore, opportunities like this one must be utilized by the healthcare system.

In summary, there seems to be an increase in the incidence of diabetes in SSA, and comorbid psychosocial problems including depression, anxiety, and distress among other in individuals with diabetes are reported. Although there is abundant evidence in developed nations, little is known about the psychosocial issues affecting children with diabetes in SSA and Zambia. Therefore, more studies on psychosocial problems affecting children with diabetes in SSA are needed. As established earlier, data on diabetes in Zambia is scarce. Therefore, this narrative review of data on diabetes in Africa acted as a basis for comparing the state of diabetes not only in Zambia but also in Sub-Saharan Africa. The comparison assumes some degree of equivalence on socioeconomic status across Sub-Saharan Africa. Although socioeconomic and cultural factors are not exactly the same in Africa, cross-cultural validation may be the only way to understand the state of diabetes in Zambia in the absence of more substantive evidence.

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The intricate interplay that is woven between nutrition and brain development is often radically disrupted in African settings where insults come from multiple factors. Many children are already born at a disadvantage due to poor health and malnutrition in the antenatal period. Many children continue to lack adequate nutrition during the early newborn and infant period. Children grow up not reaching where they should be with their development, they reach adolescence, and in some cases have their own children early in life. The cycle then begins again. Research evidence points to good nutrition, adequate psychosocial stimulation, and health all being vital in providing a sound basis for enabling good development. Most of the research for this comes from studies based in South America and Jamaica as well as from developed country settings (Engle et al., 2011).

Malnutrition is likely to hinder cognitive abilities through several interacting routes rather than just from a single route as previously thought. It is now considered that malnutrition alters intellectual developments by interfering with overall

health and energy. Low socioeconomic status can exacerbate this by placing impoverished children at particular risk for cognitive impairment later in life (Brown & Pollitt, 1996).

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## Levels of Malnutrition in Africa

The millennium development goals pushed for less than 13% of children to be underweight (low weight for age) worldwide. The new Sustainable Development Goals are taking this further and pushing for zero hunger with the ultimate aim being for all children to be free of malnutrition in all its forms. Africa has got a long way to go to meet this target with 5.5-8.5% of children under 5 years wasted and approximately one third of all children stunted (UNICEF, 2017). Recent studies estimate that only small improvements are anticipated with the number of affected children actually increasing over time from 56 to 61 million (Black et al., 2013). This may be exacerbated over time with increasing pressures from climate change and urbanization. In many African settings, there is inadequate intake of both micronutrient-rich foods such as nourishing seeds, nuts, fish, and meat which are more costly. Children often are eating much higher percentages of staple grains and lower percentages of protein than recommended by the World Health

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Organization (WHO) (Series, 2007; Stephenson et al., 2010).

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## Poverty and Lack of Psychosocial Stimulation in Africa

We know that in Africa, levels of poverty are high, and with this goes a lack of developmental stimulation. Recent MICS indicators demonstrate that children in many African countries do not get adequate stimulation in all forms although this differs considerably throughout the continents. In many settings in Africa, very few children have books (<35% in Ghana to 12% in Cote d'Ivoire). The MICS surveys demonstrate that some children are stimulated to promote learning and school readiness such as those in Nigeria (55–75%). In some settings, the amount children are reported to be stimulated is much lower such as in Burkina Faso where only 10–30% engaged in stimulating activity (UNICEF, 2005–2006).

In this chapter, I outline the interaction of nutrition and child development and situate the research as much as possible within the African setting. We know that brain development starts in the antenatal period and continues considerably throughout the early years of childhood with some development continuing even up into adulthood. With this in mind, it is clear that the effects of nutrition and the insults caused by lack of nutrition (including micronutrients) can affect child development and brain growth and function in different ways during these different time courses. Furthermore, the type of nutritional intervention and/or insult (protein-energy malnutrition vs. iron deficiency anemia vs. zinc deficiency vs. micronutrient deficiency generally) varies and therefore affects brain function in different ways. Finally, the research that has been conducted to look at this interplay comes from three main sources: animal models, neurophysiological and imaging studies, and clinical studies. The human studies can be pure correlational studies, or they can be intervention studies done at different stages in the life cycle. These studies vary widely in the severity of malnutrition which has been correlated with development, the type of nutritional interventions

provided, and the types of outcome measures which are used to look at efficacy. They can also vary as to whether they include just a nutritional intervention or an intervention combined with stimulation. These joint interventions are beyond the scope of this chapter.

I will first discuss the normal course of brain development to put in context the research regarding nutritional insults on the brain. I then break up the chapter into research on protein-energy malnutrition, free fatty acids, choline, and then some micronutrient deficiencies. I structure each of these to look at the evidence firstly from animal and electrophysiological models and then from clinical correlational and intervention studies in Africa. Within each of these areas, I discuss the evidence from different time points including the antenatal period, infancy, and preschool period.

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## Normal Brain Development and Its Time Course

Brain development starts in the early period of the growth of the fetus and continues until well after birth. The effect that nutrition will have on the development of the brain is likely to vary depending on the time period that the insult occurred as well as the length of time of the nutritional insult as well as what type of nutritional insult it was. Studies on brain development and the effect of nutrition come from a number of sources.

### The First Two Trimesters

The development of the brain in humans is more prominent and prolonged than in any other species (Bystron, Blakemore, & Rakic, 2008; O'Rahilly, 1999). In humans, the neural tube starts to fold inward 22 days after conception to form the neural tube, brain, and spinal cord. This closes by day 30 of the embryonic period. There is some evidence that folic acid, copper, and vitamin A all affect this process (Prado & Dewey, 2014). The cerebral cortex at this stage

is composed of horizontal layers of nerve cells which go through a process of cell division enabling them to increase in number as well as specialization of cells for different functions (e.g., neurons vs. glial cells). At first the early brain primordium is composed entirely of dividing neural stem cells (progenitor cells). These migrate into the developing neocortex and result in the formation of a six-layered structure. Earlier migrating neurons form the deepest layers of the cortex, and later migrating neurons form successively more superficial layers. The earliest produced neurons migrate through a process of somal translocation, where they extend their long basal process beyond the edge of the ventricular zone (VZ) into the outer region of the brain compartment. How this migration occurs is still unclear (Stiles, 2012). There are certain signals which control a particular stage of the cortical neurons' journey. At first they move in a straight line from the inside to the outside until they reach the intermediate zone which contains relatively few neurons but many connecting fibers or axons. They then emerge from the intermediate zone and realign with their original direction of movement toward the outer surface of the cortex. The cells will then form synapses (nerve signals that travel from one cell to another). Although many events in neurodevelopment involve the proliferation of neural elements, two important processes lead to the loss of neural elements. One is naturally occurring cell death with loss of up to 50% of the neurons in the brain region which occurs during the prenatal period, and the second is synaptic exuberance and pruning where there is massive excess production of connections and then a systematic elimination of up to half of the connections (Stiles & Jernigan, 2010).

One of the most distinctive features of the human cerebral cortex is the expansion of the prefrontal parietal and temporal association cortices and the appearance of functional areas devoted to language. Molecular studies show that cortical size, lamination, and connectivity are largely genetically regulated (Chenn & Walsh, 2002; Cholfin & Rubenstein, 2007).

It is therefore likely that during these early periods of brain growth, insults to the brain from nutritional deficiencies may lead to changes in proliferation and migration; however, evidence is still limited.

### **Last Trimester (After 24-Week Conception)**

The human brain undergoes an amazing change in structure and function between 24 and 44 weeks after conception. At the beginning of the third trimester, the brain has a smooth structure with few gyrations or sulci. By the end of the third trimester, the brain has become complex with gyri and sulci. This reflects growth of neurons in the cortex as well as differentiation and increasing synaptic complexity. This period in time is when the auditory and visual cortices begin to develop rapidly, as do underlying receptive language and higher cognitive functions (Haydar, Kuan, Flavell, & Rakic, 1999). The hippocampus has completed most of its connections prior to term with most of its connections from the entorhinal cortex complete. It begins to send off projections through thalamic nuclear structures to the developing frontal cortex. Myelination as well as synapse formation begins prior to term even though some of it is dependent on experiences. These processes provide a neuronal basis for the fetus to learn.

### **Postnatal Brain Growth**

We know that the brain increases in size dramatically ( $4 \times$  over) by the age of 6 years but that brain growth continues up to the age of 20 years. We also know that there is a continued dramatic increase in the complexity of the neuronal processes which are affected by genetics and the environment. Increase in complexity of the Golgi stained cortical neurons. The first couple of years seem crucial for brain development with connections and bursts of synapse formation largely forming in the first year of life. At

the end of the first year of life, the total number of synapses approaches twice that which is seen in an adult (Stiles & Jernigan, 2010). This is then followed by a much longer period of elimination or pruning of excess synaptic contacts which is then not completed until late adolescence.

## Protein-Energy Malnutrition and Its Effect on the Brain

### Animal Studies

Much of the literature surrounding the effect of nutrition on brain growth in the antenatal and early period of infancy comes primarily from mouse models. Most of these studies use a model of mouse protein-energy malnutrition which they provide through feeding them isocaloric diets with either adequate protein (casein) or low protein (Hernandes, Françolin-Silva, Valadares, Fukuda, & Almeida, 2005).

### Changes in Brain Structure

These studies have shown that protein-energy malnutrition can cause reduction in the number of neurons, synapses, dendritic arborization, and myelination and also cause general decrease in brain size. In fetal and early neonatal animal models, neuronal DNA and RNA are reduced as is the fatty acid profile (Winick, 1969; Winick & Rosso, 1969). It is not clear if the number of cortical neurons is hugely affected in malnutrition, but the density of cortical dendritic spines and the width of the cortical cells seem to be different with complexity of dendritic branching of the cortex. Hence the cerebral cortex may have reduced volume. There seems to be disruption in the pyramidal cells with reduction in density of the cortical dendritic spines and width of the cortical cells.

Studies from mice born to *protein-deficient rat mothers* show that with protein-energy malnutrition, there are changes in cell proliferation and reduced thickness in the external granular

layer of the brain from day 11 into the postnatal period with a reduction in the number of Purkinje and granular cells in the internal granular layer (Ranade et al., 2012). There is some evidence that the hippocampus and the cerebellum are particularly sensitive to protein-energy malnutrition. Some studies have shown an increased density of Purkinje cells within the cerebellum in those who are malnourished (Ranade et al., 2012).

### Changes in Brain Function

Some evidence in animal models suggests that malnutrition can lead to decreased seizure threshold in the hippocampal area making temporal lobe epilepsy more common (Cabral et al., 2011; Florian & Nunes, 2010). Rats malnourished early in life (6% protein vs. 16% protein) show significant alterations in social interaction behaviors in childhood, which may relate to dominance behaviors in adulthood (Laus, Vales, Costa, & Almeida, 2011). Some studies on animal models show how the behavior of rats changes with protein-calorie malnutrition (Hernandes et al., 2005). The protein-calorie malnutrition is produced by a low-protein diet in some studies but in others by a reduction or inadequate amount of diet available overall, by creating large litters, or by creating malnutrition by separating the pups from their mothers for periods of time during the day. Some studies where protein content in the diet of mother rats was restricted show differences in behavior such as spending longer in the nest (Crnic, 1980), taking longer to gather pups (Smart & Preece, 1973) as well as differences in memory. In the malnourished pups, they also showed less time in exploring the environment, less time in groups, and more time in the nest (Riul, Carvalho, Almeida, De-Oliveira, & Almeida, 1999).

## Neurophysiological and Neuroimaging Studies

### Imaging Studies

A number of imaging studies, most with fairly small numbers, have clearly shown cerebral

atrophy and ventricular dilatation with prominent Sylvian fissures and basal cisterns in young children with kwashiorkor (Akinyinka, Adeyinka, & Falade, 1995; Atlabi, Lagunju, Tongo, & Akinyinka, 2010; Gunston, Burkimsher, Malan, & Sive, 1992; Househam & De Villiers, 1987). Some studies have shown that this brain pathology is improved and even reversible after nutritional rehabilitation rapidly within 90 days (Akinyinka et al., 1995; Gunston et al., 1992; Stein, Finger, & Hart, 1983).

### EEG Studies

Electroencephalography (EEG) is becoming more prominent in its use with advances in EEG technology (Metcalf, 1995) and simple to use EEG tools. The first studies were conducted in West Africa in the 1950s (Gallais, Bert, Corriol, & Milletto, 1951) where abnormal EEGs in children with protein-energy malnutrition (PEM) were shown. In these children, the dominant frequency of the EEG was much lower than in normal children. Similarly, lower frequencies over all EEG bands have been shown in up to a third of children with kwashiorkor. Some studies have demonstrated that with treatment these abnormalities tend to disappear but persist for several months after nutritional rehabilitation in severe malnutrition and children who had PEM before 6 months of age (Engel, 1956; Nelson, 1959). Long-term follow-up of previously marasmic children confirms that acute PEM results in marked retardation in faster EEG frequencies ( $\alpha$ -rhythm) for up to 12 years after successful nutritional treatment (Baraitser & Evans, 1969; Stoch & Smythe, 1963). Some studies have also related poor cognitive outcomes to the EEG changes of diminished voltage and excessively slow rhythm (Sarrouy, Saint-Jean, & Clausee, 1953).

### Auditory Evoked Potentials (AEPs)

Auditory evoked potentials (AEPs) are understood to be a sensitive measure of brain functions and have been used by many researchers both in human studies (Hecox & Galambos, 1974; Shipley, Buchwald, Norman, & Guthrie, 1980) and experimental animal studies (Buchwald & Huang, 1975). There is a great interest in their

use, and many more recent studies use them as an overall measure of brain function which can be quick and easy to conduct with user-friendly materials (Villar et al., 2013) and, in some ways, may be more objective than developmental testing. Studies evaluating electrophysiological parameters have reported diverse nervous system compromise of auditory (Durmaz, Karagol, Deda, & Onal, 1999), visual (Durmaz et al., 1999; McDonald, Joffe, Barnet, & Flinn, 2007), corticospinal (Karak, Misra, Garg, & Katiyar, 1999), and somatosensory paths (Hesse, Rivera, de Diaz, & Quirk, 1998), as well as interhemispheric modulation (Pinto & Guedes, 2008) in children with malnutrition. Some of this seems to be related to the amount of plasma fatty acids in the bloodstream at the time (Franco, Hotta, Jorge, & dos Santos, 1999). Clinical studies have shown that early malnutrition, in the form of maternal malnutrition leading to intrauterine growth retardation (IUGR) (Mahajan, Gupta, Tandon, & Aggarwal, 2003) or in the form of marasmus and kwashiorkor, can produce marked alterations in the electrophysiological parameters of AEP (Barnet et al., 1978; Bartel, Robsinson, Conradie, & Prinsloo, 1986) and irreversible increased latencies of AEP waves 12 months after rehabilitation. This suggests deficiencies in the myelination process with decreased synaptic efficiency in the auditory system. Studies have shown brain recovery in laboratory animals when stimulated (Bedi & Bhide, 1988; Rocinholi, de Oliveira, & Colafemina, 2001). Some studies report that the effects of malnutrition on AEPs are reversed by nutritional rehabilitation if associated with daily and individual sensorimotor and environmental stimulation (Lima, 1992). The problem with these tools is that they are sensitive to changes in brain function due to many other causes, such as insulin-dependent diabetes (Seidl et al., 1996).

### Clinical Studies

Studies since the 1950s have pointed to the link between clinically malnourished children and delayed development. The evidence points toward severe malnutrition as having an effect on development, but which may be somewhat reversible with time and chronic malnutrition and

stunting, of which it is less clear how reversible it is.

When we think about the effect of malnutrition on brain growth and development, we need to remember that studies point toward nutritional deficiencies which have occurred at different time points, in utero (maternal malnutrition), perinatal (low birth weight, prematurity), neonatal, and infant periods up to the 1000 days and then preschool malnutrition. The studies can be mixed and difficult to interpret with a variety of insults incurred at different time points and a mixture of assessments conducted at different time points. Intervention studies similarly are very mixed.

To reiterate from the previous section of this chapter, it is felt that certain nutrients will affect certain parts of the brain more than others (Georgieff, 2007) and certain functions of the brain more than others. Furthermore, the effect of certain nutrients on the brain will have more effect at certain time periods than others, for example, during periods of increased brain growth or myelination. In considering the effect of these nutrients on brain development, it is therefore important that the right tests are chosen to identify the domains of cognition or development which show biological plausibility and are most likely to be affected by these nutritional deficiencies. These domains must show response to dietary intervention for them to be sensitive (de Jager et al., 2014). Examples of this are episodic memory which seems to be particularly affected by folic acid and B vitamins and verbal memory which seems to be, out of the different domains of child development, the most affected by protein-energy malnutrition.

### **Outcomes and Tests Used to Follow Up Children**

Outcomes used in studies of nutritional supplementation use multiple different scales of cognitive development with few of these scales having been validated in low- and middle-income countries (Fernald, Kariger, Engle, & Raikes, 2009;

Frongillo, Tofail, Hamadani, Warren, & Mehrin, 2014). Local adaptations of these scales are possible and have been applied, for example, in Uganda (Nampijja et al., 2010) and Kenya (Abubakar, Holding, van Baar, Newton, & van de Vijver, 2008). Tests that are commonly used in the first few years of life include general developmental tests such as the Bayley-III, the Griffiths, and the Denver II. Some of the general functioning at this level will be a mixture of motor functioning, attention, working memory, speed of information processing, and executive functioning and therefore will not identify specific problems with children relating to the effect of specific nutrients as well as tests that work on a specific area of cognition (Prado et al., 2010). In the preschool and primary school age group, tests which assess cognition are more likely to be used. These may include tests to assess executive function such as the knock and tap, the tower, or block sorting tests (Prado et al., 2010), those that assess language development specifically, and those that assess attention. It is important that this is kept in mind when assessing outcome studies.

### **Antenatal and Perinatal Malnutrition**

The evidence for lack of nutrition in the very early period of life (or around the time of birth) and its effect on child development is very unclear. There is some evidence from the literature, and it is surmised that effects of malnutrition in the in utero and early neonatal period where the brain is growing most are likely to have the most impact on neurodevelopmental outcomes. Some of the early literature on this subject was conducted from the Dutch famine studies which showed the protective effects of the mother on the unborn child and the lack of cognitive deficits up to 19 years of age. More recent follow-up studies have however demonstrated some increased risk of antisocial personality disorder, schizophrenia, and entry into addiction programs within this group (Susser, Hoek, & Brown, 1998). The difficulty with some of this literature is that it is not always clear in the studies whether children had intrauterine growth retardation or which were just born low birth



weight or premature. These distinguishing features will play a big part in the ability to measure outcomes in these studies but have been difficult to measure in African settings due to the lack of reliable data on gestational age of infants. Studies from the developed world have demonstrated how children who had a compromised head growth and were low birth weight had cognitive deficits several years later (Strauss & Dietz, 1998). This clarification may come with results from the new INTERGROWTH study which is underway at present (Papageorghiou et al., 2014; Villar et al., 2013). Studies in Brazil have shown a small effect of low birth weight on IQ at 5 years (Santos et al., 2008), and in the joint data from the longitudinal studies from South Africa, Brazil, India, Peru, and Vietnam, effects of antenatal nutrition have been shown on the highest grade at school achieved (Martorell et al., 2010). Our recent studies in Malawi on the outcomes of premature infants who were ultrasound dated did show significantly increased levels of malnutrition and developmental delay in those born premature (mainly late premature), but the interrelationship between these two factors was not entirely clear (Gladstone, White, Kafulafula, Neilson, & van den Broek, 2011).

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### Infant Malnutrition

Few studies have yet been done to demonstrate the relationship between early malnutrition and development in Africa. A recent study from Kenya did show a correlation between sociability as measured on the Bayley Behavior Record and home observational tool at 6 months of age and growth faltering (infants who were shorter and lighter). Those with a lower mid-upper arm circumference (MUAC) had lower motor scores and mental scores at 30 months of age (Whaley, Sigman, Espinosa, & Neumann, 1998).

### Severe Malnutrition

The first studies were undertaken by Geber (Geber & Dean, 1956), Pollitt in South America

(Pollitt & Granhoff, 1967), and Grantham-McGregor in Jamaica (Grantham-McGregor, Stewart, & Desai, 1978). Studies from Jamaica demonstrated that in severe malnutrition, the developmental quotient (Griffiths) was 20–30 points lower than a control group of hospitalized children and that certain areas of development such as perceptuo-spatial skills, performance, and motor skills can be most affected. Behavior is shown to be affected with children often withdrawn and even having low-amplitude high-pitched cries [Lester, 1976 (Grantham-McGregor, 1993)], and development generally improves with recovery Grantham-McGregor et al., 1978 (Gardner, Grantham-McGregor, Himes, & Chang, 1999) but with those of less than 6 months improving less (Celedón et al., 1983; Grantham-McGregor, Fernald, Kagawa, & Walker, 2014).

### Long-Term Chronic Stunting

Stunting has been shown to be closely associated with reduced measures of early childhood development (ECD) (Berkman, Lescano, Gilman, Lopez, & Black, 2002; Grantham-McGregor et al., 2007; Spears, 2011; Walker et al., 2011), as well as with later school outcomes (Grantham-McGregor et al., 2007). Long-term studies have demonstrated how early childhood nutrition and height, educational attainment, and subsequent employment may be linked (Maluccio et al., 2009; Pollitt, Gorman, Engle, Martorell, & Rivera, 1993; Vogl, 2012). It is clear from some of these studies that the time factor in which the insult causing stunting occurs may affect the ability of the child to recover or not. In these multi-country long-term studies, if the child had one standard deviation of weight gain between 0 and 2 years, then schooling improved later on where if it was left to 2–4 years, little to no effect of cognition was seen (Fink & Rockers, 2014). These same studies showed an association between height-for-age Z-scores (HAZ) at <2 years and cognitive and language function at 5 years. Studies from Zimbabwe have also demonstrated a low HAZ before the age of 6 is associated with long-term difficulties achieving high

grades (Alderman, Hoddinott, & Kinsey, 2006). Studies from Young Lives have shown that catch-up growth can be quite a dynamic process with some continued opportunities for children to catch up even between the ages of 8 and 15 years. The Young Lives study demonstrated how over one third of children who were stunted at age 8 caught up at the age of 15 years, and these children had smaller deficits in cognitive scores; however, those who remained stunted had increased difficulties with cognition as measured by the Peabody Picture Vocabulary Test and a math test. These studies included an African population from Ethiopia but also populations from Vietnam, India, and Peru (Fink & Rockers, 2014).

It is likely that chronic malnutrition hinders intellectual development through several interacting pathways. Stunting is likely the manifestation of a complex cycle of environmental enteric dysfunction, recurrent clinical and subclinical infection, and chronic inflammation, all which interact to impair intellectual development. Chronic inflammation continues to make the child susceptible to infections, diverts energy and resources away from growth and brain development, suppresses the growth hormone-IGF axis (Prendergast et al., 2014), and elevates hepcidin to cause iron deficiency anemia. In addition, stunting may affect intellectual development by interfering with the child's overall health, their energy levels and interaction with their surroundings and family. There is increasing interest in the hypothesis that water, sanitation, and hygiene (WASH) interventions could reduce microbial exposure, prevent or ameliorate environmental enteric dysfunction (EED), and hence improve not only growth and anemia but also neurodevelopmental outcomes (Ngure et al., 2014). However, it is proposed that stunting also affects intellectual development by interfering with the child's overall health, as well as their energy level and interaction with their surroundings and family. The child's lethargy and smaller stature may lower expectations and stimulation from adults (Brown & Pollitt, 1996), leading to delays in school enrollment and poor attendance. In addition, poverty and food insecurity exacerbate these factors. A recent small study from Pakistan

has shown the effect that handwashing promotion in the first 30 months of age had on child development outcomes measured at 5–7 years of age on the Battelle Developmental Inventory (Bowen et al., 2012). This may be similar in African settings; hence, studies are underway both in Kenya and in Zimbabwe at present (Arnold et al., 2013; Humphrey et al., 2015).

Some studies from Jamaica have also linked early childhood stunting with altered hypothalamic-pituitary-adrenocortical and sympathetic system activity. Stunted children are shown to have faster resting heart rates and higher concentrations of urinary epinephrine and are more inhibited and more frustrated. It is thought that growth retardation is associated with alterations in stress sensitive systems, particularly the sympathetic system, and that this may contribute to poor levels of development observed in stunted children (Fernald & Grantham-McGregor, 1998, 2002).

Many studies from African settings (and elsewhere) have shown a correlational link between nutritional status and child development. Most of these studies use anthropometric data and simple approaches for evaluating nutritional status. It should be clear therefore that the utilization of simple anthropometry could be used almost as a proxy measure of child development in some settings. It will not be as accurate but may give some indicator of child development in these settings. The recent new universal growth charts provided by the World Health Organization and the provision of simple guidelines for anthropometry should help with this. Whenever possible, it is important to measure child growth by these simple methods even if child development cannot be measured (Department of Nutrition, 2009). Clearly in situations where child growth in Africa is a problem, either from intrauterine growth retardation or low birth weight, acute or chronic malnutrition, and stunting, it is likely that children's development will also be faltering. As this is prevalent in so many settings in Africa, we must remember that the simple measurement of growth will provide an indicator that we should holistically also think about child development.

## Interventional Studies

Interventional programs providing nutrition specifically to improve child development have been attempted at a number of stages of the life cycle. These include the antenatal period, the preschool period (including infancy), and programs which run into school age. Many of them target one or another nutrient, but the better ones are more integrated and add in components from many sectors, such as early antenatal support, screening and nutritional support, quality obstetric care, promotion of exclusive breastfeeding, and psychosocial stimulation. These are still limited in most African settings as they rely on good integrated service development along with quality supportive supervision.

### Antenatal Programs

Very few studies have looked at the longer-term outcomes of antenatal nutritional supplementation programs in Africa. Most that have done have looked specifically at micronutrients. This is addressed later in this chapter. One of the few studies where high-protein and high-energy fortified biscuits were provided to mothers in Gambia in 1989–1994 demonstrated no benefit on school or cognition (Raven's Progressive Matrices, vocabulary testing, and forward and backward digit span). Earlier studies from Guatemala have demonstrated some direct correlation (Brown & Pollitt, 1996), but these studies are old, and it may be that in Gambia, the increased exposure to schooling within this sample makes more of a difference and masks any limited effect of nutritional supplementation (Alderman et al., 2014). Despite specific research on direct correlations being limited, it is clear that there is a link between antenatal malnutrition and low birth weight and prematurity (Christian, Mullany, Hurley, Katz, & Black, 2015). We know that mothers who were stunted themselves are more likely to go on to have children who have problems with stunting and poor development (Walker, Chang, Wright, Osmond, & Grantham-McGregor, 2015). We also know that there may be a related epigenetic relationship with maternal malnutrition leading to IUGR which modifies gene expression in offspring and affects future

generations (Dancause et al., 2011; Drake et al., 2012). Holistic programs to support child development in African settings should provide good nutrition in pregnancy for these reasons.

### Programs in Infancy

Studies from Pemba (Tanzania) have shown mild improvements in motor development as well as less fussing and more object manipulation at 10–14 months in those infants who were given iron, folic acid, and zinc supplementation. The effect sizes were small although significantly and unexpectedly a negative effect was seen if just iron or zinc was provided alone (Olney et al., 2013). Recent studies from Zambia where micronutrient fortification was given at 6 months in a micronutrient-fortified porridge showed no benefits to child development as measured by the Bayley Scales of Infant Development (BSID II) at 12 and 18 months in a randomized study (Manno et al., 2012). Similarly, recent studies demonstrated improved motor development in infants up to 12 months who were given complementary foods fortified with micronutrients and essential fatty acids (Adu-Afarwuah et al., 2007) in the first year of life. Some studies from other settings have shown that an early stimulation home visiting program may somehow modulate the effect of iron supplementation but only in those with iron deficiency anemia (Lozoff et al., 2010). Similarly, if you are provided with zinc and psychosocial stimulation, the zinc has an effect on development but not if provided alone (Gardner et al., 2005).

Breastfeeding in and of itself has been shown to improve performance in IQ by 3–4 points (Horta, de Mola, & Victora, 2015) with recent studies showing dose responses with IQ, education, and income into the future years (Victora et al., 2015). Often the delayed development in these children has been very intricately intertwined with difficulties with socioeconomic status, lack of maternal education, and poor maternal child interaction which may be a cause or a consequence or just a related factor (Engle et al., 2011). This interplay may come in a number of ways; small infants may be treated as smaller than they are and therefore not provided with the appropriate developmental stimulation for their

age; undernourished children are frequently fussy and irritable and withdrawn which may lead to caregivers to treat them negatively; and decreased activity on the part of the child due to malnutrition may lead to limited child exploration and initiation of caregiver interaction (Prado & Dewey, 2014).

### **Nutritional Rehabilitation for Severe Malnutrition**

Evidence shows that much of the damage which occurs in the developing brain due to nutritional deficiencies may be reversible in terms of structure. Increase in cell packing and change in cortical glial cell density is reversed (Angulo-Colmenares, Vaughan, & Hinds, 1979), but it may be that the nonneuronal structures may resist rehabilitation (Wiggins et al., 1984) and the number of neuronal mitochondria in cortical cells is still decreased (Strupp & Levitsky, 1995). Furthermore, there may still be an alteration in neurotransmitter metabolism at the receptor level (Strupp & Levitsky, 1995) with a reduction in the noradrenaline receptors in mouse models which have had protein-energy malnutrition. This may mean that there is a decreased ability of adrenergic receptors to downregulate leaving some to believe that after rehabilitation from malnutrition in adulthood, there is a higher likelihood of depression (de Souza, Fernandes, & do Carmo, 2011). Early observational studies demonstrated children who were malnourished could have developmental quotients 20-30 points lower than their matched siblings, with perceptuo-spatial skills, performance, and motor skills most affected (Grantham-McGregor et al., 1978; Pollitt & Granhoff, 1967).

Many studies have shown good recovery from the effect of malnutrition particularly in the longer term. Studies from Peru showed that those children who were stunted at 18 months but who recovered performed as well as those who were not at 4-6 years of age (Crookston et al., 2010). We also know that these feeding programs work best when integrated with early psychosocial stimulation. Sadly there is no literature on the number of malnutrition units

which are making an effort (as recommended by WHO) to provide psychosocial stimulation into their settings. This is something that could be audited and promoted in future networks within Africa.

### **Preschool Programs**

Some studies looked at specific cognitive outcomes in children provided with nutrition in the preschool period mainly in programs where nutrition and stimulation are provided simultaneously. Many of these studies look at child development outcomes, and many use the HOME inventory to look at enrichment of home stimulatory environment. Some studies also measure outcomes which include mother-child responsive talk, sensitivity and intrusiveness through techniques from Aboud (2007), parent-caregiver involvement (Cooper et al., 2009), and attachment (Bryant, Bryant, Williams, Ndambuki, & Erwin, 2012; Marvin, Cooper, Hoffman, & Powell, 2002) or even measurements of feeding (Sumner & Spietz, 1994). Some trials have previously studied maternal depression as an outcome measure (Cooper et al., 2009; Vazir et al., 2013). Most trials have studied short-term outcomes for up to 2 years maximum, while other studies have looked at longer-term outcomes. Intensive programs in Africa which have shown benefit include those with weekly visits (with or without a nutritional component) from South Africa (advice and guidance on sensitive and responsive parenting two times weekly for the first 2 months of life and then once monthly up to the fifth month of life (Cooper et al., 2009)) and Ethiopia (five home visits and five group meetings held alternatively over 3 months). These programs are intensive, and as yet, there is not a lot of evidence as to how programs can be more integrated with already existing services.

Some few studies have looked at integrating psychosocial support into settings in Africa where there have been humanitarian crises with refugee agencies providing nutrition (Morris et al., 2012). There are many settings in Africa where this is the case, and these programs should be considered carefully in terms of the benefits that they can provide.

## School Age/Primary School Feeding Programs

The evidence stemming from Africa relating to specific effects of nutrition on the developing brain up to school age is limited. Despite this, many NGOs and governments are taking on school feeding programs with evidence from other settings in the world. Some recent studies from Malawi have demonstrated specific cognitive effects (improved reversal learning) of school feeding in primary school (Nkhoma, Duffy, Cory-Slechta, et al., 2013; Nkhoma, Duffy, Davidson, et al., 2013).

## Micronutrients and Their Effect on Brain Development

### Iron Deficiency Anemia and Folic Acid Deficiency

There is good evidence that iron supplementation in the antenatal period will lead to a 23% decrease in the numbers of preterm births and a 19% decrease in the number of low birth weight babies (Pena-Rosas, De-Regil, Garcia-Casal, & Dowswell, 2012). The likelihood is that these will have subsequent effects on developmental outcomes of infants making it important for mothers to take iron supplementation during pregnancy. Recent systematic reviews have also evidenced the clear need for folic acid during pregnancy with studies showing that folic acid fortification reduces neural tube defects and subsequent disabilities between 41 and 72%, respectively (De-Regil, Jefferds, Sylvetsky, & Dowswell, 2011; Imdad & Bhutta, 2012).

Recent studies from South Africa have shown that iron may improve verbal and non-verbal memory especially in those who are anemic, but this had no effect in children of 6–11 years treated for a whole school year (Baumgartner et al., 2012). Recent studies from Kenya have shown a small effect on cognition (Raven's Matrices and math tests) from animal source protein on the cognitive performance of children provided with supplements for 21 months who were in Standard 1 (Neumann

et al., 2003; Whaley et al., 2003). The reviews have been mixed and have shown some improvements in psychomotor development but mixed effects of cognition with some showing actual decreases in intelligence quotients (De-Regil et al., 2011) and some showing some improvements in mental development (Sachdev, Gera, & Nestel, 2004).

### Multiple Micronutrients and Vitamin A

Multiple-micronutrient supplementation in pregnancy has shown an 11–13% reduction in low birth weight and small for gestational age (SGA) births in settings around the world. Effects on iron deficiency anemia are comparable to those seen with iron and folic acid supplementation (Haider & Bhutta, 2015). A systematic review has also shown mild improvements in academic performance and motor development for those children who have been provided with multiple-micronutrient supplementation who are at risk of deficiency (Eilander et al., 2010).

### Zinc

Zinc is involved in RNA and DNA synthesis and is critical to cellular growth, cell division, and metabolism (Black, 1998). An optimal source of zinc comes from diets rich in animal protein, and many diets which are high in phytates and vegetable based may lead to zinc deficiency. Breast milk is a good source of zinc, and it is only once complimentary feeds are introduced that zinc deficiency becomes a problem. Golub demonstrated in his animal studies how severe zinc deficiency over 15 weeks during the period of rapid growth of the brain alters emotional development, lethargy, learning, attention, and short-term memory in rhesus monkeys (Golub, Keen, & Gershwin, 2000; Golub, Keen, Gershwin, & Hendrickx, 1995). Zinc is felt to affect the CNS as zinc-dependent enzymes are important in brain growth and are a precursor for the production of



neurotransmitters. Zinc finger proteins participate in brain structure and neurotransmission.

Few or no studies have taken place in Africa, and there is little evidence as to the effect of zinc on child development. One study in Egypt did show that mothers consuming diets in Egypt high in animal products were more attentive shortly after birth as measured on the Brazelton Neonatal Behavioral Assessment Scale and had slightly higher motor scores on the Bayley (Kirksey et al., 1994; Wachs et al., 1993). Most studies are from Asia or South American settings and have been inconsistent but if anything have demonstrated a promotion in activity and motor development in the most vulnerable infants (Bentley et al., 1997; Hamadani, Fuchs, Osendarp, Huda, & Grantham-McGregor, 2002; Hamadani et al., 2001; Sazawal et al., 2007). There is more evidence specifically in school age children who have been provided with more challenging neuropsychological tasks. This mainly comes from groups in China (Penland et al., 1997).

## Essential Fatty Acids

Recent studies in rats which were provided with an iron-deficient and/or n-3 fatty acid diet over two generations with a 5-week postweaning period in the second generation demonstrated a 70% reduction in brain fatty acids and up to 30% reduction in iron deficiency in the brains of these animals. In these mice, dopamine concentrations were significantly increased and serotonin significantly decreased, particularly in those with combined deficiency. This related strongly to deficiencies in reference and working memory (Baumgartner et al., 2012a, 2012b).

Some studies have looked specifically at the effect of essential fatty acids (omega-3 and omega-6) on the developing brain. Essential fatty acids are long-chain unsaturated (polyunsaturated) fatty acids and are found in larger quantities in breast milk and in high fish intake diets but also in diets rich in green vegetables, nuts, and seeds. Omega-6 fatty acid (LA) can be converted into arachidonic acid (AA), and omega-3 fatty acid can be converted into alpha-linoleic acid

(ALA) and docosahexaenoic acid (DHA) (Huffman, Harika, Eilander, & Osendarp, 2011). It is thought that an adequate supply of essential fatty acids is necessary for optimal development (Hoffman, Boettcher, & Ersen-Schade, 2009; Innis, 2007a). DHA in particular is a major component in the retina and affects visual acuity (Hoffman et al., 2009), and AA and DHA are considered to be vital structural elements of cell membranes and vital in the formation of newer tissues. Conversion of omega-3 and omega-6 fatty acids to the more useful ALA and DHA is thought to be low in infants (Brenna, 2002; Pawlosky, Hibbeln, Novotny, & Salem, 2001) with some individuals more genetically able to convert through the fatty acid desaturase (Lattka, Illig, Koletzko, & Heinrich, 2010). Conversion seems to be less in infants than in adults, and there is some evidence that precursors early in life are not sufficient (Innis, 2007b; Uauy & Castillo, 2003).

There is very limited evidence that a higher omega-3 fatty acid intake (measured through blood levels of omega-3 and omega-6) during pregnancy may result in minor changes in birth weight, length, and gestational age as well as visual and cognitive development of infants (Hibbeln et al., 2007; van Eijsden, Hornstra, van der Wal, Vrijkotte, & Bonsel, 2008). There is only very limited evidence from high-income settings that there is a beneficial effect on visual, mental, and longer-term cognition in infants of those mothers who were given fatty acid supplementation in pregnancy and lactating women (Eilander et al., 2010; Gould, Smithers, & Makrides, 2013). These studies were based on two randomized controlled trials and one cross-sectional study which showed some bias, so further more rigorous randomized controlled trials are needed to confirm this effect.

Some studies from developing countries have shown some relationship between intake of fatty acids during pregnancy and growth and development outcomes of the offspring. Most of these studies have come from India or South America, and there is limited evidence that increased fish intake in pregnancy may improve birth weight outcomes, decreased preterm deliveries, and pre-



eclampsia rates (Mardones et al., 2008; Muthayya et al., 2009), but this has not been shown in studies in Bangladesh or Mexico (Ramakrishnan et al., 2010; Tofail et al., 2006). Only one observational study has linked brain growth to DHA or DHA and EPA supplementation in Mexico. This study showed that higher intake of AA but not DHA in mothers was linked to improvements in brainstem auditory evoked potentials. No improvements in development were shown in this study or in the study in Bangladesh by Tofail et al. Studies in Africa have been few, but a recent study in Gambia where supplementary omega-3 was provided in an RCT to Gambian infants showed a minor difference in the MUAC and skinfold thickness at 9 and 12 months but no difference in cognitive functioning as measured by the two-step means-end problem-solving test (Willets Infant Planning) and the single-object task attention assessment (van der Merwe et al., 2013).

## Iodine

We know that more than two billion individuals worldwide do not have an adequate iodine intake (Zimmermann, Jooste, & Pandav, 2008). 42.3% of the population of children (49.5 million) have iodine deficiency (UI < 100 µg per liter) in African settings (de Benoist, 2004). Specific country studies have shown rates of 7.3% of 5–17-year-olds in Dakar (Fiorentino et al., 2013) to 82% of 7–9-year-olds in Ethiopia (Meron et al., 2012). Some of this depends on the normal indices for iodine which are used (usually less than 50–100 µg per liter). An ongoing program promoting iodination of salt worldwide continues, but despite this many countries in Africa still have problems with iodine deficiency. Recent reports show that tremendous progress is being made in West Africa with 72% of the population having adequate iodination but figures a little lower in South East Africa with rates of 54%. Some countries such as Nigeria, Burundi, Kenya, Lesotho, Uganda, and Zimbabwe have adequate coverage, but some countries are actually worsening due to poor monitoring levels (Section, 2008).

Endemic cretinism (arrested physical and mental development with dystrophy of bones and soft tissues due to congenital lack of thyroid secretion) has been stated as one of the most common treatable causes of mental retardation and developmental delay worldwide (Xue-Yi et al., 1994). There is strong evidence for the deleterious effect of maternal iodine deficiency on child development (Boyages et al., 1989; DeLong, Stanbury, & Fierro-Benitez, 1985). It is thought that this endemic cretinism is due to reduced levels of maternal thyroxine early in pregnancy (Pharoah & Connolly, 1995). In iodine-deficient populations, mild degrees of mental impairment are associated with it and occur five times as frequently as cretinism (Boyages et al., 1989). Recent studies from Xinjiang province in China, a place which has some of the lowest levels of iodine in the soil and water worldwide, have shown that if iodine is given to mothers before the third trimester of pregnancy, this improves head circumference and development at 2 years of age. Giving iodine during pregnancy had greater benefits than giving it postnatally (O'Donnell et al., 2002), but there is less good evidence on whether chronic childhood iodine deficiency also affects cognition (Qian, Wang, & Watkins, 2005). A recent review of the literature has provided new figures which show that iodine supplementation can reduce cretinism by 73% and improve cognitive development scores in children by 10–20% (Zimmermann, 2012). This is an easy nutrient to add to all salt products worldwide, and implementation of these programs would easily lead to benefits in child thriving in many settings.

## Choline

There has been some recent interest in the role that choline may play in neurodevelopment and whether the lack of choline in the diet may lead to neurodevelopmental delay and whether supplementation may improve outcomes. Choline is important in structural formation of cells as well as in cell signaling. It is integral to forming VLDL phospholipids as well as the neurotrans-

mitter acetylcholine and is crucial in DNA regulation, repair, and protein formation (McCann, Hudes, & Ames, 2006). We know that choline is important in hippocampal change during brain development (Wong-Goodrich et al., 2008) and that supplementation of choline in rats improves cognitive and neurological function in offspring (Glenn et al., 2007). Furthermore, recent studies also have shown that if mothers have been deficient in choline, their offspring may not respond so well to environmental enrichment. 7-month-old rodents whose mothers were given choline had neurogenesis when the rodents' environment was enriched, but those whose mothers were not given choline had no altered neurogenesis (Glenn et al., 2007).

Studies from developed settings demonstrate no effect of supplemental choline in the antenatal period (Cheatham et al., 2012), and studies looking at the correlation between choline levels and neurocognitive abilities have also not shown any significant correlation (Boeke et al., 2013; Strain et al., 2013). Few studies have been done in developing settings, and it is unclear as to whether those women who are deficient in choline may benefit in terms of treatment to improve their offspring's neurodevelopmental outcomes.

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## Conclusions

We know that the rates of malnutrition and stunting (often between 40–50%) in children in African settings are higher than almost any other setting in the world. Micronutrient deficiencies are also prominent with night blindness rates due to vitamin A deficiency (2.1%), rates of iodine deficiency at least 40%, zinc deficiency (23.9%), and iron deficiency (20.2%) (Andersson, Karumbunathan, & Zimmermann, 2009; Black et al., 2008; Wessells & Brown, 2012). All of this contributes to children not reaching their developmental potential. This, combined with a lack of psychosocial stimulation, maternal stress, and poor maternal health in the antenatal and postnatal period along with limited early child development preschool resources, leads to many African children not being provided

with the right start in life. To make a shift and change for these children, it is vital that nutritional programs are integrated into mainstream support for children at all stages. Despite the evidence, often programs which provide psychosocial stimulation as well as nutrition are still not being provided in many malnutrition units in Africa. Furthermore, although there is evidence of how we can provide integrated programs within humanitarian crises, the number of places where this is happening in Africa is not clear.

The potential to improve developmental outcomes for children in African setting is huge, and there is evidence that this can be improved through nutritional support particularly when integrated into health and educational programs. Some of the nutritional interventions which can be provided are simple, cheap, and effective, particularly those that can be provided to the mother: folic acid, iron and multiple micronutrients, and iodine fortification. The use of nutrition (particularly stunting) as a proxy measure for child development is clear, and professionals must continue to be aware of the differences that improving nutrition at all stages of the life cycle is likely to make to child development and the longer-term potential of individuals in Africa.

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## Part IV

# Methodological Considerations

Amina Abubakar and Fons J.R. van de Vijver

Africa, like many developing regions of the world, suffers an acute shortage of adequately standardized and culturally appropriate measures of child development (Ertem et al., 2008; Fernald, Kariger, Engle, & Raikes, 2009; Holding, Abubakar, & Wekulo-Kitsao, 2008). Most psychological measures have been developed within a very limited geographical and social setting, namely, white middle-class North American and European children and families. Consequently, researchers and clinicians in emerging and developing parts of the world find themselves lacking the necessary tools and measures to assess child development and outcomes. Given this shortage, three potential solutions have been suggested: adoption, adaptation, and assembly (van de Vijver & Leung, 1997; van de Vijver & Tanzer, 1997). In the next section, we discuss each of these solutions, highlighting their potential pros and cons and defining the conditions for when to choose which solution.

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## Adoption

Adoption refers to the literal translation of measures from one culture to another (van de Vijver & Tanzer, 1997). Adoption has been advocated for its relative cheapness, the ease with which it can be implemented, and the potential comparability of scores across settings and studies. However, adoptions are often not culturally informed, which could challenge the validity of the data collected. In developing tests, test developers should be cognizant of the day-to-day experiences, values, and the social environment in which the target population lives. Cultural influences may lead to several forms of bias in psychological assessments (van de Vijver & Tanzer, 2004).

Three forms of bias have been distinguished (van de Vijver & Tanzer, 2004). The first one is *construct bias*, which occurs when an instrument only partially samples the domains that constitute a construct. For instance, modern intelligence testing arose from the need to have measures that can predict educational performance and achievement in a Western school setting. Consequently, these intelligence measures have a strong emphasis on aspects such as reasoning, memory, and acquired knowledge. However, in non-Western

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countries such as those in Africa, there is evidence that the conceptualization of intelligence has an additional very strong social aspect (Mpfou, 2001). Grigorenko et al. (2001), in a study among the Luo of Kenya, observed that there were four aspects to the conceptualization of intelligence in this East African community. The first is *rieko*, which is used to refer to children who are smart and possess knowledge and competence. Among the Luo, *rieko* is distinguished by, among other things, source—e.g., *rieko mzungu* (white man technical knowledge), *rieko mar kite* (knowledge based on cultural sources)—or by outcome, e.g., *rieko mar lupu* (fishing skills). According to Grigorenko et al. (2001), the second aspect is *luoro*. *Luoro* is shown by a child who possesses socially desirable qualities, such as willingness to share and the showing of respect to their elders. The third and fourth aspects reported are *winjo* (a child's ability to comprehend what is going on and to understand what is appropriate or inappropriate in a certain circumstance) and *paro* (innovativeness, creativity, and the ability to follow through with tasks). These different aspects of intelligence are reported to be complementary and to balance each other. For instance, Grigorenko et al. (2001) note that *specifically, the ambiguous powers of individual rieko (that could be either positive or negative) need to be controlled by social values and rules (luoro)* (p. 370). Therefore, Western measures may not fully capture the abilities of African children and may not sample relevant skills for adapting to traditional African society.

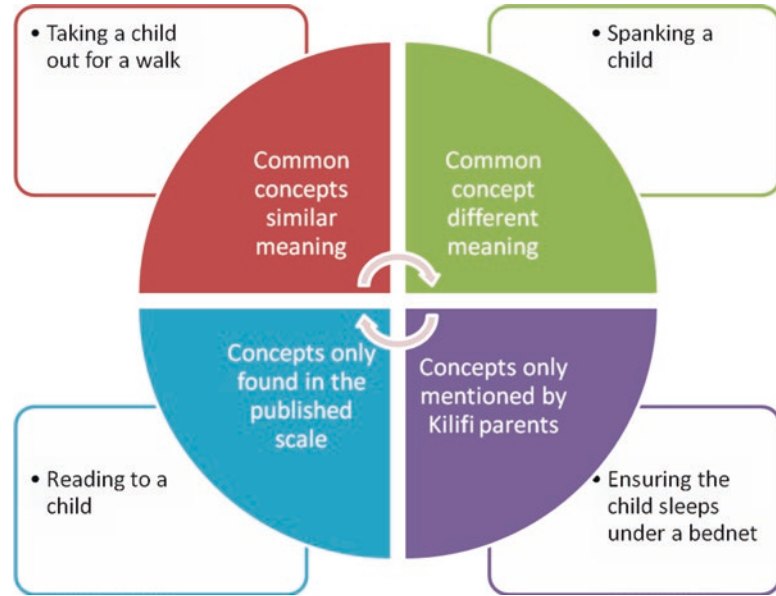
Construct bias has also been observed in other constructs relevant to developmental sciences, such as parenting behavior. In a study to investigate good parenting behavior, Holding, Abubakar, Obiero, Van Baar, and Van de Vijver (2011) carried out a series of focus group discussions with community members in Kilifi, Kenya. The six focus groups comprised mothers and stakeholders (teachers and nurses). This study was part of a larger study to make an adaptation to the infant-toddler version of the Home Observation for the Measurement of the Environment (HOME). The HOME uses a combination of parental interviews and observations to elicit parenting behavior with

a view to rating the extent to which the mother elicits good child-rearing behavior. To be able to adequately account for good child-rearing behavior in this new context, Holding et al. (2011) carried out focus group discussions. The main question discussed in these groups was “What are the good child-rearing practices in this community?” The responses were content-analyzed. It was observed that the relationship between what the local community perceived as good child-rearing practices and what is in the HOME scale could be placed into four categories; see Fig. 11.1 for a summary. The categories refer to what is common and shared by the two, what is shared by the two but has different interpretations and norms, what is in the published literature but not in the community discourse, and what is unique to the local community. The differences seemed to arise from cultural values, norms, and perceptions (it is remarkable that in the local groups, even among professionals, there was no mention of reading as an important child-rearing activity), and also from local needs (e.g., covering the children under a treated bed net to protect them against malaria).

The second bias, *method bias*, refers to problems that arise due to administration procedures, instrument, and sample characteristics (van de Vijver, 1997). Most assessment measures have laid down procedures and conditions for administration; these procedures assume that all children understand the instructions and norms within the assessment context and would respond appropriately (Gopaul-McNicol & Armour-Thomas, 2002). However, the literature is full of examples where the test administration procedures were culturally inappropriate, thereby hindering the full participation of the children being assessed (Foxcroft, 2002). Many researchers working in a rural African context have pointed out how a one-to-one dyadic interaction with adults makes African children uncomfortable, since these children rarely participate in such activities in their daily life. The lack of experience with this kind of setting—which is fairly common in child assessment—can significantly hinder the degree to which the children can fully engage in assessment tasks. For example, rural



**Fig. 11.1** The relationship between locally identified themes on child-rearing and those in published scale



Kenyan children spend a significant amount of time with siblings; requesting such children to fully engage in a developmental assessment task in a one-to-one assessment with an unfamiliar adult led to significant problems in task engagement (Abubakar, Holding, van Baar, Newton, & van de Vijver, 2008). However, introducing the test in the presence of a sibling, and allowing them to settle in gradually, enhanced their test engagement. Other potentially inappropriate testing contexts that have been reported from Africa include engaging the children in a long dyadic conversation with the test administrator. For instance, in Senegal it has been observed that children involved in a task where they had to respond to an assessor's question of "why" quickly changed their response when they were asked to explain their answer, because the children assumed they were wrong and were not used to engaging in an argument or even a conversation with an adult.

Instrument characteristics, such as stimulus and task familiarity, have been observed to influence test-taking behavior and performance across different cultural contexts. Malda, van de Vijver, and Temane (2010), in a study in South Africa, compared children of Tswana and Afrikaans origin. They observed that children from both cul-

tural groups performed significantly better in tasks that involved items, vocabulary, and experiences drawn directly from their cultural settings (Malda et al., 2010). In response to this problem, many researchers have resorted to replacing unfamiliar with familiar material. For instance, a recent study from Zimbabwe indicates that several items of culturally inappropriate stimulus material had to be removed so as to ensure that the McCarthy Scales of Children's Abilities was appropriate for that context. Changes included the removal of the picture of a sailboat, since the rural children in their context were not familiar with sailboats; they replaced it with a similar-colored picture of a lorry (Kandawasvika, Mapingure, Nhembe, Mtereredzi, & Stray-Pedersen, 2012).

The last form of bias is *item bias*. This may arise due to *differential functioning of items* in different contexts. For example, in a study in West Africa, digit span was found to have a significant bias against the Wolof-speaking children, because among the Wolof, digits are counted to the base of five, while among the Mandinka, digits are counted to the base of ten. In this case, the Wolof-speaking children were disadvantaged because they had to remember much longer digits after the initial five (Jukes & Grigorenko, 2010).

Moreover, in developmental psychology item bias may arise due to differences in both the speed and patterns of acquisition of developmental milestones. For instance, Vierhaus et al. (2011) observed that in the assessment of developmental outcomes among Cameroonian children, using the Bayley Scales of Infant Development [BSID] (Bayley, 1993), the performance of the Cameroonian children deviated from the expected patterns. While unable to perform some of the “simple” motor tasks, they were able to perform the “more advanced” tasks.

Another source of item bias can be the *differential meaning of items*. For instance, in the measure of home environment (Bradley, 1994), an item on how frequently the child goes to the hospital did not translate well into the Kenyan context. Part of the problem may have arisen because in poor rural settings, mothers may only take the child to the hospital because the child is unwell. In the home measure, this was supposed to be positive, since it showed the mothers’ caring attitude toward the child and constant monitoring of the child’s welfare. Given the many potential shortfalls associated with adoption, it is the least recommended procedure. In situations where scales and measures are adopted from one cultural context to the next, care has to be taken to present proof that the measure actually functions in a similar way across contexts. The literature is replete with examples in which the cultural appropriateness of an instrument is simply assumed, where we would argue that appropriateness has to be demonstrated.

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## Adaptation

Adaptation involves a systematic evaluation of all aspects of a measurement instrument and modifying it where needed to make it more suitable to the context. This approach is relatively costly and time-consuming and may severely hinder the comparability of results across different sites. The more items are changed from the original, the less opportunity there will be for cross-cultural comparison. However, availability of an instrument that has been developed and rigorously evaluated

on-site significantly enhances the validity of the data collected (van de Vijver, 2002).

Test adaptations have to address all the sources of bias previously discussed to ensure that the adapted test is appropriate for the context. Malda et al. (2008) have proposed a framework of the types of adaptations that need to be carried out in order to establish an adequate adaptation of a test or measure. The slightly modified version of the framework on areas that need adaptation is presented in Table 11.1.

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## Assembly

Assembly involves the development of a new measure. Two potential approaches to assembly exist. One is to assemble a measure that is directly informed by the local culture and context with no outside influences. An example of this form of assembly is a measure of practical intelligence developed by Grigorenko et al. (2001). This measure was developed based on the definition of intelligence among the Luo. Following discussions with the local community, the authors gathered that among the Luo, children were considered intelligent if they were able to identify local herbs with medicinal value and what ailments those herbs may cure. Given this information, the authors developed a scale on knowledge of medicinal value of different herbs that was administered to the children as a way to tap into their crystallized knowledge. Another and less radical approach to assembly is to develop a measure that is based or fashioned on available scales. Such a measure borrows items and procedures from various measures. An example of this kind of assembly is the developmental milestones checklist (Abubakar, Holding, Van de Vijver, Bomu, & Van Baar, 2010) and the Malawi Developmental Assessment Tool (Gladstone et al., 2008, 2010a, 2010b). These scales include items modified from various sources, maintaining the same basic structure of most child development measures, and measure similar constructs as published measures with additional items identified from target populations.

**Table 11.1** A summary of framework on adaptations – based on Malda et al. (2008)

| Different forms of adaptations | Examples of different forms of adaptations   |
|--------------------------------|--|
| Sample driven                  | These are adaptations aimed at ensuring the adequacy of test materials, procedures, and contents. Examples here include the changing of test materials to ensure that the materials used in the test are familiar to the participants. For instance, Holding et al. (2004) replaced pictures in the KABC magic window: pictures of an elephant were replaced by a cow, a cap by a hat, and a ball by an apple  |
| Construct driven               | These are adaptations made to ensure that items measure the construct of interest adequately and cover the whole broad range of behaviors defining the construct. For instance in Malawi, Gladstone et al. (2008) included items such as “carries an insima bucket on the head” for gross motor and “can be sent on an errand” for adaptive behavior to ensure that the scale has lifestyle-relevant items   |
| Culture driven                 | These are changes and modifications made to meet cultural standards, norms, and values. For instance, changes were made in the infant-toddler measure of the home environment in Kilifi, Kenya, to capture the multiple caregiving environment. So instead of focusing only on the activities between the child and the mother, Holding et al. (2011) also took into consideration activities and stimulation received from other caregivers such as siblings, since sibling caregiving was a common practice in their setting   |
| Linguistic driven              | Modifications made to address differences arising from different language structures. A good example of this can be captured in the adaptation of the Communicative Development Inventory (CDI). The Communicative Development Inventory looks at the language acquisition of young children; the tradition with this scale is not to translate it but to adapt it. This largely arises from the fact that languages differ significantly in their structure. It therefore requires a long procedure to collect data on the structure of the language and make modifications suitable to that language (Alcock et al., 2015) |
| Theory driven                  | These are modifications carried out to ensure that the measures assess the construct of interest within the theoretical underpinning of the test. An example here is the digit span test. This test is developed based on Baddeley’s theory of working memory. Therefore the selection of the digits needs to keep in mind the $7 \pm 2$ rule  |

## Procedures

### Adoption: Ensuring Equivalence

The adoption or literal transfer of tests from one context to another has been fraught with controversy and doubts on whether or not the test measures similar constructs across contexts. However, we would argue against the wholesale rejection of adoption as an item or test translation method, as various reasons have been given to support the use of adoption under certain circumstances:

a. It has been argued that schooling may result in certain changes in values, cognitive abilities, and test-taking behavior. These changes may result in participants from cultural backgrounds, who may otherwise have needed

tests that have undergone major modifications, to be able to take tests that have been adopted.

b. In clinical trials where participants are randomly placed into control and experimental treatments, the impact of test bias on study outcomes may be controlled because the test bias would be equally shared across groups (Jukes & Grigorenko, 2010).

However, when a test is being adopted into a new setting, there is a need to check for equivalence to establish how the results can be compared to the original test. One has to ensure that they are measuring what they think they are measuring (i.e., confirm test validity). Different forms of equivalence have to be addressed. These include semantic, metric, and scalar equivalence (see Table 11.2). Semantic equiva-

**Table 11.2** Different forms of equivalence

| Types                                 | What it means  | Strategies for enhancing equivalence  |
|---------------------------------------|--|---|
| Semantic equivalence                  | Evaluate the extent to which items have the same conceptual meaning across cultural context  | <ul style="list-style-type: none"> <li>• Ensure proper translations</li> <li>• Forward and backward translations</li> <li>• A review by a panel of experts</li> <li>• Cognitive interviewing</li> </ul>   |
| Construct equivalence                 | Ensure the theoretical meaning is similar across cultures  | <ul style="list-style-type: none"> <li>• Exploratory and confirmatory factor analysis to examine if the scale has the same structure across cultures</li> <li>• Evaluate nomological network: Do you achieve convergent and discriminant validity?</li> </ul> |
| Measurement unit (metric) equivalence | Same measurement unit used across context  | Confirmatory factor analysis (CFA): equality of factor loadings   |
| Scalar equivalence                    | This is when the full score means the same thing across contexts. The highest form of equivalence following the achievement of both construct and semantic equivalence | CFA: equality of factor loadings and measurement intercepts   |

lence is enhanced through the use of adequate translation procedures and implementation of cognitive interviews (see sections below for details relating to translations and cognitive interviewing), while the other forms of equivalence can be checked using various statistical approaches. One of the most popular approaches to confirming metric and scalar invariance is the use of factor analysis, notably confirmatory factor analysis (CFA). To illustrate how one can carry out CFA to check for metric and scalar invariance, we provide a step-by-step description of the procedure.

### Example of Equivalence Assessment: The Case of Brief Multidimensional Students' Life Satisfaction Scale

Using the *Brief Multidimensional Students' Life Satisfaction Scales* (BMSLSS) (Huebner, Seligson, Valois, & Suldo, 2006), we illustrate how equivalence of a scale can be statistically examined using CFA. The BMSLSS has been used widely to evaluate subjective well-being. The measure includes six items: five of them focus on specific domains (family, friends, school, self, and living environment), and one is a measure of global well-being. Sample items

include "I would describe my satisfaction with my life as," and these items are scored on a seven-point Likert scale ranging from 1 "terrible" to 7 "delighted."

### Sample

For the purpose of this illustration, we used data from 341 university students from Kenya ( $N = 175$ , females = 119) and the USA ( $N = 166$ , females = 88). The mean age of the sample was 19.82 years ( $SD = 1.82$ ), although the Kenyan students were older (mean = 20.62,  $SD = 1.81$ ) compared to the US students, whose mean age was 18.95 years ( $SD = 1.40$ ); the difference in age was significant,  $t(336) = 9.511$ ,  $p < 0.001$ .

### Analysis

To evaluate the extent to which the scale measures the same thing in the USA and Kenya, we carried out the four steps necessary in estimating equivalence.

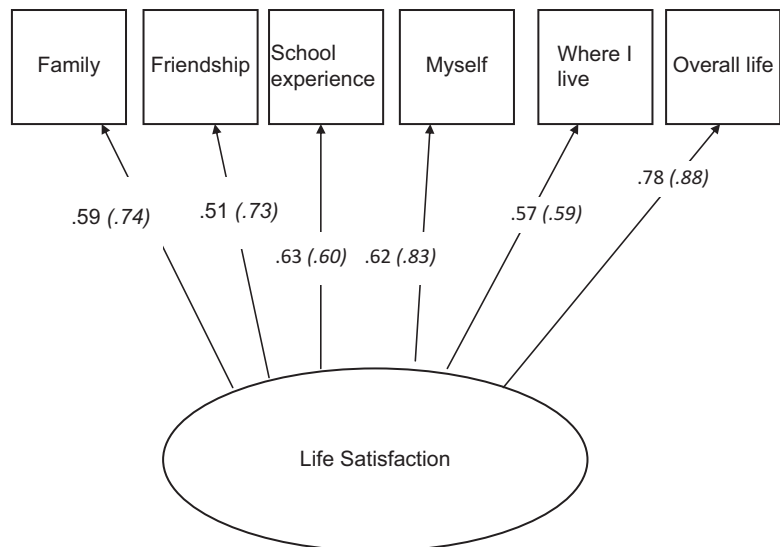
- a. In the first step, one is required to investigate if the data from each of these countries fit the recommended one-factor model. A *unidimensional model* including all the six items was estimated using AMOS 19 (other software,

such as LISREL and Mplus, can be used for the same purpose). Following suggestions from the literature, we assessed the goodness of fit for each model using various parameters including chi-square, the chi-square divided by its degrees of freedom, the Tucker-Lewis index (TLI), and the comparative fit index (CFI). The general guideline is that a nonsignificant chi-square reflects an acceptable fit to the data (Hu & Benter, 1999); however, given the sensitivity of the chi-square to sample size, we did not rely strongly on it in the current study. Additionally, the chi-square value divided by its degrees of freedom should be less than 3, and values greater than 0.95 for the TLI and CFI are considered to reflect acceptable model fit (Hu & Benter, 1999). The standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA) are also reported, since they have been shown to be sensitive to model misspecification; values of less than 0.08 are considered indicative of acceptable model fit. The model showed a good fit to the data in both samples: Kenya,  $\chi^2(8, N = 175) = 15.44, p < 0.001, \chi^2/df = 1.93, TLI = 0.943, CFI = 0.970, \text{ and } RMSEA = 0.073$  and for USA  $\chi^2(8, N = 166) = 9.53, p < 0.001, \chi^2/df = 1.192, TLI = 0.991, CFI = 0.977, \text{ and } RMSEA = 0.034$ . In addition, the factor load-

ings were significant and substantial in both cases; see Fig. 11.2 for details of the factor loadings. What these results indicate is that this scale has a unidimensional structure in both countries. In single-country studies, where the aim is not a cross-cultural comparison, these results are sufficient to conclude that the scale shows an adequate factorial structure in each context. However, what these results do not tell us is whether or not the scale operates in the same way in both countries. Using only this set of finds, one cannot justify comparing observed means in these two groups. To be able to compare groups means that further analytic steps are required.

b. The next important step involves multigroup CFA, where one examines the configural model for all groups simultaneously. If the fit indices in the separate groups are acceptable, the model has a similar factor structure, but the factor loadings are not necessarily equivalent across groups. We used multigroup confirmatory factor analysis to test the models. Some scholars advise skipping the first step and carrying this second one; however, other scholars note that in a multigroup analysis involving various countries (or groups), the lack of invariance in one country or group may threaten the invariance analysis for all other groups. Consequently, it is recom-

**Fig. 11.2** Factor loading of the scales across US and Kenyan samples



mended that both steps are adhered to as much as possible. Table 11.3 presents the fit indices which indicate that the data from this sample has the same structural patterns.

- c. The third step involves testing for metric invariance, in which case one tries to establish the extent to which the factor loadings are of the same strength in the different populations. This is achieved by constraining the factor loadings to be equal across groups. Not only do the fit indices here have to be beyond acceptable standards (as discussed in step one), but one also has to look at the criteria for judging the quality of successive, nested models. The idea behind nesting is that models are tested whereby the number of identical parameters across groups is systematically increased, and the influence of the additional constraints on model fit is evaluated. Here the delta CFI (the term used to refer to the change in CFI from one model to the other model that should be less than 0.010 to support the fit of the more restrictive model) and the smallest AIC figure represent the best fitting model. Although our model has a good fit to the data, the change in CFI was larger (0.014), which indicated that we did not yet achieve metric invariance. The literature suggests two potential solutions. First, when one fails to meet these criteria, they can identify the items causing misfit and free some factor loadings (partial metric invariance). Second, in cases where

the analysis involves multiple groups, an option is to eliminate some of the groups which may potentially be causing the misfit. In this case, we released some factor loadings one by one. Results indicated that the worst performing item was item 4. It seems that students in the USA and Kenya responded in a different pattern to this item. We therefore released the loading on this item. This analysis yielded a good fit; so, based on this analysis, we achieved a partial metric invariance.

- d. The fourth step involves testing for scalar invariance, which entails constraining the intercepts to be equal across groups, and checking the fit for the model (as in most other programs, in AMOS this is called the measurement intercept model). If the model meets the rules of thumb as used for the metric invariance step, it can be concluded that the observed means from both groups measure the same underlying construct and can be compared in an analysis of variance or some other procedure to test mean differences between groups. In our model (see Table 11.3) this was not achieved. We therefore had to go an extra step and free some intercepts to attain partial scalar invariance in these two groups; we had to free three of the six constraints. When partial scalar invariance has been established, one could go an extra step and compute latent means. Latent means are considered to be better approximations of the construct

**Table 11.3** Fit indices for the analysis on the measurement invariance of BMSLSS in Kenyan and US sample

| Model                                       | $\chi^2$ | <i>df</i> | $\chi^2/df$ | RMSEA | TLI   | CFI   | $\Delta$ CFI       | AIC     |
|---|----------|-----------|-------------|-------|-------|-------|--------------------|---------|
| Unconstrained model                         | 35.156   | 16        | 2.197       | 0.059 | 0.949 | 0.973 | –                  | 111.156 |
| Measurement weights                         | 49.838   | 21        | 2.373       | 0.064 | 0.942 | 0.959 | 0.014              | 115.838 |
| Measurement weights (partial invariance)    | 42,519   | 22        | 1.933       | 0.052 | 0.960 | 0.971 | 0.002 <sup>a</sup> | 106.011 |
| Measurement intercepts                      | 134.912  | 27        | 4.997       | 0.139 | 0.830 | 0.847 | 0.112              | 188.912 |
| Measurement intercepts (partial invariance) | 49.536   | 24        | 2.064       | 0.056 | 0.955 | 0.964 | 0.009 <sup>b</sup> | 109.936 |

<sup>a</sup>Delta CFI based on comparison with unconstrained model

<sup>b</sup>Delta CFI based on comparison with the partial measurement weights model



scores of groups than the observed means, as the latter contains error which has been filtered out in the former.

### **Adaptation and Assembly: A Systematic Approach**

We advocate the use of systematic approaches in carrying out both adaptations and assemblies. Various guidelines exist on how to carry out adaptations. In the next section, we present a four-step test adaptation approach that has been informed by our earlier work (Abubakar, 2008; Holding et al., 2008).

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### **Construct Clarification: A Mixed- Methods Procedure**

In this first stage, the aim is to clearly define the construct we would like to measure and identify behaviors that define the construct in the new context. The use of a mixed-methods approach allows for the elicitation of both emic and etic aspects of the construct to be studied (Holding, et al., 2008). In the context of test adaptation, etic aspects refer to components of the construct which can be accessed from a universalist context; these are aspects of the content, items, stimulus, and administration procedures that do not require changes or modifications (Abubakar, 2015). To attend to the etic aspects of the study, the researcher can review the existing literature. The target literature includes test sheets, test manuals, and published articles on the various psychometric characteristics of the scale. The review process could result in various kinds of choices for the test developer. First, one could identify a single instrument whose characteristics make it the best possible choice; they would then select this test for adaptation (Abubakar, 2015). For instance, in looking for a measure of intelligence for use in Kilifi, Kenya, Holding et al., having chosen the Kaufman Assessment Battery for Children [KABC] (Kaufman, & Kaufman, 2004) as the basis of their work, set out to examine, evaluate, and modify the

content and the stimulus so as to ensure their appropriateness for the cultural context in which they were working. A second scenario is that a variety of tests are reviewed and items are borrowed from different scales to form the basis of the new scale. These borrowed items are modified to make them culturally appropriate, and in certain cases, new items are formulated to supplement items identified from the literature. In this case, one assembles a new measure based on existing scales (Abubakar et al., 2007). A third scenario is where one reviews the literature and does not use any existing items, but uses the existing theoretical information to design a tool (Abubakar, 2015).

Emic aspects refer to culture-specific aspects of the construct being studied or culture-specific ways in which a construct under study needs to be evaluated. Qualitative data collection techniques, such as focus group discussion, observation, interviews, and item rating with members of the local communities, are some of the approaches that can be used to collect emic information about a construct. Both local experts and the target populations need to be involved in the process. Local experts are members of the community who are literate and possess expertise in the relevant areas. These experts provide the middle ground between what is in the literature and the community level information. Second, target community members need to be involved in this process as they provide not only the cultural aspects of the construct but also the day-to-day experiences of the target population. This part of the data collected will be useful in informing the test developer how best to access the data they need, how to formulate the test procedures, and how to evaluate the cultural appropriateness of the items/tasks. Methods for eliciting community understanding include focus group discussions (FGDs), individual in-depth interviews, and direct observation. Examples of the use of the local community in item identification include the works of Patel, Simunyu, Gwanzura, Lewis, and Mann (1997) in Zimbabwe in defining mental health symptoms and those of Gladstone et al. (2010a, 2010b) in Malawi in defining items that form parameters of what to measure in child development studies.

## Item Development: Translation and Formulation

The aim of this step is to prepare a list of items in clear and unambiguous language; during this stage information gathered in step one is integrated (Holding, Abubakar & Wekulo-Kitsao, 2008). Two key tasks of this stage are to (a) adequately translate items identified from the literature and (b) adequately formulate items based on the suggestions from the community. In the next stage, issues related to translations and adaptations are examined.

### Item Translations

Despite many years of experience that the procedure can have serious methodological flaws, the translation-back translation approach (Brislin, 1970) remains the most popular approach to testing translations. Interestingly, Brislin already noted various problems with the method when he described it for the first time. For instance, a translator may opt for a literal translation and may remain so close to the wording and grammar of the original language (e.g., word order) that the new text may be difficult to read, or items may be meaningless in the target language. The problem will remain undetected by a back translator who “makes sense” of the poor translation and produces an adequate back translation, thus covering up for the translation errors (Brislin, 1970). Therefore, a process that goes beyond mere translation-back translation is recommended (see Fig. 11.3 for a summary). In this procedure, the back translation process is combined with a panel approach that reviews the quality of the translation to enhance its quality. The success of this process will largely depend on choosing the right translators and constituting a comprehensive panel including psychologists, linguists, and members of the community familiar with the target construct. This is an iterative process, and there may be a need to return to and repeat earlier steps to get a truly good scale (Fig. 11.3).

## Formulation of the Appropriate Items

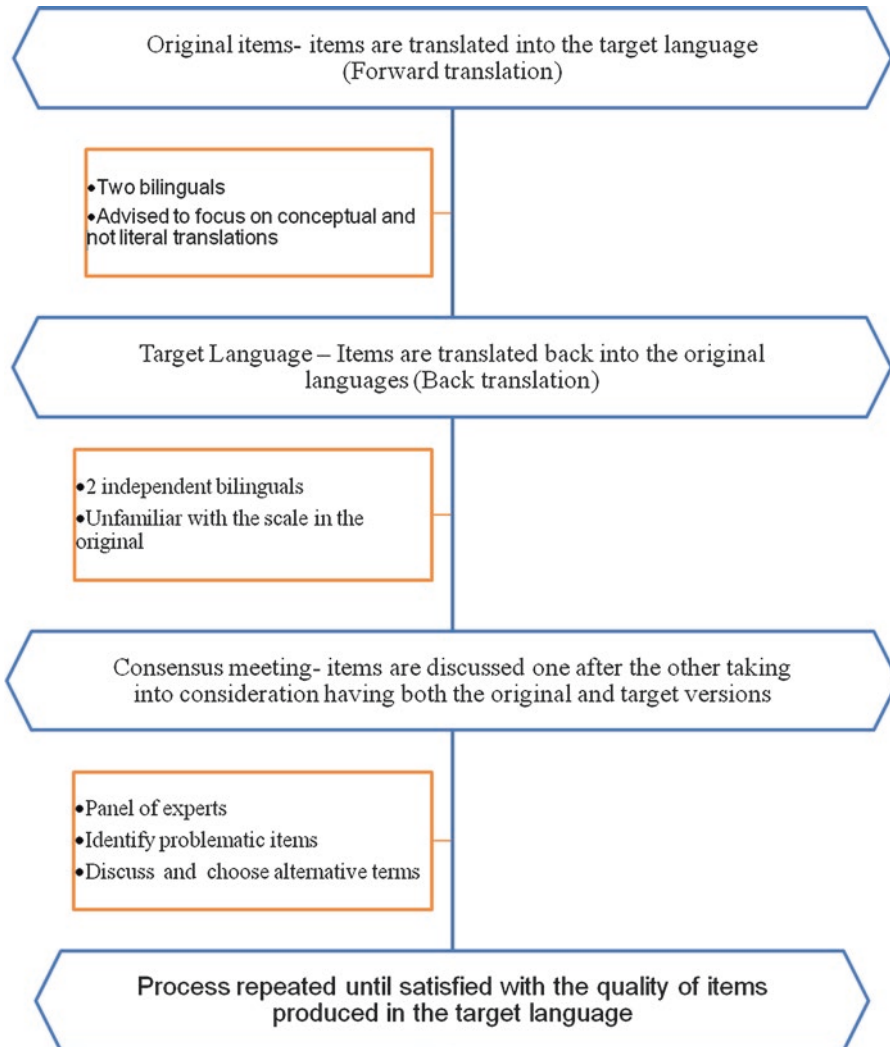
Item wording needs careful consideration. Earlier studies indicate that simple items function better, especially when the target community has low literacy levels. Complex items, such as those that are double-barreled, need to be avoided. Additionally, the use of negations and ambiguous or fuzzy words is likely to complicate the comprehensibility of the scale.

### Scale Development: Refining the Scale Through Pretesting and Piloting

At this stage, key tasks include (a) full development of the scale by piloting and pretesting the items, (b) the development of scoring and administration procedures, and (c) training the team that will administer the test. In developing the scale, one has to take into consideration the ability level of those taking the tests and those administering the tests. When dealing with educated, literate populations, complex instructions and tasks may work fairly well. However, when one is dealing with communities with low literacy levels, there is research evidence to show that less complex questioning yields better results. For instance, among low-income mothers in rural Africa and Asia, complex Likert scales and response options such as those in the Beck Depression Inventory and the Edinburg Postnatal Depression Scales have been found to work very poorly, since the participants find the scales confusing (Hanlon et al., 2008).

### Pre-pilot and Cognitive Interviews

After having developed the scale, one has to evaluate test contents, administration, and scoring procedures to ensure their adequacy. Modifications to test materials can be implemented as required. Various steps can be taken to ensure the quality of the content. One such step is conducting cognitive interviews during the pre-pilot stage (Drennan, 2003; Willis, 2005). Cognitive interviewing has been defined as the process of administering



**Fig. 11.3** Steps in item translation

survey response; the procedure is used to evaluate the quality of the responses to help determine whether or not the question generates the information the authors intend. There are two basic approaches to cognitive interviewing:

- a. Think-aloud protocol: in this approach, the interviewer asks the person taking the test to say their thoughts out loud as they prepare to answer the question asked. In this way the interviewer hopes to understand the process by which the person comes up with the right answer. Below is an extract from a think-aloud protocol (this extract has been developed

based on that presented in a manual on cognitive interviewing by Willis, 2005).

*Interviewer: How many times did you talk to a pediatrician about your child's health in the past 12 months?*

*Respondents: Ok, I regularly talk to my friend who is a pediatrician about my child's health. But I won't include that because I guess the talking you mean here would focus on the professional consultation. Every month I take my child to the doctor for growth monitoring and vaccination, so that counts. Additionally, whenever he has been ill I have taken them (sic) to the doctor and that has happened 4 times this year. So in total I have talked to a pediatrician 16 times this year.*

- b. Verbal probing techniques: in this technique a participant is asked selected questions to examine their comprehension of the questions, to highlight the reasons for their choices, and to pick out problematic items. Questions used in this session need to include measures of comprehension, recall, and evaluation. Below is an example of extracts of a verbal probing approach to cognitive interviewing:

To what extent do you agree with this statement: “Adequate parenting behavior is the most salient factor in enhancing child growth and development”? (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

*Interviewer: Is it possible to tell me in your own words the question that you just answered?*

*Respondent: The most important thing that influences the way children grow and develop is how their parents bring them up.*

*Interviewer: Are their aspects, words or phrases within the question you did not understand?*

*Respondent: Well, I understood all of them. However, I find some terms to be a bit vague and subjective. What is ‘adequate’? Won’t everyone have a different standard for judging this? Some people may think adequate parenting is providing basic needs and that everything after that is just an additional task, while some parents may think adequate parenting includes both providing basic needs and spending time with your child.*

*Interviewer: I see you choose number 4. Why?*

*Respondents: Because I feel that when a child has good parents they will get all their needs met and will grow well.*

*Interviewer: Why not strongly agree? In your opinion what is the key difference between the response choices, agree and strongly agree?*

*Respondent: To say strongly agree would imply that a child’s growth and development is wholly dependent on the parent. But that is not wholly true; other aspects such as child temperament may play a role too.*

The collected data need to be analyzed and synthesized to make the necessary changes to the questionnaire or scale to be used. Since cognitive interviews usually generate both qualitative and quantitative data, it is important to use both analytic approaches to make the best of the collected data.

## Training of the Assessment Team

In regions such as Africa, child assessment is not only hampered by a lack of standardized tools but also by a shortage in adequately trained personnel. Therefore a core element of test development and adaptation in this context is to choose test items and administration and scoring procedures that are suitable to the educational and experience levels of potential test administrators. In addition, it is important to ensure that the test administrators are adequately trained so that they are able to collect reliable and valid test scores. Consequently, during the test development process, relevant training needs to be implemented. A good test developer needs to establish the minimum competence levels that are required of the test administration team.

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## Test Evaluation: Psychometric and Non-psychometric Approaches

In evaluating the quality of the adapted tests, there are standard psychometric and non-psychometric approaches to be used.

### Psychometric Evaluation

Following adaptation, an evaluation of the quality of the developed test is very important. The extant literature has sufficient guidelines on the psychometric approaches to be considered (Hambleton, Merenda, & Spielberger, 2005). Psychometric evaluations mainly focus on evaluating the validity and reliability of the tests. Test reliability refers to the consistency of the obtained scores under similar conditions. Various forms of reliability exist, including internal consistency, test-retest, and interobserver reliability. Table 11.4 summarizes these reliabilities alongside the approaches that can be used to evaluate them. Validity refers to the extent to which a measure evaluates what it purports to measure. There are various forms of validity, as presented in Table 11.4.

**Table 11.4** Psychometric approaches to evaluating an adapted scale

|  | Summary   | Potential ways to evaluate it  |
|--|---|--|
| <i>Reliability</i>                                 |   |  |
| Internal reliability                               | Intercorrelation of items within a test   | Cronbach alpha; split half reliabilities   |
| Test-retest  | Correlation of two time point tests   | Intra-class correlations or Pearson product moment correlation   |
| Inter-tester                                       | Correlation of scores take by two assessors   |  |
| Inter-form reliability                             | Correlations on two parallel forms  |  |
| <i>Validity</i>                                    |   |  |
| Construct validity                                 | This is the degree to which measures really assess what they are expected to measure. This is assumed to be the overarching concept subsuming all other forms of validity | Full evaluation of this form of validity requires the evaluation of all other forms of validity. However, confirmatory and exploratory factor analysis can be used to evaluate the structure of the scales |
| Concurrent validity (including criterion validity) | Relationship between the test under construction and simultaneous measures of the same concept  | Correspondence of new measures with existing standardized measures, with current best practice and correspondence of different methods of measuring the same ability                                       |
| Convergent validity                                | Relationship between abilities theorized to be closely related  | Correlation between subscales of new measure   |
| Discriminant validity                              | This is when the measure is able to grasp real differences between groups. For instance differentiating between children with intellectual disabilities and those without | Mean score differences between groups could be t-test, ANOVA, ANCOVA, etc.   |
| Ecological validity                                | That the results as much as possible reflect the real day-to-day realities and functioning within a context   | Correlating test scores with score of functional abilities and daily living skills is one potential approach   |

## Non-psychometric Approaches

Non-psychometric information can be collected from both the participants and the test administrators. Additionally, notes taken during the assessment session can serve this purpose well. Such data have the potential to provide significant information on the suitability of the adapted testing. Some of the relevant information here includes the time taken to administer the test. If, for instance, a test takes 120 min in a new sample, whereas test takers in the original sample took 60 min, one has to critically evaluate what this lengthy time period means. Does it mean the test is now more difficult, or are the instructions lengthier? What is the possibility that the test takers in the second language are getting too tired, having to take it for 2 h? Would the results still be comparable between the samples? An important note is how participants react to test procedures.

If you have a test with infants, where their first reaction to a picture and photographs is to cry, it makes the evaluation of the original construct (habituation in this case) difficult. Any interpretation of the test results need to adequately take into consideration this non-test-related information.

## Feedback from the Test Administrators

Test administrators could be asked after the data collection to evaluate the test's contents, starting with the items, administration procedures, and stimulus used. The evaluation could be specific, asking for observed instances where negative occurrences or reactions were noted, or they could be at a more subjective level where they report on the ease of administration and quality of interaction with participants. This approach requires that careful observational notes of the assessment session be kept.

### Feedback from Participants

Participants can provide valuable evaluative information at the end of the task session. These steps can be easily integrated into the questionnaire by having open-ended questions at the end asking for a review of the test. Additionally, qualitative approaches (e.g., focus group discussion) following participating developmental assessment can also be used. During such sessions, the participants can point to content, methods, and procedures they may have found difficult to fully engage in. This would provide the test developer with information to further improve the test, or alternatively, information that can explain the patterns of results from the psychometric analysis.

### Adaptation or Assembly for Cross-Cultural Use: Strategies for Increasing Validity and Equivalence

In adapting tests for use across cultural and linguistic groups, three important strategies can be used to ensure the equivalence of those tests.

1. *Culturally decentering test development*: In this process the test developers set out to develop a test that does not favor or sample items (materials or content) that are only familiar to one cultural group. In this process, the test developer will exclude all items that are culturally unfair to one group. This is potentially problematic if one finds limitations in getting different items that are equally relevant across cultural groups. This procedure requires that one develops or adapts the test concurrently in all test sites. Though ideal, it may be very hard to achieve, as the overlap in all necessary criteria may limit the number of items that are potentially useful.
2. *Culturally multicentering test development and adaptations*: In this approach one selects items and content from the different cultural groups with equal frequency, to ensure that the test holds the same level of difficulty for each cultural group. Therefore if one is planning to have a test to be used in four cultural groups, it is important to collect test context materials from each of the cultural groups.

This provides the opportunity for the test to be familiar to each child and enhances the possibility of fairness.

3. *Development of parallel tests*: This approach involves the development of tests in two sites simultaneously. However, unlike option two above, in this approach one chooses to study the same construct in the two sites, but the materials and contents are made unique to suit the cultural contexts. For example, in adapting the communication development inventory due to differences in language structure, the basic format is maintained (Fenson et al., 1993). However, the contents of the test, and how many items are informed by the language, imply that a direct translation of the instrument is not carried out.

### Documentation

Keeping a good record of the test development and adaptations is a salient aspect of the whole process (Hambleton et al., 2005). Documentation will allow interested parties to be able to trace the adaptations made and evaluate the quality of the work beyond psychometrics. Key aspects that need to be documented include (if applicable):

- Initial forward translations
- Results of back translations
- Recommendations made by the panel of experts
- Items that were difficult to translate and aspects of the items that made translation difficult
- Process of pretesting and items that needed modification at this stage

Beyond the item-level detail, one also has to document the samples involved in this process (i.e., the composition of the expert panel and the pretest respondent samples). Documentation not only allows for one to keep a record of what has been done, it also helps to document good practice in the area of test development for low-income countries.



## Conclusion

Africa suffers an acute shortage of adequate measures for monitoring child development. Various approaches exist to alleviate this shortage. As part of the recommended good practice, researchers and practitioners can systematically choose the approach they want to use to obtain the measures they need (adopt, adapt, or assemble). Moreover, whatever approach is taken, the validity and reliability of the final scale needs to be demonstrated using both psychometric and non-psychometric approaches. We hope that this chapter clarifies that the technology to develop tests for an African setting is available (even if it has not been practiced frequently) and that this chapter may help to disseminate this knowledge. This will build confidence that the data collected are both reliable and valid and can be adequately used to inform policy and research.

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# The Potential of Qualitative Research for Applied Developmental Science in Sub-Saharan Africa

# 12

Carolyn Demuth

Theories on human psychological functioning and the methodologies used to study human psychological functioning are always guided by specific conceptions of the world and how to gain knowledge about the world (Guba & Lincoln, 1994; Kuhn, 1962). The same holds true for development science: mainstream developmental psychology has long been dominated by an understanding of development as a series of universal and natural (“biologically based”) processes within the child that are largely independent from the relevant historical and cultural context. The focus was primarily on age-related cognitive competencies and their effects on some aspects of social and nonsocial behavior with the aim of identifying general laws of development. Based on these ontological and epistemological assumptions, the vast bulk of developmental psychology research has been conducted with quantitative methods such as laboratory experiments, surveys, and objective testing. Research methodology is aimed at “controlling” or “neutralizing” effects of context in order to identify

underlying universal developmental processes (cf. Hogan, 2005; Tudge, 2008). Culture—if considered at all—was treated either as confounding variable or as independent variable that influences the assumed universal psychological functioning. This ontology of a “context-free” child has been widely criticized by a number of scholars within the field (Bronfenbrenner, 1979; Cole, 1996; Keller, 2007; Valsiner, 2006, 2007). In fact, already the early pioneers like Vygotsky (1978) advocated to study child development in sociocultural context and in mundane everyday interactions (cf. Hogan, 2005; Mey, 2010). Mainstream developmental psychology research, however, still largely operates within this traditional epistemology.

What is more is that most theories of child developmental and programs derived for applied developmental science are based on research that has been conducted with white middle-class families in North America and Northern Europe (Henrich, Heine, & Norenzayan, 2010) and can therefore not necessarily be considered to be normative for about 86% of children who live in the Majority World (<http://www.unicef.org>). Daily lives of children in sub-Saharan Africa are very different from children in Western societies, and little is still known about what healthy psychological development looks like from an African perspective. What is urgently needed therefore is research on child development in diverse areas of sub-Saharan Africa that does

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take into account the specific socio- and eco-cultural characteristics in which child development takes place.

In the following, I will lay out why research on child development needs to take seriously the sociocultural embeddedness of mundane child-rearing practices. I will then move on to discuss the methodological implications that follow from such an approach. Particularly, I will argue that an ethnographic approach, combined with the microanalytic study of mundane communicative practices with caregivers in which children engage, is a promising avenue to study child development in cultural context. I will provide some illustrations from my own research on mother-infant interactions among Cameroonian Nso farming families. Finally, I will discuss some challenges that remain when doing research on people whose cultural background the researcher does not share. I will conclude by giving a brief outlook on clinical, intervention, and policy implications.

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## A Contextualized View of Child Development

Within the field of cultural psychology, there has long been a recognition that human development needs to be understood—and hence studied—in naturalistic situations and in cultural context (e.g., Rogoff, 2003; Shweder et al., 2006; Valsiner, 2000; Vygotsky 1978; see also Keller of this volume). Children grow up in complex networks of relationships with others. It is within these social worlds that they develop their capacities to understand, perceive, communicate, self-regulate, and develop a sense of self. It can be said that the developing self is inseparably interwoven with one's participation in mundane everyday social interaction. This holds true right from birth as Fogel (1993) states:

Developmental changes in the sense of self emerge from changes in the infant's body and brain, changes that themselves arise from communication with others [...] Human developmental changes originate in the dynamically changing relationship between communication, self and

culture. Human developmental change springs from social relationships and their cultural frames. (p. 24/25)

Through repeated participation in social interaction with significant others, children learn to make sense of their experience and to gain an understanding of the world and of self and self in relation to others. Communication lies at the heart of social interaction and hence of self-development. Mundane communicative practices are the place where development takes place. In order to gain a proper understanding of how children think and act, and how specific ways of thinking and acting develop, it is therefore crucial to study these interactions in naturalistic settings. Any endeavor to study human behavior in artificial laboratory settings and to make generalizations from these findings will inevitably lead to misinterpretations of such behavior because it is studied isolated from the concrete context of everyday life. Rizzo and colleagues, for instance, argue that:

to achieve an accurate understanding of human action, psychologists must observe, analyze, and interpret the practical, everyday activities of people along with a detailed understanding of the social-ecological conditions within which these activities are embedded. Further, to achieve an accurate *developmental* understanding of human action, they must augment this analysis with analyses of the changes in these conditions over time and of the consequent adaptations in people's practical activities. (Rizzo, Corsaro, & Bates, 1992, p. 104, emphasis in the original)

From this epistemological view, three things become important that have consequences for methodological approaches to study child development, as I will outline in the following: the importance of an *eco-cultural approach*, the central role of *communicative practices* in which children participate, and the need for a methodology that allows for studying developmental *processes*.

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## An Eco-cultural Approach to Developmental Science

Eco-cultural theory stresses that child development is situated in concrete mundane social interactions, and these social interactions are at the

same time embedded in broader sociocultural systems and in practices and beliefs of members of a given society. These broader ideologies and praxeologies have sociohistorically evolved in an adaptive process to the requirements of the environment (LeVine, 1990a; Whiting, 1977; Whiting & Whiting, 1975). Accordingly, caregivers' beliefs of what is considered good parenting and what are desirable outcomes of child development, their socialization practices, and socialization goals need to be considered as functional within the specific eco-cultural context in which they have evolved (Keller, this volume; Super & Harkness, 1996; Weisner, 2000, 2014). Children in diverse parts of the world make culturally distinct experiences as they participate in everyday social interaction. Distinct experiences will lead to specific socio-emotional and cognitive developmental pathways (Weisner, 2002), and a specific developmental pathway can therefore not be assumed to be universally normative. While there might be universal developmental tasks, such as building emotional bonds and acquiring socio-cognitive understandings of the world, different eco-cultural environments offer distinct cultural solutions to these tasks (Quinn, 2005). What might be considered a healthy development in one society might be considered pathological in another. For sub-Saharan Africa, this has been shown, for instance, by the seminal work of John and Beatrice Whiting (Whiting & Whiting, 1975) and Robert LeVine (e.g., LeVine, 1990b; Levine et al., 1994). Several other authors have questioned the assumed normativity of specific patterns of intelligence (e.g., Nsamenang, 2006; Serpell, 2011), attachment (Otto, 2008), proto-conversation (Demuth, 2008, 2013b), and socio-emotional and cognitive development (Keller, this volume) and suggested alternative cultural solutions for the African context.

In developing countries, especially in subsistence-based communities, socioeconomic insecurity is translated into both early marriages and the early onset of reproduction (Gielen & Chumachenko, 2004). It has been predicted that poor agrarian societies, particularly in the sub-Saharan region, contribute the most to the world population growth (*ibid.*). That means that not

only does the great majority of children live in the non-Western agrarian contexts but that this trend also is bound to intensify in the future (p. 83). Research on child development therefore needs to focus more on various parts of sub-Saharan Africa that have so far been neglected in academic theorizing. Moreover, how globalization and the rapidly growing global interconnectedness through the Internet and other modern technologies alter cultural models on child care and ultimately child development outcomes are crucial empirical questions that need to be addressed. Such studies can provide a basis for reconsideration of developmental theories that assume a middle-class Western way of life. Weisner and colleagues (Weisner, 2014; Weisner & Lowe, 2004), for instance, argue that research on the impact of globalization on children's well-being has mainly focused on physical health and attainment of (cognitive) skills and competencies and uses standard indicators developed in Western societies. The psychological experience of well-being is, however, culturally defined and depends on the capacity to participate "in the activities a cultural community deems desirable, and the psychological experiences that go along with that participation" (Weisner & Lowe, 2004, p. 5).

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### **Methodological Approaches to Study Child Development in Cultural Context**

From the argumentation so far, it becomes clear that research on child development needs to be able to provide insights into how children's experiences are constructed within the bounds of geographical, societal, and ideological dispositions and constraints, family structures, and parental beliefs about good child care. On a microlevel, methodological procedures are needed that are able to study the dialogical nature of culture and development in concrete social interaction. Finally, the very object of developmental psychology—processes of change, with age in the psychological functioning of individuals—requires a discrete research program based on a methodology and methods that allow for studying these



developmental processes (Valsiner, 2000). This complex endeavor obviously requires a research design that consists of various procedures and cannot be achieved by one single method alone.

Qualitative research offers a variety of methodological procedures to study human development in cultural contexts. Some textbooks have specifically focused on the application of qualitative methods for psychological research (e.g., Camic, Rhodes & Yardley, 2003; Forrester, 2010; Lyons & Coyle, 2007; Willig & Stainton-Rogers, 2008; for a practical beginners' guide, see also Sullivan, Gibson, & Riley, 2012). Their application for developmental psychology has been discussed by, among others, Demuth and Mey (2015) and Mey (2010), and several handbooks have been specifically dedicated to developmental science (Freeman & Mathison, 2009; Gardner & Forrester, 2010; Greene & Hogan, 2005). Qualitative research is, however, a vast and heterogeneous field. For the purpose of this chapter, I will therefore focus on only few procedures that seem appropriate to the study of child development from an eco-cultural perspective comprising both micro- and macrolevel of child development in cultural context. There are, of course, other procedures that can also fruitfully be applied but can't be discussed here in more detail. I will present a sample of my own research to illustrate one of these approaches. Finally, I will move on to discuss some of the challenges researchers might be faced with when applying these approaches to sub-Saharan Africa.

### Macrolevel Procedures: Ethnography

Ethnography has been argued to be the "most important method in the study of human development because it ensures that the cultural place will be incorporated into understanding development" (Weisner, 1996, p. 306). It has its origins in cultural anthropology and is hence particularly suitable to study child development in cultural context. Ethnography does not constitute a single set of methods and procedures but is marked by systematic but flexible deployment of a variety of methods, such as participant observation, mapping, census, videography, field notes, object-

or photo-elicitation, and open, semi-structured, and focus group interviews. It might also include standardized procedures such as "spot observations" (LeVine et al., 1994; Rogoff, 1978) or quasi-experiments (Maynard & Greenfield, 2008; Rogoff & Angelillo, 2002). Weisner (2002) has developed a specific interview ("Ecocultural *Family Interview*") to study children's and families' routines. An important common characteristic of ethnography is the sustained contact and involvement with a community that allows the researcher to become deeply engaged in the lives and mundane everyday practices of their participants. The aim is to understand the meaning from the perspective of the local participants within the context of mundane everyday life.

Ethnography is particularly suitable for cultural developmental science for a number of reasons (Corsaro, 2006; Corsaro & Molinari, 2008; Jessor, Colby, & Shweder, 1996; Miller, Hengst, & Wang, 2003; Rizzo et al., 1992; Weisner, 1996): it explicitly includes the sociohistorical and eco-cultural context in which development actually takes place. Staying in the field, close to the participants (and their interactions), allows for detailed descriptions of different situations over longer periods of time and is hence also an important strategy for collecting longitudinal data and for studying developmental processes of transition and change. It permits a methodically comprehensive approach to study human development from a variety of perspectives and to gain knowledge about caregiver's ideas of good child care and their socialization goals and an understanding of these in light of the prevailing socio-cultural and sociohistorical living conditions. Interpretative procedures offer the possibility to reconstruct the meaning of children's behavior and experience from the perspective of the child and hence to reconstruct the logic of their thinking (Corsaro, 2003). The researcher has the possibility to share everyday experiences with children and to gain access to concrete practices in which they participate and to watch their reactions in social interaction. How do, for instance, relationships between peers and siblings look like? What are children's ideas about the world and about their relationships to their friends and their family? What conclusions about children's



social cognitions can be inferred from children's accounts of their experience (Dunn and Brophy 2005)? How do they understand others' emotions, intentions, beliefs, and goals? This becomes evident, when observing how children tease, mock, comfort, or help others and how they make jokes or talk about other's emotions and intentions (Bartsch & Wellman, 1995; cf. Dunn and Brophy 2005). How children develop a theory of mind also depends on whether talking about other people's mental states is part of their everyday communication or not (Bonaiuto & Fasulo, 1997).

Deep engagement with mundane everyday life, especially if the researcher is not familiar with the sociocultural structure, might help to discover where methodological procedures and assumptions might reveal a Western bias. Weisner (1996, S. 308) describes this about his beginnings of ethnographic research on families in Kenya:

It took months of confusion and stubbornness on my part, and constant involvement with and interviewing of families (not to mention struggles with languages, my role in the community, my health, and so on) before it gradually dawned on me that the cultural place did not always fit my design or prior expectation. For one thing, children were being taken care of by other children much of the time, not by their mothers or fathers, and even when mothers were present, they were not directly involved in care, but rather managed, coordinated, and struggled with the tasks of domestic life in a way I did not grasp. The cultural system of care-taking – that is, the rules of discipline, talking with children, evaluations of child competence, beliefs about gender – or the principles used in maintaining domestic life, were complicated; I didn't understand these. Mothers and fathers talked with me about parenting not primarily in terms of dyadic interaction and stimulation with their children but in terms of inheritance, generations, pride, obligation and obedience, and family-adaptive task. Mothers were more concerned with the complex adult relationships in their large households that they were with childrearing as a specialized activity. Modernization, mother-child stimulation, and stress may have been themes in North American developmental work at the time (and still are), but there was a lot more going on in the families I was observing.

Collecting and systematizing extensive field knowledge also help the researcher to generate adequate interpretations and "thick descriptions" of a particular phenomenon (Geertz, 1973).

Methodological rigor is achieved by systematically making the researcher's initial expectations of what should happen in social interactions of the community under study explicit and available for matching, confirmation, revision, and writing (Weisner, 1996).

## The Crucial Role of Communicative Practices

Communicative practices lie at the heart of social interaction. A number of cultural developmental psychologist have stressed that studying child development in context requires attention to meaning. Narrative is a fundamental tool of meaning-making that children are novice meaning-makers and that their social environments provide historically situated meanings embodied in practices (Bamberg, 1997; Bruner, 1990; Miller, Fung, & Koven, 2007; Miller, Fung, Lin, Chen, & Boldt, 2012; Shweder et al., 2006). Meaning-making processes are situated in social interaction and co-constructed on a moment-by-moment basis as the interaction unfolds. Such an epistemological stance requires that psychological constructs are studied not as "entities" inside the mind but as communicative practice in social interaction:

to focus on constructs like mental illness, intelligence, personality traits, unconscious wishes, conflicts, and so forth as the predominant influences on human behavior is to disregard the essence of human action (i.e., its communicative intent) and to thereby preempt the study of its *functional* significance in the setting. [...] all human behavior is constructed and performed in an effort to communicate, and thus no psychological analysis of behavior, whether clinical or scientific, is complete until this aspect is understood. (Rizzo et al., 1992, p. 103) [Emphasis in the original]

Such discursive practice approach is particularly fruitful for developmental science studies in cultural context. The work by Miller und Fung (e.g., Miller et al., 2007, 2012), for instance, has impressively shown how 2-year-old children in Taipei, China, and Chicago, USA, are provided with distinct narrative frames by their social environment to make sense of their experience. In such a way, children not only learn to talk in

culturally appropriate ways about their experience but also to perceive them in a specific cultural way. The relationship between children's participation in specific discursive practices and their developing understanding of the world has meanwhile also been studied longitudinally (Dunn and Brophy 2005). Children learn how to tell their experiences, what stories are worthwhile to be told, and what should not be told; in other words, they learn what a "good story" constitutes in the society they live in (Brockmeier & Carbaugh, 2001). The discursive and narrative devices they draw on to construct their identity are hence dialogically interwoven with cultural ideologies and might have long-term influences on their identity constructions later on in life (Demuth, Keller, Gudi, & Otto, 2011; Chen et al., quoted in Miller et al., 2007). It should be stressed here, however, that children not simply internalize cultural ways of thinking, acting, and perceiving but draw on interpretative procedures to make sense of their experiences and actively contribute to cultural production and change (Corsaro, 2014).

### **Microlevel Procedures: Studying Discursive Practices**

Such epistemological understanding calls for a methodological approach that places discursive practices front and center (Miller et al., 2012). Terms such as "communicative" or "discursive" practices are used to signal a contrast with a purely referential conception of language, to privilege a conception of discourse as action as it is put forward by discursive psychology (e.g., Potter, 2012). It is oriented to examine social interaction as the site in which psychological phenomena that have traditionally been conceived of as developing inside the mind (attitudes, traits, knowledge, intentions, agency, emotions, identity) emerge in a process of intersubjective agreement. It treats language not as means to refer to these phenomena as hidden "entities" in the isolated mind but as constitutive of the social reality and of the mind.

The focus of analysis lies on the *action orientation* and rhetoric force of discourse, i.e., the

ways in which accounts are constructed and on the functions that they perform (e.g., Potter 2012). Originally, discursive psychology is aimed at examining shared patterns of constructing social reality, i.e., discursive resources that speakers may share, so-called interpretative repertoires. The concept of interpretative repertoires has meanwhile gradually been abandoned in favor of analytical proceedings based in *conversation analysis (CA)* (Sacks, Schegloff, & Jefferson, 1974). CA is interested in the regular, orderly structures that sustain mutual intelligibility of actions among interlocutors, in all the different contexts they engage. The achievement of intersubjectivity as the members' consensus on a collective set of symbols and practices is at the heart of analysis. Although neither mind nor culture is ever explicitly mentioned or formulated in CA studies, they are incorporated in the way participants at talk display their understanding of the unfolding actions, by means of their relevant orientation to certain formal features of conversation such as pauses, hesitations, intonation, and overall prosody in interaction, overlaps, and other aspects of the sequencing of actions. The specific strength of CA is that it addresses strictly naturalistic data material and is able to document the participants' orientation to meaning using the same "relevant" categories they use to understand each other and make themselves understood. It is increasingly used in combination with videography allowing for paralinguistic features to be included in the analysis and to capture and document the high complexity of mundane social interaction. Although technological advancements allow for increasingly sophisticated analysis of video material, transcription of selected portions that will be analyzed in more detail is usually still required after a substantive review of the data corpus. Embedded in a longitudinal and ethnographically informed design, it allows to microanalytically analyze change and transformation of interactional patterns over time and hence to study developmental processes.

Other useful variants of discursive psychology focus, for instance, on how people afford subject positions to one another (Harré & van Langenhove, 1999) or how identities are

co-constructed in social interaction (Bamberg, 2012).<sup>1</sup> On the whole, we can conclude that studying discursive practices microanalytically in children's mundane everyday interactions offers new and promising methodological avenues to the study of children's mundane social interactions in that they describe cultural patterns of how people build accounts of their experiences and images of the self, in light of discursive resources available in a specific sociocultural setting. Research in this field privileges the study of small numbers of children in great depth and, if possible, over an extended period of time. Such endeavor, however, needs to be embedded within an ethnographic approach that provides knowledge about broader cultural norms and ideologies if it does not want to risk some misinterpretation as I will outline in the following paragraph.

### **Ethnographically Embedded Discourse Analysis**

Various authors (Demuth & Fatigante, 2012; Deppermann, 2000; Miller et al., 2012) have pointed to the importance of including ethnographic knowledge to discourse and conversation analysis if we don't want to risk some extent of misinterpretation. Systematically combining ethnographic research with microanalytical discourse analysis can provide fruitful insights to better understand the background of specific cultural discursive practices. The meanwhile classical research on narrative practices in Taiwanese

families in Taipei conducted by Peggy Miller and Heidi Fung (see, e.g., Miller, Fung, Lin, Chen, and Boldt), for instance, provides examples of how mothers' shaming practice of making their children repeatedly recount their own misdeeds in front of others becomes understandable if one considers the eco-cultural conditions, cultural models, and parental ethnotheories and socialization goals. This practice instantiates the indigenous notion of *jihui jiaoyu* or "opportunity education" (Fung, 1999) which is considered the most effective way to instill moral lessons and hence virtues in young children.

Deppermann (2000) argues that meaning and order cannot be directly inferred from what is spoken but always require interpretation by drawing on contextual knowledge. This becomes particularly obvious when we try to apply discourse analysis to interactions in a foreign language, in which interlocutors talk about things that the researcher does not understand or in which the interlocutors follow implicit rules that we are not familiar with.

He identifies seven areas of applying ethnographic knowledge within this approach:

1. Sensitization for a phenomenon (identifying a phenomenon from the very beginning, not only the analysis of it requires specific contextual knowledge).
2. Filling missing interpretations (e.g., what places, individuals, or happenings an utterance is referring to will often remain unclear without specific ethnographic knowledge).
3. Preventing misinterpretations caused by ethnocentrism of one's resources of analysis (a possible misinterpretation of social interaction might in fact remain undiscovered until reflected on by someone who is ethnographically informed).
4. Deepening of interpretation (e.g., implicit hints to a person's particularity, evaluations with regard to local norms, reference to genres or earlier social interactions, prosodic contextualization of evaluations and emotions).
5. Deciding between various possibilities of interpretation (CA requires that interpretations are to be checked in light of the responses of the interlocutors). Sometimes such reaction

<sup>1</sup>There exist also other forms of discourse analysis that aim at somewhat different research questions: e.g., *Foucauldian Discourse Analysis*, *Critical Discourse Analysis*, or *Genre Analysis*. Their focus is not on social interaction per se but on institutional and social structures that frame specific discursive events and the ways in which ideological and political domination is reproduced in text and talk. Their relevance for developmental psychological research lies in studies concerned with cultural and historical ideologies of various aspects of human development, like childhood, parenting, or aging.

will, however, not be displayed because participants share mutual knowledge that makes such a reaction superfluous or because cultural norms or local contingencies prevent participants to produce complementary actions to prior their moves.

6. Generalization of interpretations (to what extent the identified practices are “typical” or “representative” requires broader knowledge about the social practices of a community).
7. Validation (of typicality).

The unique potential of CA and discursive psychology lies in the data-driven analysis—applying ethnographic knowledge as sole source for interpretation of social interaction risks to prematurely explain participants’ discursive actions. Ethnographic knowledge therefore needs to be systematically integrated in the analytical process of reconstructing participant’s interactional moves. This means that the researcher has to make clear how ethnographic knowledge does not merely provide general context information about the field but is consistently displayed in the way an interaction proceeds (“procedural consequentiality,” Schegloff, 1991). The interpretation of any string of sequences must deal and take into account the specific norms that not only attain to verbal speech but also to adjustment of the bodies, use of objects, arrangements of space, temporal constraints, etc.: any of these dimensions help shape the meaning of the social (and) interactional event in which the members of a particular community participate. One possibility of combining both perspectives within one research team is the joint analysis by both a trained conversation analyst and a trained field researcher (Demuth & Fatigante, 2012).

### **Example from a Study on Mother-Infant Interactions in the Northwestern Grassfields of Cameroon**

In a comparative study with 20 farming Cameroonian Nso mothers from Kikaikelaki and 20 German middle-class mothers from Muenster,

Demuth (2008, 2013a, 2013b) investigated discursive practices used by the mothers in playful interactions with their 3-month-old infants. She found distinct patterns of co-constructing the interaction that point to different normative orientations and communicative genres that can be considered to be specific to the two sociocultural contexts. These communicative genres were found to be in line with broader cultural ethnotheories on good child care in these two communities found in previous studies and by other researchers. In the following, some examples from this study serve as illustration how discourse analysis and ethnographic knowledge can be combined. The excerpts are taken from a collection of instances when the infant expressed negative affect by whining or crying. For the purpose of this chapter, we focus on the Nso interactions here. While in this case, the researcher did not engage in a long-term ethnographic study of the Nso herself; she draws on a wide literature and directs reports from ethnographic research and closely worked together with colleagues working in the field as well as with native Nso colleagues.

### **Eco-cultural Background**

Kikaikelaki village is part of a locally ruled chiefdom (*fondom*) of the Nso, who lives in the north-east corner of Cameroon’s North West province. The official language used in school and administration is English. Cameroonian Pidgin English is the common lingua franca. The local language is Lamnso’ which has long been an oral language, and its written form has only recently become available. The Grassfield region is one of the most fertile and populous regions in the country; however, infrastructure is still very poor. The savannah climate and lack of adequate sanitation and potable water are major risk factors for diseases such as malaria, diphtheria, diarrhea, worm ailments, and jaundice. There are two systems of authority within the Nso society: the Cameroonian postcolonial state on the one hand and the local chiefdom (*fondom*) of the Nso on the other. The chiefdom is locally ruled by the *Fon*, who is both the head of the traditional government and the chief religious authority in charge of keeping the ancestors happy.

The Fon’s political power is regulated by comparatively lower and upper chambers of parliament, e.g., men’s secret societies and military associations in combination with the Fon’s primary counselors and various lineage heads. Social interaction is structured by highly institutionalized modes of behavior according to age, gender, and social title. These include terms and forms of address as well as behavioral signs of respect such as bending down, averting one’s eyes, and talking through one’s hands (Goheen, 1996). Families earn their living primarily through subsistence agriculture, and the average amount of formal schooling is in general very low. Families live in compounds that are composed of the lineage head, his wife or wives, his adult sons, and their families, children, and other dependents. Women assume basically the entire responsibility for food production (farming), provisioning the household, and child care, whereas men work in the wage-labor sector, grow coffee, and engage in a variety of entrepreneurial activities (Goheen, 1996). The Nso children grow up in a dense social network including parents, siblings, relatives, grandparents, and neighbors (Yovsi, 2003). Older children are expected to help on the farm, do household chores, and take care of younger siblings. The Nso community has been characterized by norms of collective responsibility, sharing, and exchange (Goheen, 1996; Nsamenang & Lamb, 1994; Nsamenang & Lamb, 1995) as well as harmonious and hierarchically organized relationships between family members and the wider social reference group. While child-rearing is the responsibility of the entire community, the mother is the primary caregiver during the first 6 months of life (Yovsi, 2003). Fathers are rarely at home and therefore play a minor role in the daily communication with their children when these children are young.

**Co-constructing the Meaning of Expressing Negative Affect**

Overall, in the Nso mother-infant interactions, there were fewer instances of situations in which babies started whining or crying compared with their German counterparts. The Nso mothers commonly used discursive devices to exert direct control and positioned the child as hierarchically subordinate and as someone who is expected to

obey and comply. Rebuking and shaming devices were found to be common reactions to the infant’s expression of negative affect. The following examples serve as illustration of this prevalent pattern (for a more detailed discussion, see Demuth 2008, 2013a)

**Interpretative Repertoire 1: “Unmitigated Directive Orientation Toward Obedience”**

Although reactions to whining varied in their intention and intentionality across dyads, the reactions followed a very similar pattern: vocal distraction and rhythmic animation, expressing disappointment and scolding the child, conveying a social norm, commanding the child vigorously to stop, asking rhetorical questions, and assuring relational accord after the child complied. We find this pattern, for instance, in the following excerpt:

Example 1: Nso10\_t12

The infant is sitting on her mother’s lap; the mother has just started to sing to the child as she starts to cry

|   | Baby           |         | Mother                                       |   |
|---|----------------|---------|--|---|
|   | Action/gesture | Vocal   | Action/gesture                               | Speech  |
| 1 |                |         | > B  | Mama happiness?   |
| 2 |                | (Pants) |  | (2)   |
| 3 |                |         | Sways B from left to right                   | Be dancing. <i>March on to victory</i>  |
| 4 |                | (CR)    | Looks briefly to camera, then to B, shakes B | a::y eme:y eme::y!  |
| 5 |                | (CR)    | Nodding each time with a stern look          | (Angrily shouting)<br>A BAD<br>CHILD!<br>A BAD<br>CHILD!<br>A BAD<br>CHILD!<br>A BAD<br>CHILD!<br>A BAD<br>CHILD! |
| 6 |                | (Stops) |  | (3)   |







tives as she prompts the child repeatedly to look at and take the object. Eventually she “makes” the child do what she wants him to do (line 43) by pressing the leaf into his hand in an imposing gesture. We argue that she confirms in this way that she does not accept whining behavior and that she expects immediate compliance and obedience from the child.

The child gradually calms down, and the mother and child engage in a playful sequence of alternating vocalizations. The child starts to whimper a few times, however, and eventually starts crying again

imperative. The reason she mentions this is that it is not common in this area to cry. Note also that she first uses a cooperative expression, “we,” (line 130) and then switches to “they” (line 131–139) indicating a normative discourse. In a stern voice she commands the child to stop and again poses a rhetorical question (133) similar to the first excerpt. Note that after the baby stops crying (line 134), the mother smiles and the tone of her voice becomes softer. In this strategy, we argue the mother moderates the initial severity of her reaction and reestablishes social harmony in her interaction with the child.

|     | Baby           |       | Mother                            |  |
|-----|----------------|-------|-----------------------------------|--|
|     | Action/gesture | Vocal | Action/gesture                    | Speech   |
| 127 |                | (CR)  |                                   | (1)  |
| 128 |                | (CR)  |                                   | Terrible!  |
| 129 |                | (CR)  | > B, waves leaf                   | Take! Take! See! See!                            |
| 130 |                | (CR)  | Gives B a stern look, shakes head | No! No! No Don't cry again! We don't cry in Mbah |
| 131 |                | (CR)  |                                   | Terrible!!! They don't cry in Mbah!              |
| 132 |                | (CR)  | Waves with hand                   | (Angrily) Stop=fast!                             |
| 133 |                |       |                                   | Who has told you that they cry here?             |
| 134 |                | vo::c | Smiles at B                       |  |
| 135 |                |       |                                   | (Softens her voice) They don't cry here          |
| 136 |                | vo::c | Smiles at B                       |  |
| 137 |                |       |                                   | They only laugh                                  |
| 138 |                | vo::c |                                   |  |
| 139 |                |       |                                   | They don't cry here                              |

The mother uses a shaming expression (“terrible”) indicating that the child’s crying behavior is socially unacceptable. She verbally and physically prompts the child to redirect his attention (by shaking him and prompting him to look at and take the leaf), followed by a repeated nega-

### Linking Discursive Practices with Local Ethnotheories of Good Child Care

From a “Western” perspective, the co-constructions of these interactions might not be in line with what has been defined as the concept of a “sensitive mother” (Ainsworth, Blehar, Waters, & Wall, 1978) which is considered to affect the healthy psychological development of the child. From an eco-cultural approach, however, that takes into account what might be functional for preparing a child to become a successful member of the Nso community, based on knowledge from ethnographic studies, the logic that lies behind these interactional patterns and socialization strategies becomes understandable. The concept of good infant care according to local ideologies of the Nso has been described as “responsive control” (Yovsi, Kaertner, Keller, & Lohaus, 2009). It is the mother’s responsibility to know what is good for the child and actively guide and structure the interactions. Maternal sensitivity accordingly is defined in terms of closeness, monitoring, instructing, training, directing, and controlling infant activities (ibid).

Nso ethnotheories of good parenting center around obedience, respect for elders, conformity, and compliance to rules as well as practical autonomy, social responsibility and obligations, as well as a strong community spirit (Keller, Demuth, & Yovsi, 2008; Nsamenang & Lamb, 1994; Yovsi, 2003). Parental goals serve to socialize children to competent members accord-

ing to the local structure of the community. Without functional integration into the hierarchically structured community, individuals are not considered to fully be a “person,” i.e., a sense of self cannot be obtained without reference to the broader community (Nsamenang & Lamb, 1994). Socialization accordingly focuses on the acquisition of pro-social skills such as honesty; cooperation and compliance to rules; deference and obedience to elders and superiors, including older siblings; social responsibility and commitment within the family system and ethnic community; and subordinating individual interests to those of the group in favor of a strong community spirit (Nsamenang & Lamb, 1994; Yovsi, 2003). The goal is to socialize children toward acquiring a “good character.” It is to this end control and regulation is often used in child care. It serves to prevent the child from developing a sense of pride about his own achievement, which would be regarded as “showing off” and a “bad character” (Nsamenang & Lamb, 1994). In an interview study conducted by Otto (2008) during her field work among the Nso, mothers expressed that a good child is one who does not express emotions, especially not negative ones. Mothers reported that a calm child is a child who can be easily taken care of by multiple caretakers and allows the mother to do her chores and fulfill her heavy workload. Otto concludes from her findings that the most adaptive emotion regulation strategy among the Nso children is characterized by avoiding the expression of negative emotions. The above microanalysis of mother-infant interactions contributes to a deeper insight of how infants learn to experience a relatively calm state as positive.

The above examples illustrate how ethnographic knowledge can be systematically integrated in the analysis of infants’ participation in mundane everyday interactions. By sequentially reconstructing participant’s interactional moves, discourse analysis of these interactions can lay open how cultural norms and beliefs are consistently displayed in the way an interaction proceeds.

How important it is to apply ethnographic knowledge to discourse analysis also becomes clear when we try to analyze, for instance, the

following excerpt from the same study. Previous to this sequence, there was an older child in the background shouting the name of the local lineage head. The mother looks up briefly and listens and then laughs and turns again to her baby:

Example 3: Nso24\_t12

|   |         |   |
|---|---------|---|
| 1 | Mother: | Have you heard that Aaron called the Tsenla lineage head? |
| 2 |         | (Talks to others)   |
| 3 |         | dji:ji:ji:  |
| 4 |         | Shall you ever be calling the Ngamanse lineage head?      |
| 5 |         | Shall you ever be calling?                                |
| 6 |         | Shall you ever be calling?                                |

In order to be able to understand what is going on in this sequence, we need to know that the Nso society is highly hierarchically structured and characterized by the centrality of chieftaincy and an emphasis on title and rank as significant political attributes. Titles and offices are important as symbolic capital. Most important titles are hereditary and obtained according to lineage. The lineage head (“faay”) is the economic, political, and spiritual leader of a large lineage. Social interaction is therefore structured by highly institutionalized modes of behavior according to age, gender, and social title. These include terms and forms of address as well as behavioral signs of respect such as bending down, averting one’s eyes, and talking through one’s hands (Goheen, 1996). Given the finely tuned system of deference by which titleholders are given public recognition, it is crucial in everyday life that people know what individuals belong to which ranks. The lineage head is hence a person of high respect, and it is socially entirely inappropriate to call his name in public (Yovsi, personal communication). Moreover, the child who was shouting the name of the lineage head has an intellectual disability. Only with this background knowledge, it is possible to appropriately interpret this interaction.

The mother draws the baby’s attention to what the child with an intellectual disability was doing. By using the form of a rhetoric question starting with the words “have you heard” (line 1), she conveys that the other child’s behavior is unconventional and surprising. She further elaborates on the topic by addressing and repeating a

rhetoric question to the infant (line 5–6). Underlying to this rhetoric question is a social expectation (“I hope you will never do such thing”). The mother hence conveys a social norm of what is appropriate behavior, as well as the expectation of respectful behavior toward the head of a compound. The misbehavior of the older child is, however, not negatively sanctioned despite the fact that it is socially inappropriate. This points to an interpretation that this misbehavior is excused by the disability of the child.

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### **Challenges and Potentials Within the Context of Sub-Saharan Africa**

In this chapter, I have tried to lay out how qualitative research can productively contribute to applied developmental science in sub-Saharan Africa. I have argued that there is a pressing need to know more about children’s everyday experience in this understudied area of the Majority World in order to understand what can be considered healthy child development in this eco-cultural context. Weisner (2000) suggests that three criteria are to be met: well-being, basic support, and sustainable daily lives. However, how, with what specific content, and toward what cultural goals these three conditions should be achieved need to be defined within each specific cultural community. Qualitative research procedures, specifically ethnography and ethnographic discourse analysis, have been suggested to offer a very promising and fruitful avenue to this endeavor.

However, there are several methodological challenges to be met that should be discussed briefly here and that can be subsumed under the term *reflexivity*. *First*, reflexivity also implies the consideration of the interpersonal dynamics between the participants and the researcher. Besides the examination of the influence of the researcher’s social identity and cultural background, as well as her/his assumptions, personal profile, and biography had on the production of the “data,” reflexivity in qualitative research, and

particularly in ethnography and ethnographically informed research, refers also to the consideration that the researcher pays to her/his own personal reflections, irritations, and feelings in the analysis of the data (Mruck & Breuer, 2003).

*Second*, if research involves translation of data, it needs to be explained how language and communication issues were addressed throughout the entire research process. This includes strategies employed to seek understanding from data that originated in a second language; of the role of translation and, if applicable, the role of language assistants and their influence on data assessment and data interpretation; of their fluency in both languages and familiarity with local dialects and regional language practices; as well as of the cultural backgrounds of the researchers (Temple & Edwards, 2002). This is particularly important in studies drawing on discourse and conversation analysis since this kind of analysis requires a significant amount of knowledge about language use and about implicit cultural beliefs and normative values that go beyond the essential content of what participants say. Translation and transcription are never mere technical tasks but always involve interpretation and meaning construction on the part of the researcher, and therefore these processes need to be explained and critically reflected on the documentation of the research project (Temple & Young, 2004).

Finally, while qualitative research generally draws on open procedures and aims at being context sensitive, they still might reflect a cultural bias that the researcher is not aware of. Methodological procedures developed in one cultural context cannot be simply applied to other societies without questioning their appropriateness. This also holds true for qualitative research (e.g., Ping-Chun Hsiung, 2012), and research needs to take into account prevailing cultural norms and values. Conversational practices may be constrained or shaped by culture-specific phenomena such as taboos, which prevent the use of certain words or names and impose restrictions on gaze. Interviewing children and asking them to elaborate on their personal views, for instance, might be a practice that is very much in line with the cultural norms and values in North-American

and Northern European middle-class families. In a hierarchically structured society like the farming Nso, however, children are socialized toward a natural understanding of the importance of social roles and of the hierarchical structure of their society. Rather than elaborating on their personal views, they might be expected to obey and to give the correct answer to adults (see also Harkness and Super, 2008). To insure the cultural appropriateness of data assessment procedures, it is hence crucial to have sufficient knowledge about the cultural norms and taboos in the given society. This can of course be best accomplished if the researcher him- or herself is part of this society or ethnic group or if the researcher has spent sufficient time in the field and works very closely with local colleagues and research assistants. Most research in developmental science is still done by Western researchers, though. In order to increase the number of studies conducted by indigenous researchers, sufficient methodological training in qualitative research is urgently needed. Moreover, local researchers should be encouraged to develop indigenous methodological approaches that might be more suitable to the context under study than procedures developed in Western societies. This is also the aim of *Indigenous Psychology* which tries to understand phenomena from “within” the reference frame of a specific ethnic group (Chakkarath, 2012). It takes a critical stance toward methodological procedures that have been developed in Western mainstream psychology (and particularly for research with highly educated middle-class families) and strive for developing alternative procedures from an emic perspective.

Last but not least, another line of qualitative research should briefly be mentioned here that is specifically useful for applied developmental research has not been the main focus of this paper: *Participatory Action Research* is based on an understanding that research should not only be done for but primarily *with* the people under study (Greene & Hogan, 2005). It has a long tradition within community psychology and social action projects. The outstanding characteristic of action research is its commitment to the active, democratic participation and empowerment of individ-

uals under study as foundation for social change. Procedures range from naturalistic observation, interviews, case studies, surveys, and even experiments. It has a strong potential for developing intervention programs in many areas.

## Clinical, Intervention, and Policy Implications

The epistemological and methodological approaches discussed in this chapter are relevant for the work of early child development teachers, child psychologists, pediatricians, and community health workers. Curricula and textbooks for training psychologists and other professionals in the educational realm need to teach an eco-cultural approach to child development that considers the specificities of the local setting in which it is embedded in. Local experts (pediatricians, advice columnists, social workers, etc.) must be aware that what is healthy and pathological development needs to be (re-)defined for each specific cultural context. That means, for example, that early childhood development (ECD) programs in sub-Saharan Africa need to be appropriate to what is functional in the *local* setting. This requires prior studies on local parenting practices and ethnotheories in order to avoid a host of counterproductive and unintended outcomes. Psychological anthropologists and cultural developmental researchers are therefore urgently needed to be involved. Qualitative research, particularly ethnographically embedded microanalysis of mundane social interaction, can contribute to a better understanding of what healthy child development looks like in cultural context, and from there culturally appropriate educational and intervention programs can be developed.

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# Ethical Issues in Conducting Child Development Research in Sub-Saharan Africa

# 13

Cheryl D. Foxcroft

“One way that we can build a better future for children is by empowering them through allowing them to speak up for themselves. ... we as adults have to guide them and to take ultimate responsibility but that is something quite different from patronizing them. The rights of children must, importantly, include the right to be themselves and to talk for themselves”. (*Nelson Mandela by Himself*, Hatang & Venter (Eds.), 2011, p. 57)

In this chapter ethical challenges in providing opportunities to let the voices of children be heard through conducting child development research in sub-Saharan Africa are contemplated. Development during childhood lays the foundations for and empowers children to be able to actualize their potential during their adult life. Consequently, child developmental research is crucial for understanding how development unfolds and what facilitates and hinders it so that a better future can be built for the children of Africa (Mweru & Ng’asike, 2009).

From the outset of this chapter, it is important to develop an understanding of who is considered to be a “child.” The implications of this understanding for conducting child development research in an ethical way are outlined in later sec-

tions of this chapter. Under the leadership of the United Nations (UN) and in an effort to create consistency regarding the rights and need for the protection of children, a definition of a “child” was agreed to at a range of international conventions (e.g., UN Convention on the Rights of a Child). This definition was accepted in Africa and is captured in the *African Charter on the Rights and Welfare of the Child* (OAU, 1990). In Article 2 of the African Charter, a child is defined as being “every human being below the age of 18 years.” In the light of this, a person under 18 years of age is considered to be a child or minor, with 18 being the majority age in many African countries. According to Schenk and Williamson (2005), the majority age is the “age at which an individual becomes a legal adult and gains full legal rights, such as the right to vote” (p. i).

Children under the age of 18 comprise about half of the population of sub-Saharan Africa (SSA), and about 42% of the SSA population are under the age of 14 (Deutsche Bank Research, 2013). African children experience a diversity of cultures, languages, geographic regions, socio-economic conditions, and so on. While some African children grow up in developed world contexts, the majority grow up in a developing world context. According to Mweru and Ng’asike (2009), “African children are the most disadvantaged in the world, with 43% of them living in extreme poverty in sub-Saharan Africa” (p. 60).

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Consequently, the African continent provides many and varied opportunities for conducting child development research, the results of which significantly add to the body of knowledge of cross-cultural child development and can contribute to enhancing the quality of life of African children, especially for those who grow up in adverse conditions (Mweru & Ng'asike, 2009). However, in the face of these opportunities, there are many challenges that confront child development research in Africa.

Some researchers argue that there is a tendency in child development research to problematize African children (Shung King, September, Okatcha, & Cardoso, 2006) and stigmatize communities (Moodley & Rennie, 2011). Largely driven by the concerns of external funders to address the well-being of children, there has been a great investment in researching the impact of poverty, poor health and health care, lack of adequate education, and so on, on the development of African children (Arojjo & Nyonyintono, 2009). In doing so, there has been less focus on the rich sociocultural milieu, unique to Africa, in which African children develop and strive to actualize their potential. It is argued that the body of developmental research in Africa, and indeed the world, is poorer for not focusing more on the latter, that is, normal development and resilience, rather than developmental deficiencies as a result of adverse circumstances. "There is need to invest in understanding the unique and rich sociocultural milieu in which African children are raised and how that makes them the people they are and are capable of becoming" (Arojjo & Nyonyintono, 2009, p. 27).

Concern has been raised that as it is cheaper to conduct studies and easier to get people to participate in research in Africa, it is possible that vulnerable African children and their communities could be exploited (Lang, 2012). It is argued further that conducting effective and ethically responsible child research is challenging (Moodley & Rennie, 2011). Schenk and Williamson (2005) assert that while child research draws on the internationally accepted ethical principles, additional care needs to be taken and strategies employed to ensure that chil-

dren are not unintentionally harmed during the research process. This chapter focuses on the key ethical challenges that confront child development researchers in Africa. While some of the methodological and ethical challenges experienced in Africa are common in child development research around the world, some have a uniquely developing world or African flavor to them. Examples from the field are used to illustrate some of the typical ethical challenges encountered in child development research in SSA and some of the ways that researchers are trying to responsibly respond to them. Consideration is first given to the principles that guide ethical research practice internationally and in Africa. Thereafter, each principle is considered in turn with respect to how to give effect to them and how to navigate the ethical challenges or dilemmas that arise in research practice. Lastly, enabling factors that facilitate ethical research practice are discussed. Many of the authors cited are either from the African continent or have gained insight into child research in Africa through international studies or through the work of their students that come from the continent. This approach was followed to amplify the voices of African child researchers.

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## **Child Research Ethics and Challenges**

### **Ethical Research Practice with Children**

#### **Why Additional Precautions Are Necessary in Child Research**

Many authors argue that children need to be protected in the research process as they are considered to be a vulnerable group. "Children are considered to be vulnerable in research as they hold insufficient power, intelligence, education, resources, strength, or other necessary attributes to protect their own interests" (Jelsma, Burges, & Henley, 2012, p. 56). Fombad (2005, p. 105) concurs and adds two further "unique vulnerabilities" of children participating in research. These are "their ambiguous legal

status as minor that both protects and limits their rights” and that the risks of doing harm as a result of the research are “multiplied in the case of children because of their immaturity” (Fombad, 2005, p. 105). As parents or guardians formally decide on whether children participate in research, children have limited power to raise their voice when assenting to and participating in research studies. Given that the researcher possesses more power than the child in a research relationship, it is essential that the researcher stringently follows ethical research practices. Furthermore, the researcher needs to realize that ethical considerations adopted in research with adults cannot merely be applied to child research without additional measures to protect the rights of children (Bwakura-Dangarembizi et al., 2012; Schenk & Williamson, 2005).

### Principles Underpinning Ethical Research Practice with Children

Ethical principles serve the purpose of guiding the practice of research to ensure that whatever is done should be in the best interests of the participants and should not cause them undue distress or harm. Fombad (2005) argues that while ethical considerations have always been taken into account with human participants, the current principles that are applied in research originate from the *Nuremberg Code* and the *Declaration of Helsinki*. The *Declaration of Helsinki* (World Medical Association (WMA), 2008) was adopted in 1964, and more recent amendments (e.g., 2008) include more specific reference to the application of the principles with child participants. While the *Declaration of Helsinki* was adopted by the World Medical Association, the principles are universally applied in a range of research contexts and disciplines and not only in the context of medical research.

It is customary that national bodies, professional bodies, research institutions, universities, and so forth draw on the generally acceptable universal principles for child research when proposing and crafting their ethical guidelines. In many African countries, four principles are seen as being the key ones that underpin ethical

research practice. For example, in South Africa (Medical Research Council of South Africa, 2001) and Zimbabwe (Fombad, 2005), these four key ethical principles are outlined as follows:

1. *Respect for persons* (alternatively referred to as “autonomy”) in that participants should be respected as being autonomous beings. They should thus participate in research voluntarily and be sufficiently informed to be able to decide whether to participate in the study or not (i.e., provide informed consent). In addition, those with diminished autonomy (i.e., those who do not have the capacity to reach informed decisions) should be protected. In the case of children as research participants, this needs to be done in an age-appropriate way, and while children can assent to research, the parent or legal guardian must give consent.
2. *Non-maleficence* or “first do no harm” implies that researchers need to avoid any harm to participants whether unintentional or intentional and also minimize the risk of potential harm. In the case of children, the researcher needs to anticipate potential negative consequences prior to the start of the study and take steps to minimize this so that the child participant does not experience direct or indirect harm during the study. If the anticipated negative consequences cannot be reduced to an acceptable level, the study should not be conducted.
3. *Beneficence* in which it is the researcher’s responsibility to “always put the best interests of the child first by promoting and protecting their wellbeing” (Schenk & Williamson, 2005, p. 2). This principle goes hand in hand with the principle of non-maleficence. Researchers must plan and conduct their research with children “in a way that maximizes possible benefits and minimizes possible harms” (Fombad, 2005, p. 108).
4. *Justice* in which researchers must treat participants fairly and in a nondiscriminatory way and find a balanced answer to the question “Who ought to receive the benefits of the research and bear its burdens?” (Medical Research Council of South Africa, 2001, p. 87). Research benefits and burdens must be

distributed equitably among participants or communities. This is why this principle is sometimes termed “distributive justice.”

It should be noted that in the international literature, the above four principles are often collapsed into three, namely, *respect for persons*, *beneficence*, and *justice*. The reason that “non-maleficence” is not listed separately is that it is combined with beneficence into one principle indicating that whatever is done must be done in the best interests of the child (beneficence), and no harm should be done to the child (non-maleficence) (Schenk & Williamson, 2005). It is interesting to speculate why in Africa, non-maleficence and beneficence are often separate principles. Could it be because of the potential risk of exploiting vulnerable African communities and children in research studies?

Researchers thus need to be aware of and adhere to local, national, and international laws, regulations, and ethical guidelines when conducting research. For example, researchers need to ascertain what body needs to provide ethical approval for their study, as in most African countries, formal in-country ethics review and approval is needed, even if ethics approval has been obtained by an ethics review body external to Africa (Bwakura-Dangarembizi et al., 2012).

Is it sufficient to have national, institution-specific, profession-specific, and so on ethical guidelines in place and have mechanisms to facilitate their implementation such as ethics review boards or committees? Morrow (2009) argues that while the key ethical principles outlined above are universal, there are “many subtleties and diversities, and the contingent aspects of how principles are understood, interpreted and practiced can vary from place to place” (p. 1). In reality, Morrow (2009) contends that the practice of these principles in different contexts is largely determined by how researchers navigate between what is in the best interests of the child, parents, and community and the purpose and aims of the research study.

Increasingly, emphasis is being placed on the fact that to conduct research in an ethical way is more complex than merely applying a set of ethi-

cal principles and obtaining ethics clearance for a study. It involves a way of practicing research that “might be seen as an ongoing process of questioning, acting and reflecting, rather than straightforward application of general rules of conduct” (Gallagher, 2009, p. 26).

Morrow (2008) argues that “[i]t is difficult for researchers to anticipate what ethical dilemmas will arise during the course of the research, so that seeing ethics as situational and responsive is important” (p. 56). Powell, Graham, Taylor, Newell, and Fitzgerald (2011) contend that researchers respond to ethical challenges based on personal experiences and contexts as well as the training that has shaped their ethical behavior. When confronted by an ethical dilemma, researchers should be flexible and try to find a balance among the four ethical principles outlined above. This is easier said than done, especially in multinational and multidisciplinary research conducted in community contexts (in the field) where a range of ethical codes and regulations together with the norms and customs in a community and the researcher’s own sense of ethical research practice need to be taken into account. This can often be a bewildering experience as can be seen in the following example.

Gune and Manuel (2007) recount how as post-graduate international students at a South African university, they conducted studies with young people in their home city of Maputo, Mozambique. When developing their research proposals, they had to demonstrate compliance with the university’s research code of ethics as well as the ethical guidelines for conducting research in their discipline of anthropology. However, it was only as they were preparing to implement the study that they reached the disturbing “realization that they would be using a code of ethics produced and informed by a cultural order different from the one practiced in the social and cultural context where the study would be developed” (p. 3–4). In addition, they realized that there was a possibility that the ethical considerations included in the study for ethics approval purposes at their university could clash with those of the participants in the community where they would collect data and even with their own ethics. They



thus started questioning whose ethics would be the overriding determinant regarding how the study was conducted. They soon realized that there was no predetermined answer. Instead, the complexity and dilemma of navigating among university and professional ethical codes, the values and norms of participants, and their own sense of ethics needed to be confronted and solved during the research process. Gune and Manuel (2007, p. 9), in their words, “survived” and “adjusted” their data collection. This they achieved through critical questioning, respecting and listening to the voices of the participants, personal and joint reflection as fellow researchers working in the same field, and consultations with their supervisors. They cite “the need to negotiate ethics from the fieldwork in Maputo City rather than strictly follow professional ethics derived from different socio cultural contexts” (p. 9) as the most important thing they learned from their experience.

Mindful of both the importance of ethical practice and the complexities and dilemmas of “whose ethics” applies when conducting child research in Africa, the next sections will elaborate on the more specific challenges related to applying the principles of *respect for persons*, *non-maleficence*, *beneficence*, and *justice*. Case studies and practical examples will be used to both highlight the challenges and contemplate innovative ways that they could be responded to.

### Showing Respect to Children: Ethical Challenges

Demonstrating respect to minor children in the research process requires a special effort on the part of child development researchers. In this regard, challenges related to the need to involve children in the research process, informed consent, anonymity, confidentiality, and privacy will be raised.

### Involving Children in the Research Process

In the quote at the start of this chapter, Nelson Mandela stressed that children “have the right ...

to talk for themselves” (Hatang & Venter, 2011, p. 57). In this regard, Powell, Fitzgerald, Taylor, and Graham, (2012, p. 3) assert that the notion of giving effect “to children’s voice and representation in research is an emerging theme in the literature.”

In their review of child research in Africa, Arojjo and Nyonyintono (2009) conclude that the “voice” of the African child has largely been minimized and is mainly “heard” through the “voice” of the adult. They view this as being a consequence of “portraying children as dependent, immature and incapable of assuming responsibility” (p. 26). As a consequence, adults tend to speak for children. Abebe (2009) concurs with this view.

The extent to which children are given a “voice” in research can be conceptualized as a continuum consisting of four categories, namely, research on, about, with, and by children (Arojjo & Nyonyintono, 2009; Powell et al., 2012). In research on children, there is no input from the child who is treated as the object of study. This often occurs in studies dealing with clinical and psychological matters but sometimes also in intervention studies. Arojjo and Nyonyintono (2009) report that 33% of the child studies conducted in Africa which they reviewed fell in this category. On the other hand, Arojjo and Nyonyintono (2009) maintain that research about children “involves the exploration of children’s issues with adults speaking on behalf of the children” (p. 36) and that 29% of the studies they reviewed could be classified as being where adults spoke on behalf of children. These studies tended to make use of secondary data sources such as newspaper reports, or they fell in the policy-making category, where the voice of the child was less likely to be included. In contrast, children are actively involved in contributing data in research with children. As the volume of childhood studies has grown over time, so too has the “recognition of children as competent, social actors and ... the importance of listening to children’s views” (Powell et al., 2012, p. 9). Twenty-four percent of the African child research studies reviewed by Arojjo and Nyonyintono (2009) could be categorized as research with



children. Depending on the methodological approach adopted, there are various ways that children can give effect to their “voice” in research. For example, they can be interviewed, observed, or recorded during play and then be asked to comment on aspects of their behavior afterward; be assessed on a psychological or educational test; make a visual representation of something and provide an explanation of it; and so on. An extension of research with children is research by children. In this instance, children are actively engaged in various aspects of the research process and could be viewed as core-researchers (Powell et al., 2012). This could entail children making input into the research questions, the design of the study, and choosing the methods or measures to be used to collect data. Kellett (2010) observes that research by children can open up new insights as children “observe with different eyes, ask different questions and communicate in fundamentally different ways” (p. 195).

What are the views of children about their active participation in research studies? In an international survey conducted by Powell et al. (2011), children placed more importance on sampling their views than did researchers, professionals, funders, and policy-makers.

Given the richness that active participation of children in research can bring, Arojjo and Nyonyintono’s (2009) findings that the majority of child studies in Africa do not include the “voice” of children are somewhat disturbing. Nonetheless their findings also indicate that almost a quarter of the studies actively involve children in participating in a research study, which is an encouraging albeit relatively new trend (Powell et al., 2012). Researchers need to intentionally plan and constantly reflect on how to give effect to children’s “voice.”

While there is strong motivation to follow a child-centered, inclusive approach in child development research (Powell et al., 2012), such an approach is not without its challenges. There are two main, related challenges. The first is to grapple with creating a space for children to articulate their views or provide input in an authentic way despite the power imbalance between them and

the researcher. Among the suggestions to address this challenge is for researchers to adopt a friend-like, facilitative approach, which has been found to be useful in the African context (Abebe, 2009). The second challenge is the need to appropriately represent and derive meaning from the children’s input. It is argued that the children’s input represents the data that must be analyzed and reflected on to bring children’s voices to the fore rather than to perceive their words as being “the definitive descriptions of empirical phenomena” (James, 2007, p. 269). In addition, children may sometimes not want to express a view on something. Grappling with the significance and meaning of such silences can provide a rich source of information, which should not be ignored by researchers. Among the suggestions to address this challenge are for researchers to adopt a critical, reflexive stance (Hunleth, 2011) and to acknowledge, record, and reflect on silences (Powell et al., 2012).

In giving effect to the ethical principle of respect for persons, researchers thus have to grapple with how to demonstrate respect in terms of how children are involved in the research and how to best make their “voices” heard. A further key way to demonstrate respect is through the practice of informed consent. This is the topic of the next subsection.

### **Informed Consent**

Flewitt (2005) considers “informed consent” to be a problematic term and in turn proposes the term “provisional consent.” “‘Provisional consent’ is ... ongoing and dependent on the network of researcher/researched relationships built upon sensitivity, reciprocal trust and collaboration” (p. 4). After this initial, provisional consent, ongoing consent needs to be continually negotiated. Morrow (2009) concurs with this and argues that consent is a process not an event. This view that consenting to research is an ongoing, negotiated process underpins the various matters raised in this subsection.

As children under the age of 18 are minors, the usual ethical convention is that a parent or legal guardian needs to provide *proxy consent* for a child to participate in a research study and a

child should assent to such participation. Nonetheless, Powell et al. (2012) stress that the matter of informed consent in child research ethics has been and continues to be the subject of much debate. In grappling with this issue, this subsection will focus on whether it is appropriate to assume that consent can only be provided by those who are 18 years and over, challenges when there is not a parent or legal guardian to provide proxy consent, procedures followed and form of the consent, providing appropriate information about the research study, and seeing consent as an ongoing process that needs to be renegotiated throughout the study.

### **The Age at Which a Child is Capable to Consent or Not**

As pointed out in the “Introduction,” the definition of a child is solely linked to age, namely, a person younger than 18 years, which corresponds to the majority age in most countries. However, researchers should ascertain the majority age in the country where they are conducting research. For example, Fombad (2005) reports that the majority age in Botswana is 21. Below this age a young person is still a minor, which has implications for consenting to participating in a research study.

Ethical codes, laws, or regulations often mandate that, to protect the minor/child, a parent or legal guardian must consent to a child participating in a research study. For example, the South African *National Health Act* (No. 61, 2003) protects children who participate in health-related research by mandating consent from a parent or legal guardian for all participants under the age of 18 (Strode and Slack, 2011; Zuch, Mason-Jones, Mathews, and Henley, 2012). Conversely, South African Children’s Act (2005) recognizes that, with increasing age, children have an evolving capacity to consent independently to a range of health-related interventions (Strode & Slack, 2011). Where the child does not have sufficient capacity to consent to interventions independently, parents, legal guardians, or even those with no parental responsibilities such as caregivers can give consent (Strode & Slack, 2011). This opens the debate around at what age a child has

the capacity to consent and why the age of 18 is strictly enforced in research studies when at a younger age a child can consent to a health-related intervention.

The 18-year age span of a child represents a very heterogeneous life stage from a developmental perspective. It can be argued that the limitations related to the capacity to consent for 5–7-year-olds are far less for 12–17-year-olds. However, Fombad (2005) cautions that while some risks associated with children’s capacity to protect their rights in research decrease with age, others increase with age (e.g., if an adolescent is confronted with finding explanations for poor school performance, their self-confidence could decrease). Furthermore, Zuch et al. (2012) add that some research (e.g., adolescent sexual and reproductive research) may not be possible or the findings could be skewed if parents or guardians have to give consent.

To complicate matters further, given the scourge of HIV/AIDS in Africa, some households are headed by children as both parents have died. According to the Children’s Act (2005) in South Africa, a child who heads a household and is over the age of 16 can give consent for the medical treatment of children in his/her care. Yet, according to laws and regulations pertaining to research, this 16-year-olds will not be able to consent to participating in a research study as he/she is still classified as a minor who does not yet have the capacity to independently consent (Strode & Slack, 2011).

It is clear from the issues raised above that there is a tension between, on the one hand, protecting children and adolescents from being psychologically or physically harmed as a result of participating in a research study, and, on the other hand, respecting the autonomy of the young person to decide for him- or herself to consent or not. Rather than to rigidly determine the age at which a child/minor is competent to give informed consent, it might be wiser to recognize that a child’s competence to consent is linked to a complex interaction of the child and their level of maturity, their context, and the nature of the decision that needs to be made and thus the age at which a child could be capable of consenting

could vary. With this in mind, Zuch et al. (2012) propose that, after providing information about the research study, children could be tested to see if they have understood what the research is about when determining if they are capable of consenting or not. However, to date, ethical codes and laws pertaining to research continue to apply the rule that formal proxy consent needs to be provided by a parent or legal guardian, while children under the age of 18 should assent to participating in a research study. It is worth noting that engaging children to assent to participate in the study or not, nonetheless gives some effect to the principle of showing respect by actively involving children in age-appropriate decision-making about something that affects them and to have their voice heard (Schenk & Williamson, 2005).

### Who Can Provide Proxy Consent?

The ethical requirement that only a parent or legal guardian can give consent for a child to participate in research poses a major challenge and dilemma for child development research in Africa (Bwakura-Dangarembizi et al., 2012; Strode & Slack, 2011). Why?

Foxcroft (2011a) notes that it is not uncommon for parents to move to urban areas to secure work while leaving their children in the care of their grandparents or other extended family members in rural villages or elsewhere. While it is still preferable to seek out the parents to obtain informed consent, this is often a challenge and is sometimes impossible as access to postal services and telecommunications remains a challenge in deep rural areas. This raises the question whether ethical guidelines for child research should make provision for caregivers or extended family members to provide consent. This question will be echoed throughout this subsection.

Informed consent is even a greater challenge when the child is orphaned. According to the United Nations Children Fund (UNICEF) (2006), by 2010 it was estimated that about 53 million children in Africa were orphaned. Put another way, 12% of children living in Africa are orphaned. This figure varies per region. In ten countries, seven of which are in Southern Africa,

15% or more of the children are orphaned. In Zimbabwe and Zambia, 20% or more of children are orphaned. While the number of orphaned children has been decreasing in many developing regions (e.g., Asia and Latin America) since 1990, the number of orphans in Africa has doubled during this period. Extended families, and especially grandparents, largely care for these orphans. Less than 1% of orphaned and vulnerable children in Africa live in child-headed households. However, this also varies per country as in South Africa, for example, about 3% of orphaned children (i.e., 98,000) live in child-headed households (Holborn & Eddy, 2011). Mupenda (2012) further reminds us that many orphaned and abandoned children live in street communities and that with street children “questions of informed consent are problematic ... as there is often no legal guardian to give permission” (p. 2).

One could argue that the large number of orphaned, abandoned, and street children that are without parents or legal guardians can easily be rectified by following the legal process to appoint guardians. However, while a third party can be appointed as guardian for an orphan, because of the length of time that it takes and high legal costs, the process is not always concluded. Consequently, Bwakura-Dangarembizi et al. (2012) contend that in Zimbabwe, for example, the legal route to obtain guardianship is not really pursued. Instead, the extended family consults, and the child is placed in the care of a relative or another person in the community. Researchers should be aware that whether “caregivers” can provide proxy consent may not always be made explicit in ethical codes of conduct and may differ from country to country and in terms of the research questions posed.

Bwakura-Dangarembizi et al. (2012) provide an interesting example of how they dealt with the issue of caregivers providing proxy consent. They were involved in research related to clinical trials for the Antiretroviral Research for Watoto (ARROW) project in Uganda and Zimbabwe. They found that 30% of the potential child participants were orphaned. In most cases the child was cared for by a caregiver who wanted the child to participate in the study.

However, as there was often not a legal guardian for these children, informed consent became problematic. The researchers were perturbed that these children would have to be excluded. They thus informed the Ethics Committee “of the challenges that were being faced and how the legal requirement could potentially disadvantage this group of children who were already vulnerable by virtue of being orphans” (p. 4). The Ethics Committee had to weigh up potential loss of benefits to the child and caregiver, what was in the best interests of the child relative to complying with the requirements of the law for consent to be provided by a parent or legal guardian. After deliberation the committee decided “to provide a ‘waiver’ of the legal guardianship requirement, but requested that care-givers sign an affidavit stating that they understood the high level of commitment required of them during the ARROW clinical trial” (p. 4). In addition, as the researchers implemented this decision, they tried to engage extended family members and not just the caregiver of the orphaned children when providing information about the study and obtaining proxy consent. Bwakura-Dangarembizi et al., (2012, p. 5) refer to this as a “family-centered approach” to decisions about informed consent.

About 40% of the children who participated in the 15-month ARROW trial were orphans for whom proxy consent was obtained from the extended family and caregivers. Interestingly, as the trial was conducted over an extended period, six children lost a parent or guardian during the course of the study, and the same process was followed to obtain re-consent by engaging with extended family members and the caregiver. The approach followed provides a useful example of how to be sensitive to the realities that confront the researcher and to innovatively navigate among the benefits to the child, the goals of the study, and ethical and legal requirements.

In the light of their experience, Bwakura-Dangarembizi et al., (2012, p. 5) concluded that “[a]n ethical approach that is culturally sensitive and yet adheres to universal ethical standards of child health research ... should be adopted in the development of an ethico-legal framework that

guides research-involving children.” Strode and Slack (2011, p. 69) concur with this in suggesting that ethical guidelines should be refined to “recognize a broader range of adults eligible to provide proxy consent in some instances,” especially for minimal-risk research.

There is a further matter to consider in this subsection on who can provide proxy consent for children. The notion of informed consent provided by individuals may be a foreign concept in collectivist cultures in many African countries. In such countries, the community and not the individual is foregrounded. Consequently, one could ask, “should the community and not the individual consent to participate in a research study?” Morrow (2009) points out that, as most social science research requires data to be collected from individuals, even if the data is to be aggregated to describe child development for an age group in a community, for example, consent for individuals to participate in the research study is still an important ethical requirement. Nonetheless, to be sensitive to the value that collectivist cultures place on “community,” there is a process of engaging community leaders and elders in the initial seeking of permission to conduct research in the community, getting them to assist the researcher to gain entry into the community to explain what the study is and to remind parents and children on an ongoing basis about how the various research activities link to the study’s purpose as well as the fact that the child can withdraw at any point (Morrow, 2009).

Furthermore, as was indicated in the Zimbabwean example cited above and as has been outlined by Shaibu (2007) in Botswana, decisions about proxy consent can involve engaging extended family members as well as caregivers by following a family-centered approach. So, to be sensitive to the collectivist culture in African countries, it is preferable to broadly engage with and inform appropriate community stakeholders about the research as well as involving extended family members about decision-making regarding consent while nonetheless gaining appropriate informed proxy consent from parents, guardians, or caregivers and assent from children as part of an ongoing process.

### Providing Information to Inform Decision to Consent or Not

Before deciding whether or not to give consent, potential participants need to know what they are consenting to. Parents, caregivers, and children have the right to have the research study explained to them in a way that they can understand what the study aims to achieve and whether there are risks involved in participating. In sharing information to obtain consent/assent, researchers need to be clear about the direct benefits of the research to the child. In most instances, the direct benefits are small. Instead, the research findings might benefit large groups of children in time if the findings influence policy-making and educational and child health services' planning. In addition, it should be indicated that potential participants are neither obliged to participate nor will they experience any negative consequences if they do not participate. The fact that they can withdraw from the study at any stage should also be indicated.

Given that data archiving is commonplace in our digital age, it is possible that at a later stage, a secondary analysis could be undertaken for another or a follow-up study, which could not be foreseen at the time of the initial research study. To ensure that ethical practice is followed, it is thus wise to include information that data will be stored and could be used for secondary analysis purposes when seeking informed consent. Potential participants should be assured that the data that is stored will not contain identifying information (e.g., names), will be securely stored, and will be treated as being confidential.

The usual guideline included in most ethical codes internationally as well as in Africa is that information about the study with a view to obtaining consent should be provided in writing in a language which is accessible to potential participants. For adults, written information is normally provided in a letter. Where information about the research is provided to children, who are able to read, it is often presented in the form of a leaflet with the information provided in an age-appropriate, appealing way (Powell et al., 2012). In addition, a consent form must be provided to the consenting person who must complete and sign it, especially where active, written consent is

required. This will be explored further in the next subsection.

Research information letters are often posted to potential participants or sent home with children from school or the local health clinic. Mathews et al. (2005) argue that these methods could be somewhat problematic. They interviewed parents who had given active consent for their child to participate in a study and found that only 65% of them had received the information letter and consent form. Follow-up interviews were also held with some of the parents who had dissented. The majority of those interviewed would have liked their child to participate, but they did not receive the information letter and consent form. The findings of Mathews et al. (2005) suggest that researchers need to ensure that information reaches all potential participants, otherwise response rates could be low, children who could have been included will be excluded, and erroneous conclusions could be reached about the extent of refusal to participate.

In addition, Zuch et al. (2012) note that given the low literacy rates in Africa, especially in rural areas, written research information is problematic and inaccessible for some adults. It could be argued that in Africa, providing written information about the research study is a necessary but not a sufficient condition to ensure that those providing proxy consent and children are appropriately informed. "Evidence suggests that the combination of written information supplemented with face-to-face interaction is the most desirable method of ensuring an informed decision" (Medical Research Council of South Africa, 2001, p. 22). Gallagher, Haywood, Jones, and Milne (2010) concur with this by advocating that in addition to written information, researchers should verbally explain the purpose and nature of the research to those who need to consent and to children. This also provides an opportunity for potential participants to ask the researcher questions of clarity as Gallagher et al. (2010) and Mathews et al. (2005) assert that misunderstanding research information could lead to refusal to participate. For illiterate adults, an oral presentation of the information about the research study represents the only way that they



can gain an understanding of it. Face-to-face discussions with those who must provide proxy consent are often done in a group context in community settings when conducting child research in Africa. This method is also useful in terms of getting community buy-in for the study. Interpreters should be available if the researchers do not speak the language(s) of the potential participants.

Once everything possible has been done to ensure that potential participants are appropriately informed, sufficient time should be allowed (e.g., 24 h) for parents, guardians, and caregivers to mull over the information and decide whether to give consent.

### Giving Consent or Dissent

A key aspect in giving effect to informed consent is to consider how consent is demonstrated or given. Essentially, one of two approaches is followed (Powell et al., 2012; Zuch et al., 2012). The first approach is where the person giving consent is provided with the necessary information and time to consider whether to consent to the child participating in the study or not. To indicate consent, consent forms have to be signed by the consenting person and returned to the researcher, whereas forms that are not returned are assumed to indicate a refusal to participate (dissent) (Jelsma et al., 2012). This approach is termed *active consent*. This approach requires greater involvement of the consenting person in the research process as it is assumed that they have taken the time to read or listen to the information, develop an understanding of the research project, and complete and sign the necessary forms. In the second approach, the consenting person is provided with the relevant information about the study, but it is assumed that they will answer affirmatively unless they indicate otherwise. In this instance, the consenting person only has to respond if they dissent (do not agree that the child should participate), while implicit consent is assumed on the part of those who do not respond. This approach is referred to as *passive consent*, as, if the consenting person agrees that the child can participate, they do not have to do anything. When comparing these two approaches,

active consent requires the consenting person to “opt in” to agreeing that the child can participate in the study, while in passive consent, the consenting person only has to indicate if they “opt out” of allowing the child to participate (Jelsma et al., 2012). According to Powell et al. (2012), researchers prefer the passive, opt-out method of proxy consent together with active assent from children. It is nonetheless argued that while passive consent might be the easier option to follow, it is ethically more risky as the consenting person is not actively engaged in the process.

In a sense, engaging the consenting person actively in the consent decision-making process upholds the principle of respect for persons/autonomy. It is thus not surprising that some ethical codes and laws, in an effort to protect vulnerable children in research, require active consent. For example, section 71 of the National Health Act (2003) “mandates *active written consent* from a parent or legal guardian for all research conducted with subjects under the age of 18” in South Africa (Zuch et al., 2012, p. 2).

In the case of active informed consent, such consent must be made explicit. “Consent may be given in written format, verbally and audio-taped, or videotaped” (Medical Research Council of South Africa, 2001, p. 35). Consent options other than a written format are very important in Africa where low literacy rates and oral traditions make verbal consent a meaningful option (Arojjo & Nyonyintono, 2009). Where face-to-face verbal consent is provided, with the permission of the consentor, it is advisable to include an observer such as a fellow researcher to attest to the informed consent given. Where the verbal consent is audiotaped or videotaped, the consentor needs to give permission for this and needs to be assured that this information will be treated as being confidential and that the recording will be securely stored.

Nonetheless, although explicit active consent is perceived to be the best approach to follow from a research ethics perspective, researchers need to be aware of some of the challenges and pitfalls that can arise. Requiring active parental consent could result in higher nonresponse rates and a biased sample. Some parents might be



more inclined than others to take the trouble to read the information letter and complete the consent form, while other parents might never receive the information about the study and might not be able to read the information because they are illiterate or comprehend information provided in their second or third language or be able to attend a meeting to outline the research study as they cannot take time off work. Jelsma et al. (2012) and Zuch et al. (2012) contend that this could mean that those who could benefit most from the research are excluded from the sample, which could bias the findings of the study and limit its generalizability.

Mathews et al. (2005) interviewed parents who had given active consent for their child to participate in a study and found that many indicated that they were unaware of the content of the information letter despite having signed the consent form in the affirmative. This strengthens the argument that not only should additional effort be put into how parents are informed (see the previous subsection) but also that consent giving should be an ongoing process in which, in this instance, those giving consent are constantly made aware of the research study and the activities involved in conducting it.

Why do parents and children sometimes refuse participation (indicate dissent)? Zuch et al. (2012) suggested that low literacy rates in Africa as well as cultural and language differences can impact negatively on the ability of potential participants or those who must provide consent to be fully informed about the nature of the study and its potential benefits and risks. Furthermore, parents and children sometimes refuse to participate in a study due to fears and local myths that develop about the researchers. Parents could fear that the researcher will abduct or indoctrinate their child with different political or religious views. In countries with ongoing wars between rival political/ethnic groups, the researcher could be seen as being a member of a rival group that is trying to infiltrate the community. For example, in Ethiopia, researchers and fieldworkers in the Young Lives project were sometimes viewed with suspicion as they were perceived to be associated with the

government (Morrow, 2009). Such suspicion is more common if the site where the research is being conducted has been the recipient of government interventions and promises that have not materialized. In such an instance, people find it difficult to distinguish between research and intervention. Based on their research in Kenya and South Africa, respectively, Nyambedha (2008) and Ebrahim (2010) concur with this and add that participants are likely to have expectations that involvement in the study would enable them to access resources and interventions that would be of benefit to them.

### **Informed Consent Should Be Given Without Coercion**

When parents, guardians, or caregivers consent and children assent to participate in a research study, researchers need to ensure that they have voluntarily agreed to participate and not because they feel coerced to do so. This poses some challenges due to the power imbalance among the child, consenting adults, and the researcher. Especially in child research, it is not easy for researchers to confidently indicate that a child has freely assented to participate in a research study. In this regard, Gallagher et al. (2010, p. 479) observe that “children’s consent must be seen in the context of constraints, obligations and expectations over which researchers have little control.”

Researchers and fieldworkers need to be aware that children are largely brought up to respect adults and do what adults ask of them. Consequently, researchers should take care that children do not feel that they have to agree to participate in the study just because an adult is asking them to do so and their parents have agreed (Cree, Kay, & Tisdall, 2002). This is particularly challenging in school settings. If the principal indicates support for the study, parents and children could find it very difficult not to consent. Furthermore, as the school setting requires that children obey adult authority figures, it is very difficult for a child to refuse to participate (Powell et al., 2012).

There do not seem to be too many solutions to address the issue that it could be difficult for children to freely consent. Among those suggested

are to engage the children in an ongoing process of negotiating consent and reminding them that they can withdraw at any stage. In addition, Powell et al. (2012, p. 21) urge researchers “to be vigilant in attending to children’s visual, verbal and non-verbal cues to monitor unspoken expressions of unease or dissent.” If the researcher finds that the child is showing signs of being uncomfortable, sensitivity can be shown by engaging the child in conversation about this and, if needs be, reminding the child that he/she can change their mind and withdraw from the study. Researchers could also have supportive psychological services available should a child decide to withdraw. This will enable the child to work through any negative and guilt feelings that they might have as a consequence of the study itself or their withdrawal from it. In this way effect is also given to the principle of non-maleficence (i.e., not harming the child).

In addition, in obtaining informed consent/assent, issues of privacy, anonymity, and confidentiality need to be addressed. These are discussed in the next subsection.

### **Privacy, Anonymity, and Confidentiality**

Researchers need to protect the identity of children and the information that they provide during the course of the study and also when disseminating the findings.

It is not always easy to find a location or venue to gather data that allows for *privacy*. When research is conducted in a school setting, it is often difficult to find a venue that is sufficiently quiet to allow for meaningful interaction with a child but also sufficiently soundproof so that the interaction cannot be overheard by passersby (Powell et al., 2012). Similar issues related to questions about privacy and confidentiality are raised in home-based research (Moodley & Rennie, 2011). While children may feel more at ease being interviewed or assessed in their home, more interruptions are likely, and finding a quiet, private space when a family might live in a room is challenging (Gorin, Hooper, Dyson, & Cabral, 2008).

Nonetheless, even if a reasonably private space can be found, Abebe (2009) points out that in Africa it is not uncommon for parents, extended

family members, and children from the village to attend an interview with a child participant. This could be linked to the inferior social status of children and the fact that parents, family, or community members are anxious that children answer the questions correctly. Abebe (2009) addressed this dilemma by conducting interviews in Ethiopia in less secluded and more public spaces such as markets and tea houses. To confirm and expand on this challenge that arises in practice, Schenk and Williamson (2005) relate the perspective of a researcher who was a “foreigner” to a village and experience that members of the village community (including children) crowded around the house where the child was being interviewed as they wanted to listen to what was happening. The researcher found it difficult to disperse them and was concerned that this could have influenced the child to give “community-appropriate” responses (Schenk & Williamson, 2005, p. 53). In these circumstances the researcher felt that interviewing the child out in the open under a tree, for example, provided community members the opportunity to see what was happening. Yet, because the researcher was able to control how far away the community members had to be if they wanted to watch, they were positioned far enough away so that they could neither hear the interview questions nor the child’s answers. While in the examples provided by Abebe (2009) and Schenk and Williamson (2005), having interviews in open spaces might address the problem of how to handle the inquisitiveness of the family and community and solve the dilemma of the child responding in a community-appropriate way, it raises a further dilemma of revealing the identity of the participant. Researchers will have to weigh the solutions to the different dilemmas up to decide how best to balance the needs and rights of the child, being sensitive toward the family and community and ensuring that the research findings are not compromised.

Other than paying attention to issues of privacy, to ensure that no negative consequences arise from children participating in a study, researchers can and ideally should employ the principle of anonymity. Anonymity is especially

important where sensitive personal information is gathered (e.g., about the HIV/AIDS status of an adolescent or political views). In the case of “fully autonomous” data collection, no identifying details are collected or recorded so “that the identity of participants cannot be traced from their records” (Schenk & Williamson, 2005, p. 33). This ultimate level of anonymity can be achieved in studies where researchers do not have to return at a later date to collect further or follow-up information, where data are not collected on multiple variables using a range of data collection measures, and where collateral information (e.g., clinic records, school performance) does not have to be linked to information obtained from an interview or psychological test, for example.

Where multiple sets of data are collected, biographical and/or collateral information needs to be added to the data set, and where follow up data needs to be collected, anonymity can be achieved by assigning numbers to each participant and indicating the participant number on each set of data or collateral information per participant. This requires a master list where each participant’s name and number are recorded. The researcher needs to ensure that this list remains confidential and that all data protocols and whatever is captured electronically in data files only contain the participant number and not their name.

However, sometimes the design of the study does not permit full anonymity, and names and other identifying information may need to be recorded. An example is if follow-up health-care or educational intervention or support is part of the benefits of participating in the study. In this instance, the name of the child and school or clinic will be needed. Where the data gathered needs to be linked to identifiers that reveal a participant’s identity, it is crucial that researchers have mechanisms in place to ensure the *confidentiality* of the participant data. In assuring participants that their information will be treated in a confidential way, researchers are asking participants to trust them that no personal information will be disclosed to anyone or in any research reports, unless prior permission is obtained from

the participant. Schenk and Williamson (2005) provide some practical suggestions how researchers can maintain confidentiality. Among these are:

1. Training research team members to understand the importance of confidentiality; once data had been recorded or coded and a number assigned to a participant, all identifying biographical information should be removed from the hard copies, and, when the study is completed, the hard copy research records should be destroyed.
2. Limiting who has access to data that contains personal and biographical information of participants.
3. Storing hard copy records in locked cabinets and having electronic records and data files password protected.

Flewitt (2005) raises two further matters related to anonymity and confidentiality that are important to take note of. The first of these pertains especially to longitudinal and qualitative studies where children and parents or caregivers might develop such a strong trust relationship with the researcher or fieldworker that they begin to treat the researcher as a friend and confidante and start sharing personal information, which is not directly linked to the study. Furthermore, the researcher might sometimes observe certain behaviors or overhear conversations between family members that have no direct bearing on the purpose of the study. Information that is not directly related to the research study should not be included in the research data set. Nonetheless, how does the researcher deal with such situations so as not to betray the trust relationship that they have with the child and parents? Flewitt (2005) suggests that if the session is recorded, the recording could be paused when children or parents share information that is not linked to the research aims, or erased afterward, or not transcribed for analysis purposes. She further advises that where researchers decide to exclude certain data, the reasons for deciding to do so should be

captured in a research diary or field notes. The rationale for this is that exclusion decisions could impact on the findings of the study.

The second matter that Flewitt (2005) raises is the ethical challenges related to privacy, anonymity, and confidentiality of visual data gathered in research posed. The main issue is that the child is easily recognizable and the audio accompanying the video can reveal further personal details such as the child's and parents' names. To follow ethical practices with visual data, Flewitt (2005) suggests the following:

1. Child participants could choose pseudonyms.
2. The child and consenting adult(s) should be shown, approve, and provide written consent for any visual images that will be used in research presentations or documents.
3. When making visual data public, the researcher should protect the child's identity by obscuring the on-screen image through "fuzzing" or reducing the pixel count or by making a sketch of a video still.

Whatever the nature of the data that is collected, an ethical dilemma that can arise in child development research is that parents or caregivers ask to see or be informed of their child's responses or performance on a developmental test, for example. The dilemma here is that the researcher has built a trust relationship with the child and has assured the child that the information the child is providing is treated as being confidential. How can the researcher protect the privacy of the child and maintain confidentiality while also maintaining a good relationship with the parent or caregiver in the process? An option is that the researcher should first engage a child in discussion to see if a joint strategy can be determined in responding to the parent or caregiver's request. This matter is explored further in the subsection on disseminating findings.

### **In the Child's Best Interests and Do No Harm: Ethical Challenges**

As pointed out previously, utmost care needs to be taken to ensure that whatever is done is in the

best interests of and benefits the child while minimizing potential harmful outcomes of a research study. In this section attention will be paid to how to give effect to the principles of beneficence and non-maleficence when planning, conducting, and reporting on research studies.

### **Planning**

Schenk and Williamson (2005) argue that careful attention to planning all the details of the study is essential to minimize potential adverse consequences. Furthermore, they argue that where a potential adverse consequence is identified, the researcher should not proceed with the study until there is a solution available to address it. Thought should also be given in the planning stage to issues of appropriate follow-up and support when the research study has been concluded. Schenk and Williamson (2005) stress that the identification of potential adverse consequences and support planning should be done in collaboration with the community and that the study should not proceed until the necessary follow-up and support opportunities are available.

Vulnerable children (e.g., orphans, children in war-torn countries, and refugees) require special protection, which should be decided on in the planning stage and reflected on throughout the research process. The reason for this is that very sensitive information might be revealed through the study which could be upsetting to the children, but monitoring and psychological services might not be available or accessible to these children after the study to support them (Schenk & Williamson, 2005). Given the real possibility that vulnerable children may be traumatized or even fear for their safety as a result of participating in the study, researchers need to make every effort to ensure anonymity and confidentiality and to refer those who experience distress. Appropriate referral sources and courses of support action could be determined with the input of the community stakeholders prior to the start of the study.

Other than immersing themselves in the community context where they will conduct the research, negotiations with "gatekeepers" through which participants will be accessed (e.g., school principals, manager of a health clinic) as well as key community stakeholders are key

activities that researchers need to undertake early in the planning phase (Flewitt, 2005; Foxcroft, 2011a; Schenk & Williamson, 2005). Not only does this assist the researcher to gain entry into the community but valuable information could be provided regarding how to minimize harm through understanding community norms and values and also practicalities such as the most appropriate time to conduct the research (Schenk & Williamson, 2005). As an example of the latter, when a colleague and I were planning to conduct a comparative study of the development of urban and rural Grade 1 children and empower teachers to identify at-risk children, we visited the various school settings where we planned to gather data together with staff from a community-based organization (Foxcroft & Shillington, 1996). Being urban dwellers, we were unaware of the different rhythm of life in a rural agricultural setting. We were informed by the school principals and community leaders that the date that we planned to conduct the study was during the fruit picking season. Attendance at school was poor during this season as children helped their parents to pick fruit. We found this information very helpful and immediately adjusted the date when we planned to collect data in the rural village. Had we not interacted with gatekeepers and key community stakeholders, our rural sample could have been very small, and the study would have been compromised.

A further aspect that requires careful attention in the planning phase is deciding what language to use when engaging with parents and children as well as when gathering data. The people of Africa speak diverse languages and dialects within and among countries and between urban and rural areas. Consequently, language could be a barrier and unintentionally cause anxiety if children, parents, or caregivers begin to feel incompetent should they not be able to express themselves in the language that the questions are posed in (Foxcroft, 2011a). It is thus important that researchers clarify with gatekeepers and community members in what language (and dialect) the data collection should be undertaken. Thereafter, researchers need to decide whether they are sufficiently competent in the language to

gather the data themselves, whether an interpreter should be used, or whether a fieldworker competent in the language should be used. Both interpreters and fieldworkers need to be appropriately trained so as not to compromise the study and invalidate the findings. While this aspect will be considered more fully in the data collection subsection, it should be noted here that even with appropriate training, language could continue to be a challenge as accurate translations may not always be possible given that equivalent concepts might not exist in the languages being used (Foxcroft, 2011a).

According to Powell et al. (2012, p. 33), “[a]ssessing beneficence is a challenge” in developing countries. Often the key benefit from a study is to use the research findings to impact on policy-makers and the planning of child health and educational services. For example, in Foxcroft and Shillington’s study (Foxcroft & Shillington, 1996) with Grade 1 children mentioned above, teachers at the schools benefitted in that they were trained in how to identify children who were lagging behind the rest of the class and were empowered with teaching and assessment methods to assist such children in class so that they could achieve their potential. Furthermore, given the interest shown by the community in the study, Grade 1 teachers from all the schools in the community were invited to the pedagogical training, which empowered them to be better teachers. This in turn could have benefitted more children in the community than just those in the school where the study was conducted.

It is thus argued that while the child and their parents may not personally benefit in the short term, others may benefit in the long term. It is further asserted that children that participate in research get opportunities to learn how to articulate their views and experience respect and the value of being listened to, which are intrinsically rewarding and beneficial. However, Nyambedha (2008) argues that in a developing world context such as Kenya, participants could have high expectations that participating in a study will benefit them directly. Part of the reason for this is that participants found it difficult to distinguish between the work of nongovernmental or



community-based organizations and research studies. Based on his experience, participants sometimes perceived that the researcher would benefit directly from the study by obtaining higher degrees, which would enhance their employment prospects, for example. In contrast, participants are inclined to hold the view that as a result of participating in the study, nothing will really change in their lives or community (Powell et al., 2012). It is for this reason that Nyambedha (2008) argues that if researchers do not address the high expectations that participants have for direct benefits from a study and clarify the benefits to the researcher, they could unintentionally cause harm to participants.

While planning can assist in designing a study that can maximize benefits and minimize harm, these aspects should remain in the forefront of the researcher's mind as the study progresses. When researching street children in Uganda, Young and Barrett (2001) note that in terms of assessing risks and protecting children from harm during the research process, guidelines established in developed countries, such as the United Kingdom, are less useful. Instead, given the unique ethical challenges that arise, researchers need to be sensitive to the context and continually reflect on and grapple with issues that arise so that they can fulfill their ethical obligation of doing no harm to the children in the study.

### **Methodological Approach**

The methodological approach followed is a key aspect of the ethical considerations of a study (Powell et al., 2012). If a study is not methodologically sound and as a result its findings are invalid, children could have been exposed to unnecessary risk to provide information which will benefit no one. To ensure that ethical research practice is followed in the methodology employed, the researcher needs to achieve a balance among the need for scientific rigor, how best to achieve the purpose and perceived benefits of the study, and to at all times act in the best interests of the child.

In Arojjo and Nyonyintono's (2009) survey of published child development studies in sub-Saharan Africa from 1996 to 2006, they found

that while a range of research methods were used, cross-sectional studies were the most prevalent. In developmental research, cross-sectional designs are more cost-effective to employ, but researchers cannot reach conclusions about development over time from such a design. Longitudinal designs such as trend, cohort, and panel studies are more time-consuming and costly, although the findings of such studies can map children's development over time. Arojjo and Nyonyintono (2009) also note that, where possible, both quantitative and qualitative research approaches should be used as they complement each other and enrich the findings.

In studies where the development of vulnerable children is being researched in relation to the impact of treatment or an intervention, a comparison/control group that receives no treatment/intervention is not ethically justifiable (Schenk & Williamson, 2005). Alternative research methods should be used. For example, the research study could rather compare the impact of different types of treatment and interventions, or program evaluation studies could be strengthened by doing a baseline assessment, evaluating the effectiveness of the program in multiple settings, and using a mixed methods approach where quantitative and qualitative approaches are used to gather information about the impact of the program (Schenk & Williamson, 2005).

As health-care services or interventions are often piloted at one center or clinic before being refined and rolled out to other centers or clinics in the area, it might be possible to use children at one of the centers where the pilot is not being implemented as a comparison group prior to the intervention being made available to them. For example, Schenk and Williamson (2005) report that a researcher in Uganda assessed the effectiveness of a psychosocial program offered to a group of children and used a group of children in another community that had not yet received the program as a comparison group. The participants in the comparison group were assured that by completing a survey questionnaire, they would be given the opportunity to participate in the psychosocial support program in the near future. The Ugandan researcher kept his/her promise to the



comparison group. The researcher also reflected that by designing the research study in this way, more children had the opportunity to benefit from the program than would otherwise have been the case if a one-group design had been used.

A number of factors need to be considered when choosing a methodological approach. These include the aims of the study, costs, and the age of the children included in the study as methods used with older children will not necessarily be appropriate to use with younger children. In addition, Morrow (2005) asserts that the perspective that the researcher has when conducting child research is a crucial ethical consideration as it influences the methodological approach adopted and how data are interpreted. If the researcher adopts a perspective that a child's views and input should be valued, the research process will be conducted in a more collaborative way, and the methodological approach needs to make provision for this (Morrow, 2005).

To conclude this section, note should be taken of the increase in multidisciplinary, interdisciplinary, and multicultural studies in child research. The advantage of this is that our understanding of African children can be enhanced by utilizing an array of disciplinary lenses (Arojjo & Nyonyintono, 2009), and similarities and differences in development can be researched across cultural groups. However, researching heterogeneous groups of children with researchers that often come from various disciplines and are not always from Africa themselves, let alone from the cities or villages where the child participants live, is not straightforward. Among the challenges that this brings are differing understandings of (a) how to respectfully involve children in the research process, (b) methodological data gathering and analysis methods, and (c) cultural norms and how to gain entry to communities (Arojjo & Nyonyintono, 2009; Powell et al., 2012). Among the ways to address these differing understandings in interdisciplinary and multidisciplinary studies is for the research team members to spend some time sharing their views to establish common ground among members as well as the unique perspectives that each one brings to the study. Furthermore, for cross-

cultural research studies, it is advisable to compile a diverse team of researchers from different countries and those with community-specific knowledge to enhance national and local input into the study. Furthermore, it is advantageous if the data gathering is spearheaded by a researcher from the country concerned (Porter et al., 2010).

### Participants and Sampling

How many participants should be included in the sample? While part of the answer to this is linked to methodological and data analysis considerations to ensure that valid results are obtained, the researcher "must balance the conflicting pressures to approach more individuals to achieve reliable results, and to approach fewer individuals to minimize the intrusiveness of the activity" (Schenk & Williamson, 2005, p. 19).

Where children are participants, attention needs to be given to the age ranges to be included, and, given the link between age and developmental stages, care needs to be given to not include too wide an age range. Arojjo and Nyonyintono (2009) suggest that not only should researchers include the ages of the children sampled in their report, but they should also appropriately categorize them as infants, children, adolescents or youth, and so on.

In Arojjo and Nyonyintono's (2009, p. 37) survey of child research studies in Africa, they found that "children, parents/guardians ... and caregivers in institutions, and teachers" were the main participants in the studies and that they were obtained through a variety of sampling techniques. Among the techniques used to obtain a sample from the population of interest were using existing demographic databases, snowballing, and using key informants in communities and school contexts to identify possible participants from existing health care, intervention, and educational programs and services. The latter is particularly problematic as it can lead to selection bias in that certain potential participants who have not accessed these services or programs are excluded. This issue is raised again in the section dealing with distributive justice.

Clear inclusion and exclusion criteria should be established before participants are selected.

Schenk and Williamson (2005) suggest that input should be obtained from community members when establishing these criteria and locally acceptable definitions of these criteria should be used. A thorny issue in sample selection in intervention and clinical trial studies in vulnerable and impoverished communities is that the lack of available care or resources makes it attractive to participate in research studies (Moodley & Rennie, 2011). However, the perceived benefits on the part of the participants might be a misconception and might not materialize (Moodley & Rennie, 2011). Researchers should be alert to this and should raise this at the outset with potential participants.

## Data Collection Methods and Issues

### Extent of Information Gathered

According to Schenk and Williamson (2005), researchers should only collect information directly from children if the information is not otherwise available (e.g., from archival information such as school or health clinic records). Where information must be gathered from children, care should be taken in that researchers should “[b]alance the need to *maximize* children’s participation by hearing their own opinions on the issues affecting their lives with the need to *minimize* their exposure to harm” (Schenk & Williamson, 2005, p. ix).

In instances where sensitive information is gathered, care should be taken to not overassess. That is, information gathering measures should be limited to only those that provide the required information. This assists in reducing the trauma that the child could experience as a result of providing information about sensitive matters. By limiting the measures used, the researcher gives practical effect to the ethical principle of beneficence (Schenk & Williamson, 2005).

### Choice of Data Collection Method

The purpose of the research and the methodology employed are important considerations when determining the data collection method to use. The range of data collection methods that could be used include structured questionnaires (stan-

dardized or not), interviews (with children, key informants, etc.), focus groups, standardized tests, reviews of records, observations, storytelling (verbally or by compiling diaries), and community/town hall meetings. A combination of data gathering methods (e.g., interviews and structured questionnaires or standardized tests) involving a range of sources (e.g., children and adolescents, parents and caregivers, adults that work with children such as teachers and community/social workers, community members, and peers) is often used (Arojjo & Nyonyintono, 2009; Powell et al., 2011). Furthermore, Powell et al. (2011) report that while children are often interviewed or assessed individually, in developing countries data are more likely to be obtained from children in groups than in developed countries.

Whatever data gathering method is used, it must be designed in such a way that valid information is obtained. In this regard, Schenk and Williamson (2005, p. 18) assert that “[i]t is unethical to involve children in an activity that will not result in valid information.” Among other things, the content of questionnaires, interview questions, and focus group interview guides must be age and culturally appropriate. Child development experts, educators, key community informants, and even children themselves can be consulted to address the matter of content appropriateness. In addition, where standardized tests are used, care needs to be taken that the act of taking a test is not so unfamiliar to the child that their performance is invalidated as a result. In instances where children are not “testwise,” consideration should be given to alternative forms of data collection, such as including practice examples in the test or even administering a practice test first to lessen the impact of a lack of testwiseness on test performance (Foxcroft, 2011a).

### Standardized Tests

In the international survey conducted by Powell et al. (2011), it was found that standardized tests were used least often in child research. Notwithstanding this, a number of African researchers advocate that standardized psychological measures can provide useful information

about inter alia African children's cognitive and emotional development and mental well-being (e.g., Bangirana, 2011; Nampijja et al., 2010). However, Abubakar et al. (2007, p. 418) express the view that "[t]he adequate monitoring and evaluation of disease effects, related risk factors and intervention among children in rural communities in Africa is hampered by a lack of appropriate assessment instruments." To address the shortage of culturally appropriate standardized tests in Africa, both the more cost-effective adaptation of existing tests and the development of indigenous measures are needed (Foxcroft, 2011b; Holding, Abubakar, & Kitsao-Wekulo, 2008). Chapter 11 provides a comprehensive discussion of how to ensure that the measures that are used for child development research in Africa are culturally appropriate.

### Use of Fieldworkers

Researchers are often dependent on fieldworkers to assist them to gather data and information in child development studies. The onus rests on the principal researcher(s) to ensure that ethical procedures are followed by fieldworkers during the data gathering phase of the study. Use of interviewers/fieldworkers of the same gender, culture, and/or language background is sometimes needed. The principal researcher needs to be alert to this and should take this into account when selecting fieldworkers.

It is important that fieldworkers can establish rapport with children, communicate effectively with them, and respond supportively and sensitively to them during the research process. Consequently, care needs to be taken when selecting fieldworkers, who need to have experience in working with children. Fieldworkers should be trained. The researcher could develop manuals on research procedures and how to communicate in a respectful way, ethical practices, and how to deal with common ethical dilemmas for fieldworkers (Morrow, 2009). To assist fieldworkers to respond in culturally appropriate ways, the training manuals could be developed collaboratively with community partners. Morrow (2009) also suggests that a memorandum of understanding be signed with fieldwork-

ers to ensure that they understand what is expected of them.

Fieldworkers should be encouraged to include any ethical questions/dilemmas that arise in their field notes and to then discuss how to address these with the principal researcher, their research supervisor, or the project leader. Sometimes, the fieldworker needs to respond to the challenge immediately and does not have the time to consult with others. In this instance, the fieldworker should note both the ethical challenge and how they responded in their field notes. When they next meet with the principal researcher or their supervisor, they could share this information, and they could reflect together about the appropriateness of their solution for the ethical challenge.

Fieldworkers are often "outsiders" in that they are not members of the community in which they are gathering data. In such instances, fieldworkers need to recognize that they could attract interest in the local community. They should also follow good practice by engaging with the community to clarify roles and expectations. On the other hand, sometimes the fieldworkers are "insiders" (i.e., from the local community) and especially require training in the importance of maintaining confidentiality (Arojjo & Nyonyintono, 2009).

### Disclosure and Limits to Confidentiality

An ethical dilemma that can arise during data collection is that the child may disclose or the researcher may become concerned that the child is being abused or at risk of being harmed or a risk to others. According to Powell et al. (2012), this is a contentious issue as it poses a threat to confidentiality given that the child could have disclosed the information on the understanding that the researcher will treat it as confidential. In this instance, Powell et al. (2012) suggest that the researcher could encourage the child to share this information with an adult in their community or to give the researcher permission to share this with an appropriate person such as a social worker. Strode and Slack (2012) concur with this, but take a firmer stand. They developed guidelines or norms based on an ethical-legal framework for researching adolescents with HIV/AIDS

in South Africa. According to two of the norms established by Strode and Slack (2012), p. 4), “Adolescents’ right to confidentiality can be limited and adolescents could be asked to disclose to otherwise confidential information to a trusted adult in certain instances” and “[i]f adolescents are being abused or neglected, this should be reported to authorities and adolescents should be assisted.” In this regard, they argue that during the informed consent/assent process, adolescents/child participants need to be made aware that their right to confidentiality has limits especially if they are being abused or it is not in their best interests or well-being to maintain confidentiality. So, the researcher needs to weigh up the competing factors of respecting the child’s/adolescent’s autonomy, considering what is in their best interests and well-being and the need to minimize harm, with the wishes of the child in reaching a decision about whether the child should be asked to disclose the information to a trusted adult (Strode & Slack, 2012). Furthermore, Strode and Slack (2012) argue that not only does the researcher have an ethical responsibility to assist a child suspected of being neglected or abused but also, after discussion with the child, to report this if he/she is professionally or legally compelled to do so.

### **Vulnerable Children**

Ethical dilemmas can arise when gathering data with vulnerable children and especially those who have serious needs (e.g., poverty, hunger, poor health). One of the dilemmas that arise is how to provide these children with constructive, positive experiences when collecting data from them when the questions could confront them with their needs and difficult circumstances. This could leave them feeling distressed and the researcher or fieldworker feeling uncomfortable. Schenk and Williamson (2005, p. 29) relate the experience of a researcher in Zimbabwe. To ensure uniformity in data collection, the fieldworkers were trained to not deviate from the interview schedule even if the question was a difficult one to ask. Among the questions was “Do you have shoes?” This proved to be a difficult one to ask as the children came from poor areas

and the fieldworker could clearly see that the child did not have shoes. This example is a reminder that careful consideration needs to be given to the questions included in an interview or survey and that it might sometimes be more appropriate to obtain some information in other ways. For example, in the Zimbabwean study, the fieldworker could have made a note that the child did not wear shoes, or community informants could have been consulted about the extent to which children in the community wore shoes.

Working with vulnerable children often exposes researchers and fieldworkers to factors that might have nothing to do with the study, but which leave them feeling powerless and wondering whether participation in the study provides any benefit to the child. This could lead some researchers and fieldworkers with the feeling that they should do something tangible to address the needs of the children (e.g., give them shoes or food). However, Mupenda (2012) cautions that researchers and fieldworkers cannot assume responsibility for addressing systemic social and economic issues. In these instances it is helpful for researchers and fieldworkers to share their feelings of discomfort and concern with team members and reflect on the extent and limits of their ethical responsibility to ensure that vulnerable children benefit from participating in a research study.

### **Interpreting Findings**

It is good, ethical practice to interpret the findings in the light of the cultural, socioeconomic, and political context in which they were gathered and the children developed (Foxcroft, 2011a). In this regard, Schenk and Williamson (2005) argue that the input of the community should be obtained so that the findings are appropriately interpreted and contextualized.

Furthermore, Flewitt (2005) argues that as researchers become engrossed in their research, they may lose some objectivity and perspective when interpreting findings and the aspects that they choose to highlight. She thus suggests that “respondent validation” (p. 9) should be undertaken. In this instance, formal and informal conversations can be undertaken with participants

(including children) to gain deeper insight and meaning from the data as seen from their perspective. This is recorded in the researcher's field diary and can be consulted when analyzing and interpreting the data (Flewitt, 2005). While this approach can help to guard against researcher bias in analyzing and interpreting information, it may not always be practically possible. For example, if the researcher lives in another country or a number of fieldworkers gather the data, it will be difficult to validate the emerging results and themes with participants.

### Disseminating Findings

As there are different stakeholder groups (e.g., the community, parents and child participants, funders, disciplinary peers) with differing needs for the research information provided, the dissemination strategy needs to be carefully planned and needs an adequate budget (Schenk & Williamson, 2005).

In compiling research reports and preparing presentations, the researcher needs to ensure that a balanced view of the range of findings is presented. Care should also be taken to protect the identities of the participants, to avoid using disciplinary jargon and to carefully phrase findings, especially when sensitive matters are raised (Gune & Manuel, 2007; Schenk & Williamson, 2005). Suggestions about how to appropriately include visual data/images in reports and presentations were provided in the "Privacy, Anonymity, and Confidentiality" subsection and will not be repeated here. It might also be necessary at times to not include certain information in a report as it could result in a breach of confidentiality or reveal a participant's identity. In this instance, Schenk and Williamson (2005, p. 54) advise that the rule of thumb to follow is that "[i]f any information is withheld, it must not result in harm to participants."

As findings could be sensationalized in the media, researchers must take responsibility for how children are represented in their reports and must be aware that findings can be misrepresented. On the other hand, a balanced report on the study in the media assists in disseminating the findings and recommendations to the general

public, which assists in establishing the value-add of research in the public domain.

Dissemination of research findings should include sharing them with the community in a way that they can relate to the information and understand it. In sharing the findings, researchers should do so in such a way that communities and individuals can see the value of their input. This could entail sharing findings at a community gathering, which also makes it possible for the researcher to gauge reactions to the findings.

If the findings could contribute to policy development, researchers should include in their report back how they intend to share this information with the government or policy-makers to advocate for the development needs of children to be addressed. However, the researchers have no control over whether the government or policy-makers take up the recommendations of the research study. This should be noted when the findings are disseminated otherwise the community could ultimately feel that the researchers did not keep their word if policy changes are not forthcoming.

Sometimes parents and communities want direct benefits from the research. Thus, a parent may ask for feedback about their child's development or a school teacher might want to know about the developmental profile of her class. These requests are not straightforward. If these were not part of the original contract (consent/assent) with the parent, child, and school and included as part of the informed consent process, it would be a breach of confidentiality to agree to these requests. Furthermore, researchers should be aware that offering to provide an individual report on a child's development could be problematic as it is not necessarily an ethically sound practice. Without sufficient background, collateral, and contextual information to enhance interpretation of the results, the validity of the report could be questionable. In addition, given the large number of illiterate adults in Africa, a written report will not be meaningful if the child's parents are illiterate. Furthermore, providing parents with a written feedback report about their child's development, especially in terms of developmental weaknesses, is also



risky. The reason for this is that outside of the confines of a professional relationship where the results could be explained in face-to-face sessions and understandings checked, parents could unnecessarily become concerned about fallouts and would be in need of follow-up psychological services to deal with this and to provide specific developmental interventions for the child. So, in trying to “do good” by providing a report, the researcher could end up “doing harm.” It is far wiser to provide a shortened report and/or presentation that summarizes the results of the study for the group of children sampled.

Given the growing trend to actively involve children in the research process, increasing attention is being paid to share the results with them. The way in which the information is shared with children needs to be appropriate for their age and educational level. Among the innovative ways that this can be done is to prepare colorful leaflets or posters using simple language and including visual representations of the findings. Sharing information with the child participants and eliciting their views through focused group discussions can provide rich feedback to the research in terms of how they react to the findings and could even assist in understanding some unexpected results (Schenk & Williamson, 2005). Equally important, children can benefit from obtaining information on the research findings. On the one hand, they can sense that they were listened to if the information sharing brings their voices and views to the fore. On the other hand, they gain firsthand experience of research and the applied value that it can have.

### **Distributive Justice: Ethical Dilemmas**

While some argue that the ethical principle of justice is confined to the selection of participants, it involves more aspects than this. In this section, other than considering participant selection and exclusion, attention is also given to potential inequality and privilege in terms of who benefits in intervention studies and from incentives.

### **Exclusion**

Care needs to be taken when selecting participants that there is no selection bias which results in inequity in that some children benefit and others do not. When deciding on inclusion and exclusion criteria before selecting participants, consideration should be given to the ethical principle of “justice.” Reasons for exclusion criteria should be clearly documented. In addition, the aims of the study should be the primary determinant for the inclusion criteria as opposed to the fact that the researcher has easy access to a specific pool of children or that the children represent a vulnerable group (Schenk & Williamson, 2005). In relation to this, it was noted in the subsection on “Participants and Sampling” that when researchers tap into existing databases at health-care clinics or schools to identify participants, the issue of selection bias occurs. The reason for this is that potentially eligible children that did not enroll at the clinic or school used did not have an opportunity to be selected for the study.

Moodley and Rennie (2011) raise a further matter regarding inclusion and exclusion criteria. In community-based studies, there is often a selection process to determine which community in a district, region, or village will be included in the study. They argue that it is challenging to use random and cluster sampling methods to identify from which communities the samples will be drawn. In the process, some communities, and hence children, will be excluded, which implies inequity in terms of the benefits and burdens of the study.

### **Intervention Issues**

An ethical dilemma that arises in intervention studies is whether participants will still have free access to the intervention after the completion of the study, should they require it. Mupenda (2012) reflects on projects aimed at preventing transmission of HIV/AIDS from infected mothers to their children. In the projects, mothers receive free HIV treatment. For the benefits to the children to be sustained, the mothers need to continue with the treatment. The matter of what happens regard-



ing the continuation of an intervention at the completion of the study should be contemplated in the planning stage, and ongoing support options should be put in place (e.g., referral to a health clinic where free HIV/AIDS treatment can be obtained).

Mupenda (2012, p. 2) raises a further ethical dilemma linked to intervention studies. In cases of extreme need or poverty, it is a dilemma that only participants get the benefit of the intervention “when local needs are so great.” Inequity is created as some are privileged to access resources and interventions as part of the research study, while others with the same needs and circumstances are not. This dilemma should be foreseen in the planning stage of the study and raised with community stakeholders. Where possible, provision should be made to offer the intervention to other communities if it is found to be effective.

### Incentives

To encourage children to participate, researchers may sometimes offer incentives. According to Schenk and Williamson (2005), if incentives are used, they should be aligned with “local living standards” (p. ix).

Should incentives be offered, clear guidelines should be developed regarding the purpose and nature of the incentive and how to ensure that it is not misperceived. Among the purposes of incentives could be to financially compensate parents, for example, for having to take a day off work to provide the developmental history of their child as part of the data for a study. If parents are paid daily, they will lose a day’s wages, or part thereof, to participate in the study. Providing them with a day’s wages might be considered to be an ethical way of dealing with the matter. However, this is a contentious area as there is an opposing view that paying people to participate in research is coercive and limits true independent informed consent.

Sometimes the purpose of an incentive is to thank the child for participating in the study and giving of his/her time. This might be expressed in terms of giving the child a sandwich and fruit juice if the assessment/interview stretches over a few hours. As indicated in the “Planning” subsection, a colleague and I conducted a study in a rural

area in which Grade 1 children had to complete a developmental screening measure in class (Foxcroft & Shillington, 1996). By way of saying thank you and as we were worried whether they had pencils to indicate their responses and complete the test items where a drawing was required, we gave a pencil to each child that participated. We were not prepared for the response that we received. Such was the excitement of the children at receiving their very own pencil that it took about 20 minutes to calm them down before the assessment could start. Until then they had only had “stompie” (translated as “very short”) pencils, not much longer than their little finger. This “stompie” had been handed down to them from older siblings or family members. To be given a long, brand new pencil was quite overwhelming. Their excitement was thus quite understandable.

While giving a thank you gift is a nice gesture, it could be argued that only the children that participate in the study benefit. To counteract this, some researchers express their thanks by providing the school or community with something that all children can have access to (e.g., donate books to the school or community library). In the case of the study that I was involved in, it would probably have been more ethical to provide all the children in Grade 1 (at least) with a new pencil, which could have made it easier for all of them to learn to write properly.

Whether the child, parent, school, or community benefits from a “thank you” incentive, Morrow (2009) cautions that the researchers need to explain the reason for the incentive clearly. Otherwise, especially in impoverished communities, participants could perceive these incentives as being “aid” rather than as a thank you for participating in a research study.

### Enabling Factors for Ethical Research Practice

To conclude this chapter, it should be clear that conducting research with children in an ethical way poses many challenges and dilemmas that are not straightforward to overcome on the African continent. However, many of the studies and ethi-

cal perspectives cited in this chapter provide indications of how African researchers are grappling with these challenges and dilemmas and finding appropriate ways of responding to them. In the process, some factors that enable the ethical practice of research are emerging.

Moodley and Rennie (2011) argue that a culture of research ethics needs to be established. As noted earlier in this chapter, Powell et al. (2011, p. 40) assert that the researchers' own ethical principles, experiences, and training "shape their ethical understandings and practice." In addition, this culture is also shaped by national bodies and local institutions, such as universities and research councils that put ethics guidelines or codes of conduct and review systems in place. However, Moodley and Rennie (2011) note that while ethics review systems might be in place, the capacity of research ethics committees (also referred to as institutional review board) shows great variation which leads to uneven application of review systems and processes. There is thus a need for ethics capacity building. It is encouraging therefore that a trend noted in the literature is the extent of capacity building initiatives in various African countries and regions (e.g., Democratic Republic of the Congo, Southern Africa) (Lang, 2012; Moodley and Rennie, 2011). Capacity building is multi-pronged in that training programs are offered for members of research ethics committees; multidisciplinary postgraduate diploma and master's programs in research ethics have been developed and implemented; exemplar research ethics curriculums have been developed as research ethics training in master's and doctoral programs is generally considered to be insufficient; bioethics units have been established at some universities; and advisory teams and collaborative research networks have been established to assist in resolving ethical dilemmas and fostering ethical practice in child research in Africa (Arojjo & Nyonyintono, 2009; Lang, 2012; Moodley & Rennie, 2011; Mpofo, 2002; Wassenaar, 2011). While greater expansion is needed in terms of capacity building and the establishment of research networks, encouraging progress is being made.

Together with enhanced capacity building in research ethics, researchers also need to cultivate the art of critical reflection which can assist them to become aware of ethical challenges that arise during the course of the research study. Reflexive researchers can critically discuss their own prejudices and assumptions and how these impacted on the design and outcome of the study (Powell et al., 2012). In addition, reflexivity together with the researcher adopting a flexible approach to their role can assist in building rapport with children (Powell et al., 2012). As a result, space is created for children to be cocreators of the research process and outcomes as they perceive that their contribution is valued.

### Coda

The quote by Nelson Mandela at the start of this chapter serves as a reminder for inter alia child researchers that they need to follow ethical research practice to ensure that the research process leaves children feeling respected, empowered rather than disempowered, and benefits rather than harms them. While this poses challenges that require innovative solutions at times, examples cited in this chapter suggest that researchers in Africa are showing signs of succeeding in this task.

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# Doing Human Development Scholarship in Africa Within the Crosscurrents of Euro-Western Intellectual Cascades

14

A. Bame Nsamenang

The rise and spread of the “knowledge society” in the developed countries have led to the hegemony of modern knowledge and its manifestations and have opened up virtually all societies to increased pressure from global values and products, including knowledge generation (Sawyerr, 2004). The focal issue is whether Africa can generate scientific knowledge with which to gain a foothold into global knowledge systems.

The main thrust of this chapter is about how human development research by African researchers working primarily at African institutions can live up to, struggle with, and endeavor to catch up with or to circumvent the issues and challenges engendered in the crosscurrents of Euro-American hegemonic narratives and theorizing. The insistence on African research and researchers at African institutions is to insure rootedness and the sustainability of knowledge generation, as well as to improve the likelihood of relevance and applicability. This orientation invokes the discursive as well as the lived tension between academic psychology, crafted within Euro-Western scientific ethos and ideological value systems, and indigenous psychology, as its insiders across cultural communities live and emit it.

Sawyerr’s (2004) wish is for sustained indigenous generation of world-class research results and new knowledge that enhance the understanding of African conditions and contribute to the advancement of its people. The challenge is to overcome the tendency to political, economic, and epistemic domination by developed countries and their institutions; the increasing homogenization of cultures and threat to local knowledge, resulting from the unrestrained importation and imposition of foreign goods, services, and cultural forms; and the exacerbation of local differences and inequalities through uneven access to such knowledge and the means for its application (Sawyerr, 2004).

Although still inchoate, it is most gratifying to see that some African scholars (Mkabela, 2005; Mpopu, 2002; Nsamenang, 2006; Ntumngia, 2009; Pence & Nsamenang, 2008; Tanyanyiwa and Chikwanha, 2011) have taken on the important yet daunting task of making relevant to the African reality Western theories and constructs believing that African knowledge has much to enrich existing Western knowledge and methodologies. Chilisa (2012) has espoused a “postcolonial indigenous research paradigm” that primes decolonization of research, therein privileging focus on “the discovery of indigenous knowledge systems and production” (Nsamenang, 2015, p. 63).

The brief introduction states the central concern of the chapter, which is underrepresentation of Africa’s knowledge systems and Africa’s

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scholars in global human knowledge systems. The second part of this chapter takes issue with some assumptions and models of Eurocentric research and scholarship as they short-chain the developmental knowledge of Africans and against which African researchers must measure. The third section examines what researching into intellectual traditions entails. In so doing, it notes the diversity of intellectual traditions and the lopsided attention they receive in developmental research. The African intellectual traditions have sparsely been charted. The focus of part four on constructed realism identifies reality itself, which is transcendent, scientific microworlds that are crafted by scientific communities and lifeworlds, which are constructed by cultural communities from their sociohistorical experiences. It also raises issues of theorizing and researching within social realities suffused in a holistic theory of the universe and that within a mind-set of Cartesian dualism. The fifth section seeks to understand what Africentric knowledge of human development should look like within research and scholarship dominated by Eurocentric governing narratives and academic grids. It muses over what Africa is and what researching the African universe of human development ought to be concerned with. Part six concentrates on clarifying two core facets of contextually relevant developmental research—generative curriculum and Grounded Theory method—which give as much attention to the context in which development unfolds and the funds of knowledge and implicit theories inherent therein. Section is a befitting conclusion to the chapter.

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### **A Terse Critique of Scientific Psychology**

While this chapter acknowledges and celebrates the extant science-based developmental knowledge in Western and non-Western societies, it builds on Chilisa's (2012) thrust of handling research as emancipation and empowerment. A major concern with the existing funds of developmental knowledge, however, is that it is not universal but is differentially useful and applica-

ble across contexts, least of which Africa. Although Africa has knowledge and the power and influence expected to be inherent therein, it should be noted that Africa's knowledge and scholars, "differ from the Euro-American in one major respect: ever since the early nineteenth century when the Euro-American presence in Africa began to be noticeably felt in the interior, Africa's knowledge has increasingly ceased to be rooted in the African soil" (Ojiaku, 1974, p. 204). This is because discourse of African issues and scholarship on African affairs, including cross-cultural psychology and indigenous research, is undertaken primarily in Anglo-Western scientific epistemes and academic grids.

Human development and its guidance toward different endpoints of the desired life are universal phenomena, but they are context-sensitive, culture-imbued, and heavily value-driven in spite of the scientific method which frames much of its scholarship. Context, culture, and values predate the birth of every child and are implicated in child development research efforts. They equally predate the origin and development of academic psychology—a scientific discipline whose pioneer gatekeepers and most successive generations of scholars have articulated it as "the science of mind, brain and behaviour" (Fairholm, 2012, p. 2). But the values that drive scientific research are a fraught matter that has never been adequately discussed and is not being addressed in human development research in Africa, wherein imported scientific ethos and epistemes have gained primacy. For example, what does Serpell's (1994) remark in a review of *Human Development in Cultural Context: A Third World Perspective* (Nsamenang, 1992a) that the African worldview portrayed therein diverges from that which drives contemporary Western developmental psychology portend for the discipline?

There has not been much concern in psychology about context, culture, and values, as if psychological science originated from universal values and is being undertaken in a vacuum, or as if a universal context, culture, or value system frames psychological phenomena everywhere. The problems and challenges of human development scholarship in Africa, as elsewhere,



hinge on Valsiner's (2012, p. 3) apt conjecture that contemporary scientific psychology suffers from its self-generated image of being an "objective science" of deeply subjective and culturally organized phenomena—the human mind and behavior.

Prior to the emergence of scientific psychology, albeit in apparent misguided imitation of the natural sciences, people of every culture had been fascinated by the human mind and behavior, had been curious to understand it in their own terms, and had made efforts to resolve human problems. For example, as far back as the ancient civilizations of China, Egypt, Greece, India, and Persia (Fairholm, 2012), there were speculations about such psychological issues as mental distress or disorders of human personality and behaviors of nonhuman animals.

By drawing the reader into reflection on the contextual rootedness of knowledge systems Chilisa's (2012) *Indigenous Research Methodologies* is indeed refreshing. It alerts us to how knowledge systems are shaped by world-views and research practices should take this into account and how academic psychology historically came to be limiting and exclusive, and what needs to be done for indigenous psychologies to be open and become integrated into a psychology of human diversity (van der Westhuizen, 2013). It is in this sense that we perceive the scientific psychology that emerged from the European Enlightenment as one system of knowledge that has been growing by ignoring other knowledge systems. One viewpoint is that it has been crafted into a hegemonic, Euro-American "article of export" (Danziger, 2006, p. 271) that trivializes, even neglects, the diversity that characterizes the psychosocial functioning of humans, a global species. Nevertheless, while acknowledging the considerable research (in this volume) that has been carried out in Africa and the rest of the Majority World, it is but rational not to ignore the fact that even cross-cultural psychology and indigenous psychology are Eurocentric, being cast in Euro-Western epistemes and scientific specifications. Thus, psychosocial functioning as a universal feature of humanity is yet to be meaningfully captured and factored into academic

programs, research and practice agendas, and policy development.

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## Researching into Intellectual Traditions

Wikipedia ([https://en.wikipedia.org/wiki/Intellectual\\_history](https://en.wikipedia.org/wiki/Intellectual_history)) characterizes intellectual history narrowly as the history of human thoughts in written form, which cannot be considered without the knowledge of the men and women who created, discussed, wrote about, and in other ways were concerned with ideas. By contrast, Reagan (1996) reported how people in all cultures throughout human history have educated their offspring into responsible and productive adulthood, but the history of education, like that of the actively proselytized intellectual traditions, "has focused almost entirely on the ways in which" Western educational tradition, like the intellectual conventions that drove and continue to drive it, "emerged, developed, and changed over the course of the centuries" (p. ix). This Eurocentric intellectual positioning and value orientation is exclusive of most others, particularly the African.

## Sparsely Charted Africa's Intellectual Property and the World's Intellectual Traditions

Social thought and ideas are the features of every human community. Thus, by intellectual traditions, I am invoking, inclusively, human thoughts and ideas in context, whether written, oral, captured in an array of art forms, or inherent in a range of practice and human action. Of course, men and women and children who tend to be forgotten contributors created, discussed, wrote about, or acted out intellectual properties, mostly in unexplored ways in Africa and other parts of the non-Western world that Kagitçibasi (1996) has fittingly designated the Majority World in contradistinction to the Majority (Western) World. Human development scholarship in Africa mostly occurs within the crosscurrents of the

intellectual waters of the Minority World to inattention to and detriment of Africa's timeless intellectual traditions. For example, the evidence for research that explores and charts the intellectual facets of Africa's long-standing, rich traditions of preparation of the young for life that has contributed to produce incomparable icons in Madiba Nelson Mandela (see Nsamenang, 2004; Brown & Shumba, 2011) and exceptional leaders like Julius Nyerere, Kofi Annan, and Bishop Desmond Tutu is quite sparse.

Fortunately, lines of scholarship in this direction are emerging, albeit slowly and timidly. They seek to generate knowledge about child development and socialization rooted in African ways of developing and knowing: analysis of traditional proverbs (Ali, 2011), Grounded Theory building (Nsamenang, 1992a; Ramokgopa, 2001), and documentation of parental theories of child development. Indeed, a number of researchers have explored and documented African parental theories of child development and social ontogenesis (e.g., Nsamenang, 1992a; Ramokgopa, 2001) in general and African conceptions of children's intelligence in particular (e.g., Bissiliat, Laya, Pierre, & Pidoux, 1967; Dasen et al., 1985; Serpell, 1993; Kathuria & Serpell, 1998; Nsamenang, 2006). These lines of research ought to gain support and accentuated focus, as they could contribute not only to genuine understanding of Africa and African livelihoods but also to Africa's inputs to the extension and enrichment of Euro-Western intellectual legacies and establishment of a much desired but dimly visible African intellectual niche in global erudition.

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## Constructed Realism

The intellectual traditions of both lay and scientific communities grapple with the "reality" of their worlds, sociocultural histories, and life circumstances. Discussing constructive realism, Hwang (2012) classified reality into three categories: *reality itself* (*Wirklichkeit*), lifeworld, and microworld. *Reality itself* is something that is beyond human understanding; it is transcendent.

Hwang (2012) further asserted that human beings can understand only the worlds they have constructed with language (or imagery), which include the *lifeworlds* constructed by cultural communities in their long history of lived experiences and the *scientific microworlds* constructed by scientific communities, as individual scientists and/or as scientific societies. Surmising from this conceptualization, we may interpret reality to be transcendent, existential, or experiential and expectant, imagined, or hoped for; human beings may vicariously perceive or feel but cannot understand transcendent reality. While humans are in varying circumstances of existential or experiential reality, they are only envisaging or hoping for other forms of reality, which psychological research has seldom taken into consideration, much less included in research agendas. Transcendent and imagined or hopeful reality makes sense for spirituality and religious beliefs and practices, which are forcefully obvious features of human societies.

The separation of the knowable world into lifeworld and scientific microworld is potentially helpful and should be taken into serious account in efforts to cope with and transcend the problems and challenges encountered in context-relevant human development scholarship. In this respect, Hwang (2012) posited three levels of considerations for the advancement of indigenous psychology in particular and inclusive psychology in general, namely, philosophical reflection, theoretical construction, and empirical research. On the level of philosophical reflection, Hwang (2012) counseled indigenous psychologists to propose a philosophy that is able to explain the essential difference between knowledge constructed by scientists after the fourteenth-century European Renaissance and that which has been developed by people of non-European cultures, particularly Africans, during the course of their traumatic colonial histories, hence the calls for the decolonization of psychology (Viruru, 2001; Lareau, 2003; Chilisa, 2012). Hwang's (2000) review and comparison of previous discourses on the difference between the types of knowledge constructed in the lifeworld and the microworld (see Table 14.1) revealed five

**Table 14.1** Two types of knowledge in lifeworld and scientific microworld

| Knowledge concerns       | Lifeworld                  | Scientific microworld   |
|--------------------------|----------------------------|-------------------------|
| Constructor              | Cultural group             | Single scientist        |
| Ways of thinking         | Originative thinking       | Technique thinking      |
| Types of rationality     | Substantive rationality    | Formal rationality      |
| Patterns of construction | Participative construction | Dominative construction |
| Functions of worldview   | Meaning of life            | Recognition of world    |

Adapted from Hwang (2001)

concerns, namely, the constructor, ways of thinking, types of rationality, patterns of construction, and functions of worldview, a revelation that makes considerable sense for multiple developmental pathways with broad but hitherto largely muted common features rather than a single, universal trajectory or rational intellectual history that seeks to capture all others.

The microworld of scientific knowledge is constructed by single scientists within scientific societies like the American Psychological Association, Asian Psychological Association, and Pan-African Psychology Union, while the language and knowledge used by laypeople in their lifeworlds are constructed by a group of people who belong to or are living with the same cultural background usually for a long period of time. In the originating years of a particular culture, people concentrate themselves on observing the external world and contemplating the nature of every object in their lifeworld (Hwang, 2001). They try their best to capture everything in the language they have created to represent it. Heidegger (1966) labeled this way of thinking *originative thinking* or *essential thinking*. In contrast, the language used by scientists to construct microworlds of scientific knowledge, Hwang (2000) contends, is intentionally crafted to attain a specific goal or to serve a predetermined end. The language has a compulsory and “aggressive” character that demands the most gain with the least cost and is a product of *technical thinking* or *metaphysical thinking* from Heidegger’s (1966) perspective, as compared to social intelligence of

Mundy-Castle (1975) and responsible intelligence of Nsamenang (2006).

## Holism and Cartesian Dualism in Theorizing Human Development

From the perspectives of insiders living in a given society, collective consciousness and social representations are all rational (Durkheim, 1965). But there is a fundamental difference between the rationality used for constructing a scientific microworld and that used in a lifeworld. In their lifeworlds, people emphasize the importance of *substantive rationality*, which refers to the value of ends or results judged from a particular position; Africans drape theirs in holistic thinking, sociogenic considerations, and transcendent frames of reference. This is completely different from the so-called *formal rationality*, a product of the European Renaissance which Western scientists have since used to create and construct scientific microworlds. Formal rationality emphasizes the importance of goals or results and provides no clear-cut means and procedures for reaching them (Hwang, 2000), although the reigning methods and procedures of scientific psychology appear to be touted as immutable. Only a few persons adequately trained into the scientific posture master and become familiar with the Euro-Western scientific means and procedures which they can use to pursue worthy goals. Nevertheless, the scientific method, a Western bequest, is such a versatile frame of reference that could and ought to be systematically applied to all data sources across the globe.

Substantive rationality pays attention primarily to value-neutral facts and the calculability of means and procedures that can be used by everyone to pursue their personal goals (Brubaker, 1984). It positions human beings and nature as parts of an inseparable entity that can be viewed as a consciousness of cosmic holism (Bongmba, 2001; Tylor, 1929), and it primes synergy and harmony with nature, human beings, and cosmic forces.

Scientists, on the other hand, construct their microworlds using Cartesian dualism through

*dominative construction* (Shen, 1994). They construct these scientific microworlds mainly about quantifiable aspects of the external world in order to attain the goal of controlling and utilizing nature. Their focus on quantification is as if non-measurable dimensions of human functioning and the world are unreal and do not influence developmental outcomes and motives. In so doing, scientists ignore that not all that can be counted matters and not all that matters can be counted. The worldview of a scientific microworld tends not to address issues related to the meaning of life, the end of life, and the afterlife. It is essentially different from the worldview of a lifeworld. It is critical to note that scientific microworlds are neither permanent nor absolutely certain; each has its own specific goal that can change with new evidence, hence the maxim that scientific truths are tentative. When a scientific goal loses importance or relevance, or when people are faced with new problems, scientists must construct new microworlds to address these problems. However, grand psychological theories and dominant narratives have persisted for centuries basically in their originative lexicons in spite of compelling new evidence of extensive cultural and racial mixing by way of information technologies, migrations, marriages, and the huge diversity of the human conditions and indigenous psychologies. In contrast, people construct knowledge in their lifeworlds through *participative construction*, as learners who are participants in their cultural communities, which change (Rogoff, 2003). Therefore, we must endeavor to chart the ideologies and implicit theories that frame lifeworlds as well as identify the methodologies they engender, which suspiciously and substantively diverge from those of scientific microworlds (see Chilisa, 2012; Owusu-Ansah & Mji, 2013). This calls for Grounded Theory development and innovative methodologies that address phenomena in context.

It is obvious from the foregoing that the worldviews of the lifeworld and the scientific microworld are essentially different. As people of a given culture contemplate the nature of the universe and the situation of humankind, they gradually formulate, with *originative thinking*, their

worldviews within the backdrop of their history. As a fused concept that encapsulates various facets of visualizing, relating to, and dealing with knowledge, the universe, and human affairs (Nsamenang, 2004), worldview may be interpreted as “a theorist’s view of development [that] is closely tied to his or her view of human nature, a view intimately tied to his or her conception of how the universe works” (Nsamenang, 1992a, p. 210). Serpell (1994) characterized the African worldview depicted in *Human Development in Cultural Context* (Nsamenang, 1992a) as a very *different frame of reference* from that which frames contemporary Western developmental psychology and that primes a sociogenic developmental trajectory that differs from the individualistic accounts of development espoused by Western scholars. On their part, Walsh and Middleton (1984) clarified that a worldview usually answers four broad categories of questions: (1) Who am I? (2) What is my situation of life? (3) Why do I suffer? (4) How do I find salvation? Generally speaking, a worldview describes not only human nature but also the relationship between an individual and the external environment, as well as the individual’s historical situativity in the world. The historical situation is “a past that is culturally present as tradition” and that has been “encoded in customs rather than genes and transmitted socially rather than biologically” (LeVine, 1974, p. 227). Worldview forcefully provides a diagnosis for problems and prescribes a recipe for their solution. The worldview in a scientific microworld does not serve such a function; it is formalized and compartmentalized into specialized domains knowable only to a select few—scholars, scientists, and the so-called experts—who are often unknowledgeable of the lifeworlds of the people of their research, scholarship, and expertise, the people they are called upon to “help,” serve, or understand. In his lexicon theory, Kuhn (1987) indicated that the scientific lexicon is composed of a set of terms with structure and content. Scientists use terms in the lexicon to make propositions in theory for describing the nature of the world. Theory and lexicon are inseparable. The microworld of a theory cannot be understood

without its specific lexicon, which is not universal but is culture-imbued, context-bound, and time-framed.

In order to think about the same problem and engage in related research in the same scientific community—human development research in Africa, for example—scientists must at best share the same worldview or at least be sensitively tuned to the diversity of worldviews and livelihoods in their lifeworlds and research terrains. One of the key issues African scholars need to resolve is a series of tensions, among which are the tensions between the spiritual and the material, traditionalism and modernity, the universal and the specific, and the global and the local realities. Africa's knowledge generation and dissemination capacity depends upon how effectively Africa's scholars are able to do this—to theorize and research Africanity (indigenous Africa) within the crosscurrents of Euro-Western methodologies and epistemes. Generative education and Grounded Theory research, which invokes an ecocultural approach to research, can play a central role in bridging these and other dichotomies.

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### **Seeking Africentric Knowledge of Human Development**

The three routes by which I think we could reduce the chasm between knowledge constructed within laypeople's lifeworlds and scientists' micro-worlds are generative education or participative learning, ecological research, and localization or contextualization of school curricula. First, the curriculum for psychology education and training (see Silbereisen, Van IJzendoorn, & Zhang, 2013) should include sensitivity to the cultural diversity and human conditions that exist to be explored, particularly in Africa's diverse ecocultures. Furthermore, such education should ensure mastery and application of the scientific method in every context. Second, an ecological research approach would foster researching phenomena as they exist in their ecocultural contexts and not as crafted or defined by experts and scientific micro-worlds. The third point that encompasses the other two is to localize psychology curricula by

developing pedagogies and contents that are more in harmony with local languages, cultural values and traditions, and the livelihoods of research participants. The field of curriculum localization, however, is one of considerable contestation. Teasdale (1998) contends that the imported school curricula from the West have taken a deep hold in and a heavy toll on Africa and have proved highly impervious to change, even more so than in the West itself. True curriculum localization can only be achieved from within (Teasdale, 2008). This would permit indigenous or local peoples to own all aspects of the education of their people. A UNESCO workshop reaffirmed this principle (Wilson & Hunt, 2000). Local cultures must be in control of the curriculum: first, the education system must be developed in the culture it serves and be owned by it, and, second, it must provide the knowledge and skills necessary for the development of the culture (Wilson & Hunt, 2000, p. 167). Things may not be logically consistent, but they ought to be culturally and "spiritually" consistent with the country's or cultural community's stark realities. It does not matter if there are ambiguities and discontinuities (Teasdale, 2008, p. 129).

The heritage from the colonial period lives on, even in countries that have been decolonized for several decades; its hegemony being nowhere more apparent than in the content and processes of education curricula, especially those of scientific psychology in Africa. This hegemony has been reinforced in recent years by the ever-increasing influence of globalization (Teasdale, 1998); although the countervailing force of localization that seeks local cultural relevance should receive greater attention, it instead tends to be ignored. In many cases it is not even noticed at all. For people to become true global citizens, they must first retain and anchor in their own deep local values and identities (Nsamenang, 2008). The response to globalization must focus equivalent, if not more, emphasis on the local; that is, global and local forces must be analyzed as a pair and not forgetting the right to a cultural identity. Against global forces, it takes much determination and considerable effort to nurture local knowledge and languages and to ensure



their effective and balanced representation not only in the curriculum but also in local knowledge generation and dissemination. Theorization and methodological innovations in Africa are at a relatively early stage in their attempts to achieve these goals. Nevertheless, as hinted earlier, emerging Africentric theorizing and research innovations are apparent but require more audacious efforts and active support for greater productivity and more influential enhancement.

Humans commonly think of tension in terms of conflicts between opposing sides that lead to violence or fights and wars, where only one side can win. We talk, for example, about ethnic tensions in Somalia and Congo Democratic Republic and between Sudan and Southern Sudan, which are highly negative and physically destructive tensions. This is not the kind of tension that I am referring to; there is pervasive, existential tension in Africa inherent in the imperatives from three significant civilizations—indigenous African, Islamic Arabic, and Western Christian—coexisting in the same African communities and individual psyches but which are largely muted. This idea of tension characterizing Africa's developmental ecologies and practices deserves focused analysis, as it is an unprecedented theoretic gold mine.

### **What Is Africa and What Knowledge Can It Contribute to Global Knowledge Systems?**

Have Africans ever contemplated on their own terms what Africa is or figured out what its knowledge systems and intellectual traditions are or should be? Discourses on this and other African affairs need to be mounted, pursued, and clearly charted, particularly in the sphere of human development and individuation, by African scholars.

What Africa is and what human development knowledge, properly defined and scientifically sourced, would Africa's scholars seek to generate and disseminate are a sore scientific challenge for scholarship in and about Africa. The challenge becomes more forceful and instigative with the

growing awareness that, hitherto, outsiders have defined Africa and "told" Africans what to do and what is "good" for their continent and its peoples. Indeed, over the centuries and persisting today, Africa has been a major recipient of alien influences, including scientific psychology, which have been vigorously imposed rather than solicited (Nsamenang & Dawes, 1998). Wober (1975) insinuated, persuasively but provocatively, that psychological research would be different in the hands of Africans because expatriate researchers introduced their values and biases into their research in Africa. Most psychologists in non-Western countries, particularly in Africa, adopt conceptual frameworks, theoretical models, and research methods developed by Western psychologists when conducting research in their native societies (Kao & Sinha, 1997). As such, their research findings may be irrelevant to the psychology of the local people and thus are unable to understand and solve problems faced by people in their daily lives. Most knowledge in scientific psychology has been developed in the USA. American psychologists usually focus on issues relevant to their home society both as research topics and as the framework for theoretical construction (Moscovici, 1972). Berry, Poortinga, Segall, and Dasen (2002) have outlined the following four levels of ethnocentric bias in Western psychological research:

1. Selection of items and stimuli in a research instrument
2. Choice of instruments and procedures
3. Definition of theoretical concepts
4. Choice of topic for research

In the light of the foregoing, one would imagine that African scholars should individually and collectively reflect within globalizing trends in psychology scholarship and anchor their scholarship on what Africa is and what its knowledge systems, developmental goals or norms, and skills repertoires are or, more accurately, should be. African scholars must become sensitive to and work from the fact that their scholarship has been and continues to be significantly stunted by Western societal beliefs, value systems, and ideo-

logical perspectives (see Ojiaku, 1974, p. 209) to the detriment of their own knowledge systems, theories of the universe, and livelihoods. Human development scholars must be aware that Africa's ways of thinking about children and their development tend to be significantly short-chained into irrelevance and extinction by directive Western theories and narratives (Nsamenang, 2012a, p. 90). Therefore, the gargantuan challenge on which to platform African scholarship is: If Euro-Western imageries and scholarly hegemones have so devalued and rendered African knowledges and developmental phenomena anti-progressive (Callaghan, 1998) or rendered them inappropriate, how would Africa's scholars ever hope to "contribute scientific knowledge of universal value" (UNESCO, 1999) into global knowledge systems? How would they ground knowledge generation in African realities without Africa-centered epistemes, theories, and research methods?

This challenge implicates what individual African scholars and scholarly societies, with their willing Africanist peers, can do to decidedly clarify what Africa or its human development knowledge is. It behooves African scholars to initiate, sustain, and actualize research on discourse of "making known the voices of African researchers in the field of child development; giving voice to indigenous African practices and concepts; and work towards the expression of a collective African voice on these matters" (Serpell, 2013). It equally entails strategizing, on individual and collective platforms, how to handle Africa's multiple needs in the face of the continent's tremendous resources that have been exploited for centuries by Westerners for their own interests and with pitiable benefit to Africa (Nsamenang, 2007; Pence & Nsamenang, 2008). The exploitation continues, while African governments persist in perpetual struggles to garner the means to research their own sorry state and to give their children a smart start in life. African scholars must transcend the tendency to antagonize, fault, or downgrade the Africentric work of peers and begin to concert on how to collegially promote or improve them. More importantly, African scholars ought to learn and work from how Eurocentric

scholarship has advanced and continued to progress, not from undermining and destructive criticism, but from constructive, additive research. Thus, it is antiprogressive to criticize without proposing an alternate concept, theory, or perspective. It is time to act on Murayama's (1997) concern whether African scholars must continue to be voiceless and dissatisfied in efforts to generate science-based knowledge from the continent's centuries-old wisdom (Callaghan, 1998) or to continue with their exasperation, silently coping the West. Such disquiet is not only for Africans; it is more so about the myopia of a scientific discipline that is not so sensitive to its subject matter in global perspective, a significant inadequacy of a purported scientific discipline with limited relevance to and applicability on African phenomena.

### **Researching Africa's Universe of Human Ontogenesis**

Human ontogenesis, the story of individual development across the life cycle, occurs in all human contexts and cultures across the globe. Human development scholarship in Africa, as elsewhere, must first understand the directive theories of the people under study, the place of the human being in their universe, and specifically how people in each cultural context think about and prepare children for life. The last point should be the focal subject matter for human development scholarship, given the implausibility of a universal human ecology. That is, a universal child development environment does not exist; child development occurs in a specific physical and cultural setting and not in a universal context or civilization. In fact, every cultural community possesses a worldview or theory of the universe that frames its conception of the child and his or her preparation for adult life (Nsamenang et al., 2008). Ochs (1988) posits at least one theory of knowledge for every culture that specifies the limits of knowledge and the path to its acquisition. Bram (1998) elaborates that the unique features of a culture are its system of values, norms, ideologies, beliefs, symbols,

and signs that cumulate into one whole system singular to that culture. We must be wary that these features of Africa's knowledge systems are not exactly congruent to those of Western epistemes within which scientific psychology was crafted, sustained, and proselytized into Africa.

An African theory of the universe is holistic and theocentric in its outcomes on outlooks and modes of life; it acknowledges everyone's humanity and bestows an omnipresent spirituality on to being human (Nsamenang, 2011; Nsamenang et al., 2008). The holism of Africa's non-Cartesian cosmology interconnects the sacred and the secular worlds to the human condition, visualizing them as conceptually inseparable (Bongmba, 2001). Anthropologist Levy-Bruhl (1966) indicated that the cultural systems of indigenous peoples are constituted on the law of mystical participation, which conceptualizes human beings and nature as parts of an inseparable entity that can be viewed as a consciousness of cosmic holism (Tylor, 1929). The theory of holism invokes an undividable interplay of secular and sacred forces to ensure the well-being of the people. It equally posits the indestructibility of the human life force, like the force in physics which only transitions from one life stage (form) to another. Force is never destroyed but converted to another form. For example, the life force is not decimated at death; it transforms into an afterlife in the ancestral world and spiritual realm (see Nsamenang, 2005a, 2005b). Although not overtly acknowledged in psychology, evidence of the afterlife can be discerned from funeral ceremonies and death wishes wherein the living requests the dead not to forget them. Many of the world's most visited monuments—e.g., the Washington Monument—are devoted to the dead. This brief account depicts a more complex picture of human ontogenesis than has hitherto been conceptualized and researched. This complexity, as explained earlier, exists at two main levels of reality: *reality itself* that is transcendent and cannot be understood by human beings and the *reality* that human beings have constructed with language, which includes the *lifeworlds* constructed by cultural groups in their long sociocultural history of development and the

*reality* of the *scientific microworlds* that has been constructed by scientists (Hwang, 2001).

African theories of the universe position the child as a cultural agent to whom various cultures teach or organize for children to teach themselves their cultural curricula at different stages of ontogeny. These theories situate the child as a cultural agent who must undertake a cultural curriculum at various stations of development. The family is central to this role, because it is the institutional hub in which childbearing and child-rearing are located, such that childcare is a collective enterprise rather than a parental prerogative (Nsamenang, 1992b). "Kinship is the nucleus from which social networks ramify, moral behavior is initiated and prosocial values, productive skills and the mother tongue are learned" (Nsamenang et al., 2008, pp. 55–56). The theory positions the child not in his or her lonesomeness or independence but as socially integrated into social networks. Meaningful development involves interconnectedness to networks of other humans at different developmental stages. Thus, values and their intergenerational continuity (Nsamenang, 2012b) are ingrained in family structures and reproductive roles and the treatment of and experiences or settings to which children at different ages and developmental stages are subjected or exposed. In spite of the often invoked negative effects, the social capital that flows from such human interconnectedness engenders strengths that prime resourcefulness and resilience, which sometimes generate outstanding accomplishments from conditions of poverty and extreme inequality but they are largely unexplored, hence uncharted.

Bare statistics of children in poverty and their desperate situation tend to mask the countless examples of domestic heroism by children in AIDS-affected families in Africa. Strength-based research in Kenya, Malawi, Rwanda, and Zambia suggests that family structures are more resilient than the international development field and human development researchers had expected (UNAIDS, 2006). Yet, most interventions in Africa continue to bypass such strengths and achievements, as such interventions have been framed by mind-sets and strategies of replacing

Africa's social capital and forms of resilience instead of understanding and enhancing them. Strength-based research would focus on how to create wealth rather than how to fight poverty. This is a provocative reality for Africa's human development scholars. Thus, it might be more fruitful and serviceable to ground research on the strengths of children and their families in Africa rather than on elusive so-called developmentally appropriate norms that have been derived from the realities of non-African childhoods.

Social capital, especially children's participation and responsibility, is inherent in African parental values that permit peer group life and support children's self-care, peer interstimulation, and performance of household duties from an early age. African peer cultures are significant developmental spaces not only for transmitting and innovating or/and creating values, which await exploratory discovery and enhancement, but also for original theory building and methods development (Nsamenang, 2015). From an early age, most children in Africa observe and participate in family tasks as well as in caregiving to younger sibs with little or no instruction, but with the guidance and encouragement of parents and peer mentors (Nsamenang & Lamb, 1995). This pattern of early learning through participation is rooted in African perceptions of children as social agents in their own "becoming" (Erny, 1968). African children can be studied in participatory processes "*as participants in cultural communities*" (Rogoff, 2003, p. 3), often in peer culture settings without the usual sense of classrooms and schools (Bruner, 1996). Social capital and agency are also noticeable in children's capacity to transcend adult models by creating their own social worlds, even when living up to adult demands and commands (Nsamenang & Lamb, 1995).

Children's agency (see De Bruijn, Van Dijk, & Gewald, 2007; Laye, 1954; Nyamnjoh, 2007; Nsamenang, 2012a) and protagonism have been recorded in young carers who support ailing parents or aging guardians, especially those affected by HIV/AIDS. Drawing on data collected in Western Kenya, Skovdal, Ogutu, Aoro, and Campbell (2009) reported how young carers

coped with challenging circumstances, often with skill and ingenuity. They concluded that children's ability to cope with adversity was determined by the extent of their community participation and proficiency in negotiating for social and material support from it. Their data revealed how young carers, on their own terms and initiatives, mobilized social support, engaged in income generating activities, and constructed positive social identities around their caring roles. In fact, sibling caregiving eased children's transition into adult roles after their parents' death from AIDS (Nsamenang, 2007). In brief, adversity and peer group processes breed a genre of resourcefulness in African children that has scarcely been captured by Euro-Western epistemes and research tools. Africentric research ought to innovate and capitalize on such inventiveness in young citizens and other unexplored facets of Africa's social capital and political economies.

Furthermore, in order to output research that transcends Eurocentric governing theories and narratives, scholarship in Africa must benefit from the fact that the early childhood developmental learning contexts of Africa's children offer opportunities (Curran, 1984) that have seldom been taken into explicit account by Euro-American theories and methodologies. In addition, the hybridism shaping the development and individuation of African children's personalities and cultural identities is an intermingling, like strands in a braid, of Eastern and Western-Christian legacies as they have been superimposed on to a resilient Africanity (Nsamenang, 2005a, 2005b). This *mélange* offers a novel theoretic and methodological terrain which no existing theory fittingly explains and no antecedent evolutionary template exactly corresponds to its triple-strand braid (Nsamenang, 2005c, p. 276). In other words, Africa's existential hybridism exuding the concocted developmental trajectories and educational ideas from Africanity (indigenous Africa) and imported heritages and legacies of the Islamic-Arabic world and the Christian-scientific West offer unprecedented opportunities for innovative theorizing and methodological creativity to transcend the insularity of Euro-Western theories and methodolo-

gies to developmental phenomena. The differentness of the African sociocultural landscape ought to oblige “research that interrogates policy (instead of informing it)” and that dissuades the “construction of *a* knowledge which is exclusive of many other knowledges” (Urban, 2006). Thus, researchers should adopt a learning posture (Agar, 1986), a discovery mind-set, and an exploratory approach to researching the human condition in Africa (Nsamenang, 2005a, 2005b). With such an orientation, it is possible to learn, discover, and chart patterns of human ontogenesis in any context.

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### **Toward Contextually Relevant Human Development Research in Africa**

The history of research on African child development or on efforts to care for, educate, and guide children’s development in Africa has focused overwhelmingly on models with origins from outside Africa, especially from Europe, the USA, and Islam. These models have been advocated as the universal ideals for preparing the next generations as if development occurs in a universal context. As such, they mostly disregard the contextual embeddedness of the human being and the situativity of developmental phenomena in context. We need to be reminded by Jean Piaget (1973) who has not often been associated with the nuanced consideration of culture and context. Piaget (1973) reflected on the importance of both as follows: The human being is immersed right from birth in a social environment, which affects him just as much as his physical environment. Society, even more, in a sense, than the physical environment, changes the very structure of the individual. On his part, Bram (1998) explained that assigning value to the original culture and to the mode of early childhood care and education, for example, does not mean automatically accepting every custom, nor does it mean adopting cultural relativism. It does mean recognizing that in every culture there are worthwhile elements, and that if these are rapidly replaced by other models, this will be harmful, rather than productive.

These insightful clarifications call for a strength-based approach that should focus on positive ideas, values, and practices of a people and its community and how to source the science-based evidence for enhancing and utilizing them.

If Africans lack science-based evidence and psychological insight into their contexts and their challenges, two frameworks—generative curriculum model and Grounded Theory research design—can inspire and guide the systematic generation of culturally sensitive and contextually relevant knowledge about Africa. The core features of these frameworks are sketched in the next subsections.

### **The Generative Curriculum Model**

Generative learning is a style of learning that incorporates existing knowledge with new ideas based on experimentation and open-mindedness. This style of learning encourages individual and team creativity, resulting in a new way of viewing old methods and taken-for-granted knowledge and procedures. Organizations, for example, rely on the generative learning style to adjust to changes in the market, technology, and society. Generative learning activities ought to provide the students with opportunities to mentally “play with” information to create a personal understanding of the subject being learned. Learners actively participate in the learning process and generate knowledge by forming mental connections between concepts. Two types of generative activities are:

1. Activities that generate organizational relationships (titles, headings, questions, objectives, summaries, graphs, tables, and main ideas).
2. Activities that generate integrated relationships between what the learner knows, sees, hears, handles, or reads and memory (demonstrations, metaphors, analogies, examples, pictures, applications, interpretations, paraphrases, inferences). Both the teacher and learner must draw from the context(s) in which teaching and learning are happening. In



more specific terms, how do learners connect what they are learning to their communities to make it more meaningful and how do teachers facilitate this process?

Generative teaching (Wittrock, 1990, 1991) is an approach to teaching that combines strategies and attempts to help students become *active* and *responsible* for *constructing meaning* from activities of teaching-learning microworlds by *building relations* (1) across subject-matter concepts, (2) between the subject matter and students' existing knowledge, and (3) linking their learning microworlds to their existential lifeworlds. Learners actively do this for and with their learning contexts. Within the generative teaching model, the teacher has the following responsibilities:

1. To teach students that learning with understanding is a generative (active) process.
2. To teach students that success in school begins with a belief in themselves, in their abilities, and in the value of effort.
3. To teach students to attend to the processes of constructing meanings for instruction and for subject matter.
4. To teach students to generate meaning for what they are studying, particularly by building theory-practice associations and meanings in the contexts of their daily life.

Thus, the model of generative teaching focuses on enabling the students to remain actively engaged and to use this engaged time as productively and responsibly as possible. Sometimes the generative teacher will use direct instruction and sometimes a more student-centered approach. However, this model assumes that even during direct instruction, effective learning will occur *only if the learner generates relationships* (Wittrock, 1990, 1991).

Determining what materials to teach in a course can be one of the most challenging tasks a teacher faces. Students have so much to learn—and so little class time in which to begin to learn it. How do we make decisions about what to include in a course? What material is going to be the most fruitful? In teaching for

understanding, the answer is “generative topics.” Generative topics are issues, themes, concepts, and ideas that provide enough depth, significance, connections, and variety of perspectives to support students' development of powerful understandings. A generative curriculum is a creative, intuitive curriculum because it derives in a creative and intuitive way from the ongoing life of the classroom and its community, which should be interpreted as local, regional, national, and global, depending on the course and themes of focal interest. But a generative curriculum is not a freewheeling, anything-goes effort. Fisher and Cordeiro (1994) explain that it must have predetermined boundaries, directions, and goals that become naturally evident through the dynamic collaboration of the teacher and learners. It starts and develops with learner's interests, interests that remain at the center of the focal concern and inquiry or learning content. As children and teachers pursue areas of interest, new curriculum is created collaboratively; learning becomes not only dynamic but context centered such that one avenue of interest leads to another. As themes and topics are initiated and pursued throughout the year, connections and relationships are made. Working with curriculum this way allows for authentic learning and provides teachers with opportunities to be learners, too. Teachers become learners of contextual and global issues who teach (Cordeiro, 1993), and the learners become curriculum coordinators with teachers. Such a curriculum would foster lifelong learning (Fisher & Cordeiro, 1994a, 1994b).

In a generative curriculum, there is a continuous interplay between content learning and process learning (Fisher, 1991). Learners apply the processes of reading, writing, speaking, listening, art, music, drama, mathematics, and participative learning to gain meaning and understanding from the content areas of the course of study with peer and teacher exchanges playing an important part in linking these processes to the content and the stark realities of life. Content is learned through process, and process through content; the two complement and enhance each other.

## The Grounded Theory Research Design

The phrase “Grounded Theory” refers to theory that is developed inductively from a corpus of data (Borgatti, 2013). If done well, this means that the resulting theory at least fits one dataset perfectly. This contrasts with theory derived deductively from grand theory, without the help of data, and which could therefore turn out to fit no data at all (Scott, 2009). The extent to which mainstream developmental theories fit the “fact” and realities of child development in Africa in particular and child development in global perspective is at best not fully substantiated because the datasets on which the extant theories have been built were obtained from limited non-African samples of human conditions and contexts. The Grounded Theory method (Glaser & Strauss, 1967) is a systematic methodology in the social sciences involving the discovery of theory through the analysis of data (Faggiolani, 2011). Grounded Theory method was developed from research on dying hospital patients by Glaser and Strauss (1965), two sociologists. In this research they developed the constant comparative method, which they later referred to as the Grounded Theory method (Glaser & Strauss, 1967).

Grounded Theory is a *research method* that will enable *theory building* that offers an explanation about a target phenomenon in context. As such, it is a research tool which enables the researcher to seek out and conceptualize the social determinants of development in a selected area of interest through the process of constant comparison. It permits the researcher to act a bit like the “X-ray machine” of her or his social world. But the term “Grounded Theory” is used in two ways: (1) if you adhere to the strictures of Grounded-Theory-the-research-method, you will engage in a research process that will produce (2) a theory-which-is-grounded-in-data, i.e., a Grounded Theory. Thus both the research method and the output of the research process have the same name—which can be confusing! The quality of that theory will depend upon your skills and the

skills you develop as you research. Grounded Theory method is a research method which operates almost in a reverse fashion from traditional social science research. Rather than beginning with a hypothesis, the first step is data collection, through mixed methods. From the data collected, the key points are marked with a series of *codes*, which are extracted from the text. The codes are grouped into similar *concepts* in order to make them more workable. From these concepts, *categories* are formed, which are the basis for the creation of a *theory* or a reverse engineered hypothesis. This contradicts the traditional model of research, where the researcher chooses a theoretical framework and only then applies this model to the phenomenon to be studied (Allan, 2003).

The Grounded Theory method gives the researcher freedom to generate new concepts explaining human behavior (Glaser, 1994, 1995). This freedom is optimal when the researcher refrains from taping interviews, doing a pre-research literature review, and talking about the research before it is written up. These rules make Grounded Theory different from most other methods using qualitative data. Studying the literature of the area under study gives preconceptions about what to find, and the researcher gets desensitized by borrowed concepts. Instead, grounded theories in other areas and Grounded Theory method books increase theoretical sensitivity. The literature should instead be read in the sorting stage being treated as more data to code and compare with what has already been coded and generated (Glaser, 1994, 1995). The use of description in a theory generated by the Grounded Theory method is mainly to illustrate concepts. In most behavioral research endeavors, persons or patients are units of analysis, whereas in GT the unit of analysis is the incident (Glaser & Strauss, 1967). Typically several hundred incidents are analyzed in a Grounded Theory study since usually every participant reports many incidents.

Grounded Theory takes a case rather than variable perspective, although the distinction is nearly impossible to draw. This means in part that the researcher takes different cases to be wholes,

in which the variables interact as a unit to produce certain outcomes. A case-oriented perspective tends to assume that variables interact in complex ways, and is suspicious of simple additive models, such as ANOVA with main effects only. The Grounded Theory approach, particularly the way Strauss develops it, consists of a set of steps whose careful execution is thought to “guarantee” a good theory as the outcome. Strauss would say that the quality of a theory can be evaluated by the process by which a theory is constructed. (This contrasts with the scientific perspective that how you generate a theory, whether through dreams, analogies, or dumb luck, is irrelevant: the quality of a theory is determined by its ability to explain new data.) Although not part of the Grounded Theory rhetoric, it is apparent that grounded theorists are concerned with or largely influenced by emic understandings of the world: they use categories drawn from respondents themselves and tend to focus on making implicit belief systems explicit. The basic idea of the Grounded Theory approach is to read (and reread) a textual database (such as a corpus of field notes) and “discover” or label variables (called categories, concepts, and properties) and their interrelationships. The ability to perceive variables and relationships is termed “theoretical sensitivity” and is affected by a number of things including one’s reading of the literature and one’s use of techniques designed to enhance sensitivity. Of course, the data do not have to be literally textual—they could be observations of behavior, such as interactions and events in a restaurant or expressions of parental values and practices.

The primary focus of the Grounded Theory method is not a search for the “truth” but to conceptualize or theorize what is happening in a given context or situation by collecting and using data from empirical research. In a way, Grounded Theory method resembles what many researchers do when retrospectively formulating new hypotheses to fit data. However, applying the Grounded Theory method, the researcher does not formulate the hypotheses in advance since preconceived hypotheses result in a theory that is ungrounded in the data (Glaser & Strauss, 1967).

If the researcher’s goal is accurate description, then another method should be chosen since Grounded Theory is not a descriptive method. Instead it has the goal of generating concepts that explain the way that people resolve their central concerns regardless of time and place. The assumption is that human actions are framed within and driven by discernable but implicit theories and motives. For instance, every culture offers “a framework for understanding the ways that parents think about their children, their families and themselves, and the mostly implicit choices that parents make about how to rear the next generation” (Harkness et al., 2001, p. 12). In this light, when Moll and Greenberg (1990) found “significant funds of knowledge” in communities, they pointed to how scholars and researchers who look for specific epistemic knowledge and skills repertoires tend to overlook or bypass those of other epistemologies.

Grounded Theory method is a systematic generation of theory from data that contains both inductive and deductive thinking. One goal is to formulate hypotheses based on conceptual ideas. Others may try to verify the hypotheses that are generated by constantly comparing conceptualized data on different levels of abstraction, and these comparisons contain deductive steps. Another goal of a Grounded Theory study is to discover the insiders’ main concern and how they continually try to resolve it. The questions the researcher repeatedly asks in Grounded Theory research are what’s going on? What is the main problem of the insiders, and how are they trying to solve it? These questions should eventually be answered by the core variable and its sub-variables and properties.

Since their original publication in 1967, Glaser and Strauss have disagreed on how to apply the Grounded Theory method, resulting in a split between Glaserian and Straussian paradigms. This split occurred most obviously after Strauss (1987) published *Qualitative Analysis for Social Scientists*. Thereafter, Strauss and Corbin (1990) published *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. This was followed by a rebuke by Glaser (1992) who laboriously highlighted the differences in

what he argued was original Grounded Theory and why, according to him (Glaser, 1992), what Strauss and Corbin (1990) had written was not Grounded Theory in its “intended form” but was rather a form of qualitative data analysis. This divergence in methodology is a subject of much academic debate, which Glaser (1998) has referred to as a “rhetorical wrestle.” It is noteworthy that considerable orientation to human development research is suffused with scientific “wrestles” or debates, which, per se, do not address the focal phenomena.

Glaser’s Grounded Theory method emphasizes induction on to or emergence from datasets, and the individual researcher’s creativity within a clear frame of stages, while Strauss is more interested in validation criteria and a systematic approach. Kelle (2005) reasons that the controversy between Glaser and Strauss boils down to the question of whether the researcher uses a well-defined “coding paradigm” and always looks systematically for “causal conditions,” “phenomena/context, intervening conditions, action strategies,” and “consequences” in the data or whether theoretical codes are employed as they emerge in the same way as substantive codes emerge but drawing on a huge fund of “coding families.” Both strategies have their pros and cons. Novices who wish to get clear advice on how to structure data may be satisfied with the use of the coding paradigm. Since the paradigm consists of theoretical terms which carry only limited empirical content, the risk is not very high that data are forced by its application. However, it must not be forgotten that it is linked to a certain micro-sociological perspective—implicit cultural theories and motives. Many researchers may concur with that approach especially since qualitative research always had a relation to micro-sociological action theory, but others who want to employ a macro-sociological and systems theory perspective may feel that the use of the coding paradigm would lead them astray (Kelle, 2005).

Critiques of Grounded Theory have focused on (1) its misunderstood status as theory (is what is produced really “theory”?), (2) the notion of “ground” (why is an idea of “grounding” one’s

findings important in qualitative inquiry—what are they “grounded” *in*?), and (3) the claim to use and develop inductive knowledge. These criticisms are summed up by Thomas and James (2006) who suggest that it is impossible to free oneself of preconceptions in the collection and analysis of data in the way that Glaser and Strauss say is necessary and possible. They also point to the formulaic nature of Grounded Theory method and the lack of congruence of this with open and creative interpretation—which ought to be the hallmark of qualitative inquiry. They suggest that the one element of Grounded Theory worth keeping is constant comparative method. They think that Grounded Theory method was developed in a period when other qualitative methods were often considered unscientific. Its academic rigor achieved widespread acceptance.

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## Conclusion

Psychologists in general and researchers in particular are not neutral, insentient knowledge generators (Nsamenang, 1999). Psychological research draws the person-in-the-scientist and his or her sociohistorical background (Cole, 1988) into the research process and interpretation of research findings, along with questions about why some but not other research themes and sites are of interest and how and to whom research findings are valuable and useful and for what purpose. Researchers apply their cultural and ideological lenses, using the sentiments and values they have as humans to study “other” human beings (Redfield, 1959). In addition, the bulk of published research on human development in Africa has been published by expatriates (Wober, 1975), including missionaries, itinerant, and tourist researchers (Nsamenang, 1992a). Ogbunwezeh (2005) “shouts” out that the face of Africa has been so brutally battered by a cross-pollination of fatally unfriendly, foreign forces and voices that she is today lying prostrate, aground, and marooned in the sandbanks of underdevelopment, largely unaware of herself. In this sense, the chronicles of African history in general and accounts of human development in

particular are externalized reports and perspectives, hence the need for African voices in the ontogenesis of their own children and people.

Tacitly, this essay has recommended and attempted to sketch the contours of an ecocultural research approach in which the context of human development and the culture it exudes are of central interest. Thus, it behooves African scholars to focus on contextually relevant and culturally sensitive research to source Africentric knowledge of human development. African cultures emit pronatalist reproductive values and parenting ethos that focus on socializing the meaning of life, individuation or self-definition, and identity formation within the socio-affective field rather than into lonesome individualism (Nsamenang, 1992a, 2004). In fact, Africa's life cycle, sociogenic developmental trajectory (Nsamenang, 1992a, 2005b) "differs in theoretical focus from the more individualistic accounts proposed by Freud, Erikson and Piaget" (Serpell, 1994, p. 18). Therefore, the call for Africentric scholarship of human development is direly required in the face of an African worldview that diverges from that which frames contemporary Western developmental psychology (Serpell, 1994) and African parents' conception of children and their development in moral terms and social considerations that have not been imagined in the dominant Euro-American developmental theories (LeVine, 2004). Africentric research should, however, not be undertaken in isolation but within the crosscurrents of global cutting-edge developmental scholarship. In so doing, scholars need reminding of Poortinga's (1999, p. 425) strong suggestion that "differences in behavioral repertoires across cultural populations should be understood against the background of a broader frame of commonness." He argued that overemphasis on cross-cultural differences in behaviors and negation of important invariance in psychological functioning across different cultures is not only "factually incorrect" but also "theoretically misleading" (Poortinga, 1999, p. 419).

Furthermore, we must note that assigning value to the original culture and to the mode of early childhood care and education, for example,

does not mean automatically essentializing that culture or accepting its cultural features wholesale. It does mean adopting cultural relativism. It does mean recognizing that Africa possesses worthwhile elements, and that if these are rapidly replaced by other models, this will be harmful, rather than productive (Bram, 1998). The cultural and physical contexts must always be taken into consideration since "The human being is immersed right from birth in a social environment, which affects him just as much as his physical environment. Society, even more, in a sense, than the physical environment, changes the very structure of the individual" (Piaget, 1973, p. 156). The handiest tool for contextual research is the rigorous application of the scientific method.

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## **Part V**

# **Intervention Strategies**

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Brain Powered Games (BPG) is a game-based, rehabilitation project developing software for children recovering from diseases that have neurological side effects, with an emphasis on children living in areas that are resource poor and lack the financial support for commercially available computerized cognitive rehabilitation therapy (CCRT) programs. Our group and others have demonstrated the feasibility and neuropsychological and psychosocial benefits of CCRT not only in Western cultures but also within the African context (for a review see Boivin and Giordani, 2009). Michigan State University's (MSU) Games for Entertainment and Learning Lab (GEL) has been developing the latest BPG prototype since May 2012. In this chapter, the primary goals of the project will be described, along with key concepts the games use to achieve

these goals, along with presentation of the details about a playtest first conducted in Uganda.

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## Prototype Goals

The primary goal of the BPG project was to develop a platform that was suitable for development of effective, culturally sensitive, and well-accepted rehabilitation training software for children in resource-poor and remote areas. To accomplish this, a prototype was developed with the following primary goals:

- Themed visual design
- Simple mechanics
- Custom data recording
- Server data storage
- Mobile deployment.

## Themed Visual Design

There are several disadvantages for many of the commercially available CCRT programs when they are used in rural, resource-poor, cross-cultural settings, such as sub-Saharan Africa. For example, most programs have a strong reliance on language-based instructions, and the games are not intuitively understood. In addition, even when there is a reliance on visual style and stimuli, these are most often designed for a Western

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audience. Even when games are reasonably simple to understand, children from non-Western areas may have noticeable difficulty relating to the topics (e.g., stimuli may include English letters, Western-based toys or household objects, or even figures representing unfamiliar or not culturally appropriate persons, such as pirates or Halloween characters). To help frame the exercises in a context for children in sub-Africa, the BPG team focused on objects and animals that are native to the area, taking inspiration from local African, and specifically Ugandan, art and animation aimed at younger audiences. The result was a combination of scenic backdrops with cartoon-like characters that can be incorporated into multiple games.

### Simple Mechanics

The children in settings such as sub-Saharan Africa are often not only young, but also have very limited experience with or access to modern technology. To overcome such challenges for these children in trying to interact with novel devices, such as complex-response buttons or computer-mouse interfaces, BPG was designed to have very simple interactions and response requirements. By limiting initial tasks to very simple mouse-click actions that give the players instant feedback, BPG programs introduce children, who in many cases have never interacted with a computer, to responses that are slowly and increasingly more demanding or complex. More complex game concepts, such as player avatars, were not included, based on early pilot testing, demonstrating that lack of experience with this concept would necessitate a slower learning curve. Future iterations will explore the possibility of introducing this more complicated feature.

### Custom Data Recording

By having custom-built games, the data being recorded can be carefully specified and adjusted. Non-Western and resource-poor areas come with a variety of variables to take into account, and

with flexible recording options, different research sites can include any necessary relevant information in the same location, rather than in separate data centers. As a project continues to grow or expand, the data collected can continue to be refined as needed.

### Server Data Storage

A challenge with many of the currently available CCRT systems is that the data and progress of each participant is stored locally on the presentation laptops or netbooks. This often restricts the subjects to using the same device and has limited ability to back up the data. In addition, flash drives used to back-up data are often easily corruptible and can lead to significant difficulty with transferring a computer virus as they are used across computers. With Brain Powered Games, the data is stored locally on the device, but can be easily and efficiently uploaded to an external server when connected to the Internet. With the data stored in a secure location, there's less risk of the data being lost to device failure or theft.

### Mobile Deployment

One issue also facing easy use of CCRT projects in many settings is the cost and fragility of computers used in the field, as well as often limited battery life. As a long-term goal for the project, the BPG game package was designed to be deployed across multiple devices, including mobile tablets and even smartphones. This would provide several advantages for research and educational teams:

- Easier to transport
- Longer battery life
- Touch screen interface
- Increasing phone and Internet availability throughout Africa.

Because teams often have to go out into remote areas to conduct their studies and meet with the children, device mobility is a very high

priority. Transport can range from a van or jeep to a motorbike or scooter, leaving little room for extra cargo. Having a lightweight device that can fit safely in a backpack or bag, also with less chance for breakage of hinges and with available on-screen responding, would be an ideal scenario for using devices in offsite and remote locations.

Due to unreliable access to electricity, a long battery life can ensure a play session can continue in the event of power failure with minimal loss of data and progress. The latest Macintosh iPads boast up to 10 h of constant use before requiring a recharge (Apple—Batteries—iPad 2013). A longer battery life also lends itself well to increasing the overall mobility of the device, allowing the team to travel further without having to stop and recharge, as well as the ability to rely on alternate approaches to power, such as smaller external back-up batteries or solar arrays.

The touch screen interface of tablet devices allow for the most direct interaction. In areas where access to modern technology is limited, the tools we use to interact with computers, such as the keyboard, mouse, or trackball, can appear foreign and unwieldy. Although most children adapt to these quickly, they still serve as an extra hurdle participants need to clear before they can start using the program effectively. While touch screens have a learning curve of their own, the ability to simply touch the object you would like to interact with is a more natural action than using other input options. Observations on the interactions using different devices are covered in the Playtest section, below.

Satellite-based wireless Internet access is rapidly expanding in Africa, and cell phone use in sub-Saharan is expanding exponentially, making the potential for inexpensive cell phone-based cognitive rehabilitation games enormous. As research continues on culturally appropriate and successful CCRT therapies, adaptation to the simpler cell phone platform would be the next step and would have tremendous potential as a true public health intervention for cognitive impairment due to various diseases (e.g., HIV, malaria, helminth infection, malnutrition, iron deficiency).

## Game Summaries

The Brain Powered Games package includes four core exercises with plans for expansion in future iterations. Each game includes a visual tutorial, several adjustable settings on the administrative side (Admin), and records gameplay data for research purposes.

### Butterfly

This is a simple game where a butterfly flies across the screen, and the player is tasked with clicking on it when it stops moving. Once the player clicks on it, the player earns ten points and the butterfly moves to a new location, and the process is repeated. The game continues until the player has scored a set number of points.

This game serves as a training exercise for the subjects, giving them a chance to become familiar with the game interface and using the mouse or trackball interface on the computer.

### Admin Settings

- Adjust the amount of total points that can be earned to demonstrate effective game play.

### Recorded Data

- Amount of time to earn half of the required points
- Amount of time to earn the second half of the required points
- Amount of mouse clicks during the first half of play
- Amount of mouse clicks during the second half of play
- Average time between correct mouse clicks
- Amount of missed mouse clicks.

### iSpy

iSpy is a memory game where the player is shown a scene with several objects. After a short time to memorize the scene, a screen appears and blocks the view. After a few seconds, the screen disappears and the scene is displayed,

again, this time with a new object added. The player needs to identify and click on the new object before time runs out. As the game progresses, more objects are added, and the player is required to find more. An additional mode is included that removes objects from the scene, and the player has to identify where the object used to be.

### Admin Settings

- Set the number of rounds
- Adjust the number of rounds before incrementing the difficulty
- Set the game modes to be additive, subtractive, or alternating between the two.

### Recorded Data

- Amount of missed clicks
- Amount of correct clicks
- Time it takes to complete the round
- Amount of objects to find during the round
- Whether or not the round was successful
- The game mode of the round (additive or subtractive).

## Stampede

In Stampede, the player is shown an animal to remember. A group of animals then run across the screen. The player needs to identify and click on the specific animal before it moves all the way across the screen. The number of animals that appear is based on the current round and the Admin settings. As the game progresses, the player is given multiple animals to watch out for.

### Admin settings

- Adjust the number of rounds
- Adjust the number of animals that appear per round
- Adjust the speed the animals travel across the screen.

### Recorded Data

- Amount of correct clicks
- Amount of incorrect clicks
- Amount of time to complete a round

- Amount of time the player spends on the animal screen
- Amount of animals that run across the screen
- Whether or not the round was successful.

## Whacky Animal

Whacky Animal is inspired by the whack-a-mole style of game. Similar to the Stampede game, the player is shown an animal to remember at the beginning of the round. A random animal will then pop up from the sides of the screen, and the player will have to click on the correct animal before they duck back behind the edge.

### Admin Settings

- Adjust the number of rounds
- Adjust the number of animals that appear in the round
- Adjust the number of correct animals in the round
- Adjust how long the animals appear on the screen.

### Recorded Data

- Amount of correct clicks
- Amount of incorrect clicks
- Amount of time to complete a round
- Amount of time the player spends on the animal screen
- Amount of animals that run across the screen
- Whether or not the round was successful.

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## Game Theory

### Digital Game-Based Learning

Much of the design for BPG was based around the theories of game-based learning and how they can apply to digital games. The concept behind digital game-based learning (DGBL) is to use elements of games to motivate students and facilitate learning. Games have many different aspects and mechanics that can support a learning environment (Coffey, 2009):

- Contextualized experience
- Goal oriented
- Dynamic scaffolding
- Motivated by fun.

### **Contextualized Experience**

Games offer a dynamic space that can be shaped to fit any scenario. They grant us great control over the variables in play, allowing us to craft a space that can demonstrate whatever concept we are trying to convey. This can be as simple as providing a visual theme to help frame the task in a context to which the players can relate.

Providing a more relatable game space was one of the main goals for the BPG prototype, as described earlier. Other CCRT programs are focused on a very Western audience to which non-Western children can have trouble relating. While such CCRT programs can still have a beneficial effect, framing in a context that has more meaning to the player can have a more powerful effect (Coffey, 2009). Providing a familiar play space makes for a more engaging, enjoyable experience with greater impact on children's rehabilitation.

### **Goal Oriented**

The goal of many games is to complete a task in order to win. Sometimes, it can be a simple task that only requires a player to retrieve an item for victory. Other times, a game may set up other smaller goals for the player to complete before they can get to the final item. For instance, if a bridge between the player and their end goal breaks, the player now has a new short-term goal (fix the bridge) which will help him or her achieve their long-term goal (reaching the end). Effective games are able to split up the long-term and short-term goals for the player in a way that they are completing the smaller tasks, but are always working toward the larger win scenario. When this balance is achieved, players will be more likely motivated to complete the tasks of their own volition.

Goals in the BPG prototype are used to show the players their progress throughout the game. In order to keep the tasks simple for this first iteration, the BPG goals were chosen to not be overly

complicated. Each game has a certain task the player must do a number of times to advance to the next difficulty. Future iterations of BPG will be exploring the concept of stacking goals during gameplay.

### **Dynamic Scaffolding**

Much like the way goals stack and increase in complexity, other components of games build off one another. Scaffolding is the theory of building off previous knowledge to overcome an obstacle that leads to a new challenge (Nadolny, 2013). In this way, effective games slowly build up concepts or mechanics that the player then uses in order to achieve his or her goals.

In the BPG prototype, the default difficulty setting for many of the games is set as a stepwise increment. With this setting, the games will repeat the same difficulty for three rounds before incrementing to the next level. In this way, the player gets a chance to become familiar with that setting before moving on. Some games also have alternate modes which use the same mechanics and techniques as before, but with a slight difference. *iSpy*, for instance, can alternate between finding objects that have been added to a scene and objects that have been removed.

### **Motivated by Fun**

Fun is a concept most people understand, but can be difficult to define in terms of what makes something fun, since there often is such an influence from personal preference. There are some theories we can look toward on how to craft an activity that draws on a player's intrinsic motivation. Jenova Chen describes a state of gameplay called Flow (Chen, 2006).

In order to maintain a person's Flow experience, the activity needs to reach a balance between the challenges of the activity and the abilities of the participant. If the challenge is higher than the ability, the activity becomes overwhelming and generates anxiety. If the challenge is lower than the ability, it provokes boredom. (p. 5).

Games that manage to match the difficulty as players learn and master new skills are said to put the players in to a state of Flow. In this way,

players remain engaged in their task, while learning new concepts and using them to overcome new obstacles. One of the guiding principles for BPG development was that the effects of Flow will not only make the experiments more enjoyable for the children, but also have a greater impact on their recovery.

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## Playtest

In March of 2013, a playtest or piloting study was conducted in Uganda to test out the viability of the BPG prototype and get feedback from the local team who would be using it in the field and the children who will be playing the games. Four children at the main research site were included, as well as five children from a remote, very rural location. This was followed by a second phase of the playtest, which was a pilot study in which a larger group of children actually went through the set of games for a specified period, along with both pre- and post-testing to briefly evaluate for cognitive changes and evaluate the extended efficacy of the games.

## Standard Operating Procedure

A standard operating procedure (SOP) was developed for the team in Uganda when working with the BPG prototype. The SOP included game installation, preparing for a play session, running a play session, ending a play session, and troubleshooting potential bugs and known errors. The section below highlights the tasks directly related to the design.

### User Management

Each subject is given a unique name to identify them and link them to their recorded data. The account would be set up beforehand, either through a web-based form or on the device itself through the game's administrative menu.

At the beginning of the day, the instructor will connect the device to the Internet and download the list of user names from the server via the Admin menu. When they go to log a user in, it

will compare the name against this list to ensure it matches the name of the subject. In the current prototype, no records of progress are transferred to the device during this process, only the list of usernames. In this way, the data collected from the subjects on the device is kept to a minimum and the rest of it is uploaded to the server. This also removes the previous restriction of children having to use the same device every time.

### Session

The playtest session was scheduled to last 45 min. With the target goal of 8 min per game, several games from a previous BPG prototype were included to supplement the four from the new package. The extra games included a matching game in the style of Concentration (Matching), a fishing game where you repeat a pattern similar to Simon Says (Gone Fishing), a Tower of Hanoi game (Hanoi Shipping), and a leapfrog game similar to Peg Solitaire (Leap Frog). These extra games were built using a different program and did not have the data collecting capabilities of the newer BPG described above. These earlier games also were incompatible at this point with iPad devices that had been brought along for the playtest.

### End of Session

At the end of the day, the instructors were instructed to connect to the Internet and upload the data from the device to the server, again via the administrative menu. If any users had been added onto the device during the day, they would also be sent up to the server at this time. After the device has sent a confirmation from the server that the data has been received, the play data is removed from the device, now having a clean slate to start recording, again.

### Observations

The section below reflects the initial findings during the playtest with children in Uganda. As mentioned above, four children came to the site to participate. Three of these children made use of the trackballs for input, while one used a nor-



mal mouse. The five children in the off-site, rural locations used the iPads for game playing.

## Interface Options

Of the three interface options, the touch screen iPads were the most effective. Some children using the trackball would actually touch the screen before using the trackball to click on it. The trackballs proved the most challenging for time-sensitive and object-tracking tasks. This may have been due to lack of sensitivity on the devices due to dirt accumulation or because the size of the device required use of both hands, which did not appear as comfortable to some of the younger children. A previous study had used these larger “toy” trackballs for child responding, but as time passed, the trackballs were found to become easily dirty due to dusty conditions. Similarly, the children also struggled with the Tower of Hanoi game which required them to click and drag objects, actions children were clearly not comfortable with doing.

## Time-Based System

The current prototype was built around the concept of a round-based system where the player was working toward a set round number. At the end of each round, a button would appear to let the player start the next round when they were ready. Unfortunately, players had trouble grasping the concept that they needed to press the button in order to continue. This required the instructors to step in and press the button for them, to keep the games moving forward. This proved to be especially challenging when the instructor was working with multiple children and had to pay close attention to each game.

## Preferred Program

When children were exposed to multiple types of CCRT programs, they predominantly appeared to prefer the BPG format. Several of them cited the cartoon animals and sound effects to be particularly enjoyable. This testing period also demonstrated the importance of piloting any novel system in a new cultural setting. Although the

Ugandan children all seemed particularly taken with the pictured animals and animal sounds, one of the games included a lion figure that suddenly appeared on the screen facing the child, leading several children to clearly become uncomfortable, and these items were dropped as the testing period continued. Although Western children did not appear to be at all affected by these items in piloting in the U.S., in the African culture, lions are not only visible in zoos, and Ugandan children appeared to be genuinely concerned about these particular items. In addition, when considering the older set of games, *Gone Fishing* was found to be very much appreciated by the children and all children completed this game, as with the newer BPG, so that in the second test phase of the playtest, this game was included (Fig. 15.1).

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## Initial Playtest Conclusions

### Switching to Time Based Versus Round

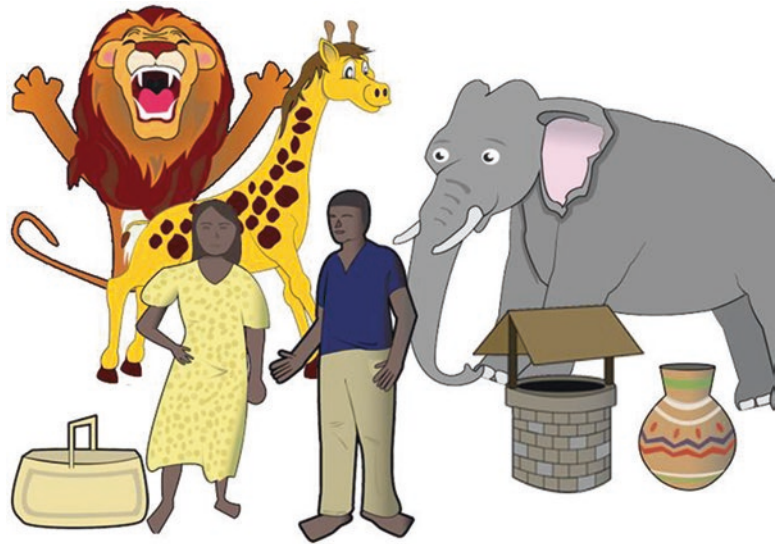
As mentioned in the observations, the button prompts in between rounds required the instructors to step in to keep the games progressing. Not only did this interfere with the state of flow of the training sequence, but also added to the instructor’s workload. The prototype game sessions were adjusted to run off a set timer, with several seconds dedicated to prep time before the round starts.

### Adding a Greater Variety of Tasks

Since the new prototype only has four different game exercises, it was felt that the repetition of tasks could decrease player engagement as the play session continues on. To achieve a reasonable level of Flow, the BPG team will be exploring ways to change the play dynamics of several of the games to make them repetitious while still gathering data.

The current game set is very focused on tasks that emphasize reflexes and short-term memory and focused attention. Going forward, there are plans to expand the scope of tasks to train other focused cognitive domains. In addition, several

**Fig. 15.1** Brain-powered games art sample



of the supplemental games (e.g., Gone Fishing, Leap Frog) are being converted into the new prototype so they can collect data from them in the same manner that is used by the newer BPG set.

**Playtest Pilot Study**

As noted previously, the playtest was designed to occur in two phases, one an initial trial with a few children to ensure the games were understandable and would work in a rural setting. As a second phase to the playtest, after changes were made to the games and the SOP was changed to include Gone Fishing and Matching, the research team in Uganda completed a small pilot study to judge the efficacy of the games in actually affecting cognitive performance. Twenty-five children living in Kayunga, Uganda, diagnosed with HIV/AIDS (13 boys, 12 girls) whose mean age was 9.60 years (standard deviation 1.69, range 6.25–12.30), eight of whom had already started HAART therapy, were entered into the pilot study (Table 15.1). These children had been passive controls in a previous study of a commercially available CCRT program to improve school performance, but had no experience with computer training, themselves. Over a 2-month period (24 sessions over 8 weeks), the children received approximately 45 min of BPG CCRT

**Table 15.1** Games completed per device

|                | On site   |       | Off site         |
|----------------|-----------|-------|------------------|
|                | Trackball | Mouse | iPad             |
| Butterfly      | 3         | 1     | 5                |
| iSpy           | 3         | 1     | 5                |
| Stampede       | 3         | 1     | 5                |
| Whacky animal  | 3         | 1     | 5                |
| Gone fishing   | 3         | 1     | N/A <sup>a</sup> |
| Matching       | 2         | 1     | N/A              |
| Leap frog      | 2         | 1     | N/A              |
| Tower of Hanoi | 0         | 1     | N/A              |

<sup>a</sup>The supplemented games are not compatible with iPads

each day, consistent with most recommendations for CCRT training (Boivin et al., 2010; Bangirana et al., 2009). Prior to and following the 8-week session, children were tested with the Test of Variables of Attention (TOVA, Greenberg, 1991), a computer-administered test of sustained attention. The TOVA stimuli are nonlanguage-based and culture-free (two simple geometric stimuli) and help professionals in over 60 countries around the world rule out attention problems and discriminate attention disorders from learning disabilities. While minimizing cultural differences in assessing attention. The test requires no right-left discrimination and, because of its simple geometric stimuli, has negligible practice effects. This measure of vigilance provides several scores including error rate for omissions (inattention),

**Table 15.2** Adjusted means and their standard errors for the outcomes at intake and post BPG for a sample of  $N = 25$ 

|                                | Adjusted mean ( <i>SE</i> ), intake | Adjusted mean ( <i>SE</i> ), post BPG | ES for BPG ( <i>p</i> -value)  |
|--------------------------------|-------------------------------------|---------------------------------------|--------------------------------|
| TOVA omission errors           | 17.93<br>(3.30)                     | 13.67<br>(3.35)                       | <i>0.34</i><br>( <i>0.23</i> ) |
| TOVA commission errors         | 4.80<br>(2.55)                      | 10.22<br>(2.59)                       | <i>0.56</i><br>( <i>0.04</i> ) |
| TOVA response time             | 621.16<br>(26.52)                   | 542.10<br>(27.12)                     | <i>0.72</i><br>( <i>0.04</i> ) |
| TOVA response time variability | 213.48<br>(17.67)                   | 217.83<br>(17.84)                     | <i>0.07</i><br>( <i>0.78</i> ) |

Note effect sizes (ES) exceeding 0.33 and deemed clinically significant are in italics

error rate for commissions (impulsivity), mean response time (speed of processing), and variability in response times (consistency of attention). Comparing TOVA scores prior to and following training, distinct differences were noted for two of the four variables (Table 15.2), supporting that the BPG had distinct areas of attention that demonstrated noticeable improvement. Data in Table 15.2 represent adjusted means that come from models that included age, SES, caregiver relationship to child, recruitment location, and HAART status (yes/no) as covariates. As can be seen, BPG training selectively improved both the commission score and the response time scores, suggesting that the children had improved their overall ability to concentrate and inhibit incorrect responses, as well as improving their overall attention-based processing speed.

## Final Thoughts

The playtest in Uganda was a major milestone in demonstrating that CCRT-based programs can be adapted for resource-poor and rural non-Western settings. Children noticeably seemed to like these games better than other commercially available software, apparently taken by the African-related sound effects and the animal and local village stimuli. The initial playtest with a handful of children allowed the BPG group to obtain valu-

able information that led to direct changes in the software of the games, followed by an actual small pilot testing of the system that demonstrated selective improvement using the TOVA test package in a small sample of convenience. Developing a project for an audience half a world away is a challenging feat, and while there are significant changes to be made, many goals were accomplished. The feasibility of the BPG data storage system was demonstrated, and the groups provided a themed game experience for the children, tested out the utility of using iPad across several locations between home and work, and established an initial training study that suggested that BPG may have a selective improvement in aspects of attention. An expanded study also has now been completed with BPG, further demonstrating its utility in improving cognition in children following training (Giordani et al., 2015). The next step will be to iterate and improve on the design to provide an even better experience next time.

**Acknowledgment** We would like to thank the development team at the GEL lab who developed the design and worked on building the prototype presented in this paper and the Kayunga Study Team who conducted the playtest and pilot study in Uganda.

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# A Mediation Intervention for Sensitizing Caregivers (MISC): A Cross-Cultural Early Intervention

# 16

Pnina S. Klein, Cilly Shohet, and Deborah Givon

The MISC presents a theoretical and practical framework for early intervention. Through the process of a Mediation Intervention for Sensitizing Caregivers of infants and young children, these children may stand a better chance of becoming more intelligent and socially competent individuals, ready to benefit new experiences, within their own environment. The MISC is based on a model for understanding specific components or “criteria” within adult-child interaction effecting flexibility of mind in young children. The proposed approach is particularly suitable for cross-cultural adaptation since these factors may be identified within existing child-rearing practices. The MISC focuses on cultural resensitization and on the capacity to identify, respond, and elicit emotional interactions, as prerequisites for further social-emotional and cognitive development. Whereas many known interventions are designed to enhance either children’s emotional state or cognitive skills and abilities, the MISC is primarily concerned with enhancing parents’ or caregivers’ ability to provide children with quality interaction, consequently affecting their need system and creating dispositions that are essential for future learning.

This chapter presents the basic reasons for implementation, processes of intervention, and outcomes of the MISC approach to early intervention, with a special emphasis on the implementation of the MISC in Ethiopia, Uganda, and Kenya and its potential relevance for other countries in Africa.

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## Early Intervention for Enhancing Development of Young Children

### Why Is an Educational Early Intervention Needed?

There are considerable differences between cultures with regard to what is perceived as an ideal child, a good parent, or a good teacher guided by different educational philosophies and goals. These differences contribute to the formation of differences in child-rearing objectives and practices. Although love is certainly very important for adequate psychological development, love alone will not guarantee a child’s intellectual development. This is not to say that children don’t need to feel secure, loved, and accepted in order to ensure healthy intellectual development. Quite the contrary: in order to satisfy their curiosity, explore their environment, and relate to others, children need to have a sense of security and a warm, stable, and secure relationship with at least one other person (usually one of the parents).

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If they do not have this secure relationship, they will not have the courage or peace of mind to explore and investigate new environments and relationships or lack the optimistic orientation that something good may be there for them if they try harder. In a way, one can say that the affectionate bond between children and their caregivers opens the gate for their mental development, but does not, in itself, determine what will pass through the gate.

In the rapidly changing world of today, one can hardly predict the situations that a child will be required to cope with in the future. Under such conditions, preparing a young child for future development must include provisions for developing flexibility of mind, a predisposition for learning from new experiences that children may encounter within their traditional cultural setting or in confronting changes introduced by “modernity.” Flexibility of mind cannot be defined merely by the quantity or variety of content areas acquired by the child, but rather by the action patterns, needs, or “appetites” he or she acquires for modes of perception, elaboration, and expression. These will enable him/her to learn from new experiences and to become a more intelligent, sensitive, and socially adjusted person. The content and means through which the objective of promoting flexibility of mind is achieved are determined by each adult caregiver and may differ from family to family and from culture to culture.

The respect for cultural differences and the belief in their equal potential impact on flexibility of mind should not cast a shadow over the crying need of millions of individual children across various cultures who suffer starvation of any cultural transmission or mediational learning experience from an adult caregiver. This type of deprivation may appear together with actual physical deprivation as well as independent of it. Adults may see to it that infants’ basic physical needs are met, without thinking of the need to “mediate,” i.e., to focus and expand their experience of the world to the infant. Furthermore, better medical care leads to the survival of infants who require specialized care and specialized mediation to develop their potential. World care

agencies have made remarkable progress in sustaining life, reducing infant mortality and improving nutritional conditions of young children. There is still, however, a growing need to focus on the mental type of starvation which, if not dealt with, may lead to retardation and to waste of human potential almost as painful and tragic to humanity as the loss of lives.

The MISC intervention model enables parents, caregivers, and teachers to prevent this tragedy by helping them recognize and understand the process through which they affect the child’s development and hopefully to improve the quality of the relationship between them and the young children they care for. These changes may consequently promote the chances for mental and emotional development of the children. The MISC approach fits in with the cultural background of the family and does not depend upon the import of external methods, ideas, and tools, because it operates inside the existing child-rearing practices. This type of intervention was used successfully with populations in modern and traditional societies. Many intervention studies were carried out in Africa, particularly in Ethiopia (Klein, 1996; Klein, 2001) and in Uganda (Boivin, Bangirana, Nakasujja, et al. 2013; Boivin, Bangirana, Page, et al. 2013).

### **Stimulation and Mediation**

Parents, especially those in middle class so-called Western countries, become increasingly aware of the need to help their children race ahead and learn to adjust to the rapidly changing world. In the past decade, scientists in the field of child development reported that immediately following birth (or even in uterus), babies are capable to perceive, process perceptions, and respond far more than we have ever been aware of. Parents are led to believe that these early capacities should be “exercised” and that the way to do it is through stimulation of all senses, even if the concept has become an overused and criticized cliché. Many parents and educators still advocate “stimulation.” Bombarding infants with visual auditory or tactual experiences cannot contribute to their development. In fact, it may even hurt it, leading the infant to develop defenses against

such intrusion. For children with sensory processing and regulation disorders, these defenses may become generalized in the form of dislike for new experiences and contact with others. *Mediation presents an alternative to stimulation, both in Western cultures and in more traditional societies.* Through mediation parental objectives for the child are achieved by matching between what they intend to teach the child and the child's response. It is the baby's (or child's) response that regulates the amount of the adult's initiation or response to the baby's communication, reading his/her intentions, needs, and preferences and responding to the baby's initiatives. Furthermore, through mediation, the complex world is organized for the child channeled by a network of cultural transmission, into a world in which things have meaning, importance, and relevance to future as well as past experiences.

Although this book focuses on children in Africa, it should be noted that in a competitive industrialized society, one cannot expect parents to be held back from "stimulating" their young children, especially when they know that others around them are doing it for their children. The MISC approach presents an alternative, helping parents realize that improving their mediational interaction with their children can make a real difference in their child's life. It may help them relax and enjoy their child more, become a more critical consumer of educational programs and materials, and rest from driving the child from one extracurricular activity to the next.

### **The Effects of Lacking or Poor Mediation**

Many differences between children in their capacity to benefit from new experiences are linked to the type of interactions they have had with the adults who cared for them. These differences are apparent in the way these children approach new experiences, in the way they integrate them with other experiences, and in the way they express themselves (Feuerstein, 1979, 1980). Many of these children lack the enthusiasm or need to explore their environment and to seek out "newness." They are satisfied with a blurred undifferentiated picture of their environ-

ment. Their eyes or ears are not sufficiently tuned to detect fine differences between various things they perceive through their senses. In cases of extreme deprivation, they grow up to be uninterested, apathetic, and uninvolved. They do not have the need to seek meaning, to make spontaneous comparisons, and to compare and contrast things, e.g., "This is a rose, I once smelled one ... so I want to smell it again." Many of these deprived children live in a reality that is constructed from bits and pieces of information rather than from a meaningful, continuous flow of experiences. They do not have the need to relate between a cause and an effect and between past, present, and future experiences. It is clear that fragmentation in time and space limits one's capacity to benefit from experience because each experience is stored in one's mind in isolation from all others. Many of these children have difficulties in bearing in mind a goal or setting a goal for their behavior, especially if such a goal requires several steps for its attainment (the latter is known as motor sequencing difficulties). They have no need to adjust or plan their behavior in line with the requirements of the task, and in general, they have no need to control or regulate their own behavior.

Many of these children have no need to express themselves verbally or communicate in a way that will be clearly understood by others. They may think and speak in an egocentric manner and are frequently unaware of the need to modify their behavior so that others can relate to it better.

Many of these children are not aware of the fact that they can obtain information from adults or from other sources beyond what meets their eyes or their other senses. Lacking experiences in which someone related events for them or pointed out information about objects or people beyond what can be perceived directly through the senses, these children are not aware that something meaningful may be obtained through questioning or through exploration.

Lacking experiences in which adults associate various objects, people, behavior, and meaning or excitement, these children may feel excitement in relation to very few experiences or objects, in a

limited range primarily associated with the satisfaction of basic physiological needs. Most of these behaviors have been identified by Feuerstein (1979, 1980) as deficient cognitive processes related to poor mediation experiences. Children who have the limitations described before may be considered as lacking flexibility of mind or as having difficulties to benefit from new experiences.

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### **Promoting Flexibility of Mind in Infancy and Early Childhood**

One of the most typical of all human traits is the capacity to be modified as a result of new learning. This capacity is characteristic of humans throughout their entire life cycle, yet, in infancy and in early childhood, children are most susceptible to environmental effects. One of the most dramatic contributions of brain research to early child development and care relates to the finding that early experiences affect the actual “hardware” of the brain, i.e., brain structure. It has been known for many years that young children learn several generalized expectations that have the potential of affecting most of their later experiences. For example, children learn that someone cares, that it pays to be active, and that someone out there responds to their demands; alternatively they may learn that they are alone and worthless and that they should stay passive because there is no response to their activity. Children develop a need to explore and share meanings; they seek more information about their environment, or they refrain from it and stick to the minimum obtained through their senses. Depending on their early experiences, children develop the need for active elaboration, comparing, contrasting, summarizing their experiences, etc. Their behaviors clearly affect new experiences which in turn affect others interactions with them. The younger the child is when he (or she) develops these various needs, the more opportunities are opened to benefit from them.

A school age child who has no flexibility of mind in the sense defined earlier may be confronted with a wealth of information, but he or

she will most likely be left unaffected by it and maybe even experience feelings of frustration and failure, unless a “mediator” actively places him-/herself between the particular child and the environment. The mediator guides the child step by step, so that his needs, capacities, and interests are matched with the specific components of the subject matter to be learned. Although it is possible to affect children’s behavior even at a later age, it is probably more pleasant, easier, and more economical in terms of time and effort to begin early in infancy, to prevent difficulties rather than engage in correcting them.

### **Unique Features of the MISC Intervention Program**

The overall objective of the MISC is to help parents, educators, or caregivers (1) understand their child’s individual characteristics, needs, interests, and difficulties and their own behavior vis-à-vis the particular child; (2) help them enjoy quality interaction with the child; and (3) enhance their ability to promote the child’s cognitive and socio-emotional development, preparing him/her to benefit from future learning.

The MISC intervention program was designed to reduce some of the difficulties which were inherent in ongoing intervention projects in various poor communities in Africa, Asia, the USA, and Europe (Klein, 1996):

1. Parents from various ethnic backgrounds, especially those of low socioeconomic status, were led to believe that there is one ideal model, a “better way” of raising young children, better than the traditional way they brought with them from their old homes. The transition from the old to the new most frequently led to a feeling of alienation. Parents felt that what they had to give or transmit to their children was not sufficient to promote later development, and therefore they could only contribute to the development of the infants the little they had been taught by the visiting specialist in the ongoing intervention programs.

2. Structured content-oriented programs, using specific materials, tended to create a dependency on these materials (toys, booklets, etc.). In several communities where mothers were engaged in intervention programs in which structured materials such as toys or exercise booklets were presented, mothers requested these same materials for their younger children and were unaware or unable to transfer insights based on experiences with one child to their experiences with another child. In fact, parents frequently lost their own initiative and trust in themselves as first and foremost teachers of their children. Some early interventions led parents to believe that children learn only when one sits with them to do the exercises incorporated in a structured program or game.
3. Structured programs typically include materials which are suitable for a specific age group or a defined situation. Once these characteristics were no longer relevant, i.e., children grew older, programs were terminated and parents did not know what to do.
4. One of the basic differences between the MISC and other early intervention programs is related to their objectives. While many programs aim primarily to affect social, emotional, or cognitive skills or processes, the prime objective of the MISC is to affect a child's need system, to create new, more differentiated needs that will promote his or her future capacity for learning. Merely bringing a child into contact with new experiences will not help him or her develop a differentiated taste or need for them. We can take children to the theater, to the library, or to a concert, but will merely taking them create the need to seek cultural experiences of this kind in the future? An infant or young child experiencing pleasant feelings in the presence of an adult will learn to want to be with him or her even after basic needs have been fulfilled. Hearing the adult, pointing to things, explaining them, associating, comparing, contrasting, etc. become desirable as well, and thus more needs for specific types of "educational" interactions are created. It is through human media-

tion that an infant or young child learns to need and seek more information, beyond what is directly perceived by his/her senses.

What makes the adult-child interaction a pleasant experience is to a large extent related to how successful the two partners are in matching and synchronizing their behaviors. Both the child and the adult play a major role in this interaction, parent affecting child and child affecting parent in return.

As the MISC is focused on the quality of interaction between caregiver and child and not on the content or the material used in this interaction, it is not a "program" in the traditional sense; it is more a framework, a model or method for sensitizing mothers (or other caregivers) to the positive aspects of their existing interaction and child-rearing practices. As such it cannot be in conflict with their own traditional way of child rearing. As stated earlier, imposing structured programs based on other people's cultural standards tend to produce three negative effects: dependency, alienation, and feelings of inferiority in parents.

In the MISC these effects are counteracted by helping the caregiver see the positive aspects of her own interaction with her child, thus strengthening her self-confidence and trust in her capacity and in her traditional knowledge of child rearing.

The essence of the MISC intervention program is sensitization and consciousness raising of parents or caregivers regarding key issues in the relationship between them and their child. In practice this means trying to convey a practical understanding of the typical characteristics of the child's needs, abilities, and behavior vis-à-vis their own behavior in their interaction with the child. The intervention program can be implemented with various groups of children, in any context where interaction is taking place, from home, nursery, and preschool to large-scale community-based projects involving local resource persons who are trained to do "home training" with parents. For example, the MISC intervention in Uganda was carried out through home visits (Boivin, Bangirana, Nakasujja, et al.

2013; Boivin, Bangirana, Page, et al. 2013). In Ethiopia, it was carried out by local health workers through home visits combined with periodical group meetings (Tefferra et al., 1996).

The training in sensitization and consciousness raising is done through analyzing concrete examples from parents' daily experience with their children, especially through analysis of videotaped episodes of typical adult-child interactions. Parents (or other caregivers) view themselves interacting with their own child and afterward analyze this interaction with the assistance of the trainer, according to the basic criteria of quality interaction.

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### Theory and Research on Mediation and the MISC Approach

There is a theoretical base (Feuerstein, 1980; Klein, 1996, 2000) and empirical data (Klein, 1984, 1991, 1996; Klein, Weider, & Greenspan, 1987; Klein & Alony, 1993; Klein, Nir-Gal, & Darom, 2000) suggesting that specific characteristics of adult interaction with children constitute mediational behavior and may affect children's predisposition to learn from new experiences. Mediated learning, as distinct from direct learning through the senses, occurs when the environment is interpreted for the child by another person who understands the child's needs, interests, and capacities and who takes an active role in making components of that environment as well as of the past and future experiences compatible with the child. Mediation affects the individual's present learning and may improve his or her opportunity to learn from future experiences.

Numerous intervention programs have been designed in order to enhance children's development and their ability to learn. However, three major themes which are prerequisite for successful intervention programs with infants and young children have not been seriously taken into consideration in many early intervention attempts. These themes include (1) cultural variability, in relation to educational goals, philosophies of child rearing, parental roles, and perceptions of the child; (2) the role of parental mediation in

children's emotional development; and (3) parental mediational behaviors which constitute the roots of future learning experiences. The MISC approach attempts to take in consideration cultural variability and clarify the criteria of a quality interaction, including its emotional and cognitive components.

### Cultural Variability: Parental Perceptions and Goals

Parents' values, assumptions, and educational philosophy, as well as their perception of their child, were found in numerous studies to guide parental behavior (e.g., Bell, 1979; Klein, 2000).

There are cross-cultural differences in parental philosophy of child rearing or perception of their child's development. However, the most dramatic differences appear in parents' view of the ideal child and consequently their objectives for the child. In addition to the sociocultural effects on parents' view of their child, parents' perceptions of themselves as effective agents in child development, their styles of coping with their life stresses, their support systems, etc. must be taken into serious consideration in an attempt to understand and effect parental mediation to the child. It should be noted that the factor of cultural impact on parental behavior is especially dramatic in relation to populations of children with special needs.

A careful assessment of cultural psychological variables should constitute a major prerequisite of any early intervention. Objectives "imported" by psychologists or educators from one culture may be unsuitable and therefore stand little chance to be effective with parents of another culture. In our own work with parents and caregivers in Sri Lanka and Ethiopia, it became apparent that they do not want what they called a "Western type" of "pushy," self-centered, competitive, "intelligent" child. Their educational objective was a noncompetitive, caring, sharing individual. Similar reports were made for Indonesian parents (Hundeide, 1996). For these parents an objective such as enhancing flexibility of mind was not desirable unless it



was clearly related to their own educational objectives for the child.

It is well established now that individual characteristics of children strongly affect parental interaction with them. For example, temperament and child's sensory processing style (Klein, Laish-Mishali, & Jaegermann, 2008; Jaegermann & Klein, 2010). Knowledge about the child, expectations, and feelings affect parental behavior, both consciously and subconsciously, for example, differential treatment of boys vs. girls with a similarly perceived temperament (Klein, 1984). Boys and girls perceived as more active received a higher frequency of "stimulation," whereas boys received predominantly motor and physical stimulation and girls received more visual and verbal stimulation.

Mother's style of interaction with her baby is strongly affected by her basic perception or model of the interaction she holds in her mind of what "good mothering" should be. Parents' childhood experiences and memories of their own relationship with their parents were found to provide a filter through which parents view the child and respond to child characteristics and behaviors (i.e., Belsky, 1984; Ricks, 1985; Crowell & Feldman, 1988). It was postulated that children create an internal mental representation or working model of self and others based on their experiences with their parents. It has been further postulated that internal models have a propensity of stability and once established tend to be perpetuated (Bowlby, 1980).

Mediation implies a communication between two individuals in which each individual is adjusting the form and content of a message to his/her partner, matching to the nature of the receiver and to the situation in which the interaction occurs. Hundeide (1996) speaks of a tacit "contract" that may exist between the adult and the child, i.e., we adjust our communications to the way we interpret the nature of the receiver and the situation. After some time this may become stabilized into a relationship, a contract, in relation to which the two participants invite particular styles of interaction with each other. Consequently, for example, mothers categorized as low mediators may be able to interact with

their children in a high mediational style, provided the context, situation, and definition of their child are such that it invites such a style. The culture may define the "right" and "wrong" styles of communication with children at different age levels. For example, at the University of Oslo, we observed mothers sitting behind their child quietly observing him/her play. These mothers claimed that children should be given the freedom to choose what they want to do with no interference from the adults. These mothers followed a model of mothering which dictated that noninvolvement equals good mothering.

Prior to planning interventions with very young children, it is necessary to answer basic questions such as what are the parent's goals for the child. How do they view the child as compared to others? Do they realize the child's unique temperament and profile of sensory processing? What do they see as their role, what do they consider as good parenting, and how much effect do they think they may have on their child's development? Additionally the MISC approach advocates a special focus on the specific themes and areas of interest of the parents within their own life space and culture and encourages them to use these in their interaction with their children. The quality of mediation may vary depending on the personal involvement of the mediator in the subject he or she is attempting to mediate. Mediators may show their best mediational skills when attempting to mediate to a child something they are excited about and are well familiar with. *Cultural themes which are highly valued by parents and with which they are well familiar may thus be considered as excellent mediational contents.* In terms of implications for intervention, it may be a good starting point to identify the particular preferences, hobbies, and interests within a family and suggest those as a content area for mediation to the child.

Cultural variability is assessed prior to the onset of the MISC intervention through observations, collection of basic data regarding the participating population, and an in-depth structured interview of the adult members of each participating family or center. For example, rural parents in Indonesia, Sri Lanka, or Ethiopia want

their children to help out with house chores or at the farm. The parent may not be interested in an intervention program unless it is clear to him or her that it may help raise a child who will be better able to understand and find solutions to problems related to their domestic life or life on the farm. Parental interests, special likes, and skills as well as those of the children are focused on throughout the intervention process.

### The Role of Parental Mediation in Children’s Emotional Development

Experts in child development emphasize the importance of making children aware that they are accepted and loved. Educational experts also emphasize the importance of positive affect for the process of learning.

It was known for many years that infants and very young children need a loving, caring environment in order to develop adequately. Numerous studies have highlighted the importance of close physical contact and expressions of love leading to

secure “attachment.” Scientists, who for many years shied away from the concept of “love,” viewing it as an unscientific concept that could not be studied by conventional scientific methods, have begun to explore and examine it.

Features of the MISC approach can be represented using the metaphor of a *tree* (see Fig. 16.1). The roots of the tree represent the basic elements constituting expressions of love and affect for the child. These are called the ABC of love and include elements such as eye contact, smiles, vocalization, physical closeness, turn taking, and sharing of joy. The existence of positive warm, responsive interactions builds the road for mutual attentions and, consequently, mutual engagement.

Following intervention attempts to enhance the “roots” of the mediational process, the intervention focuses on assuring that each child receives a sequence of three basic messages that “open the gate” for learning. These messages include the following: (1) “I love you,” conveying to the child that he or she is important and loved (rather than worthless); (2) “I am with

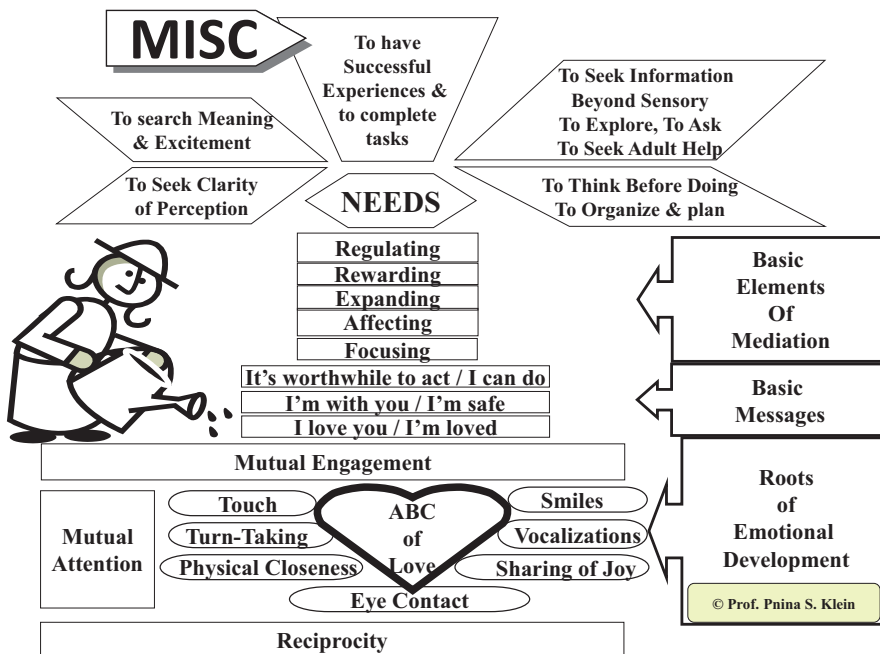


Fig. 16.1 “The MISC Tree”

you,” conveying the message that there is no need to worry, the child can explore the environment, go ahead and step forward, explore, touch, and hold things, while someone is watching out for his or her safety; and (3) “It is worthwhile to act,” conveying the message that if one acts, the environment responds and good or interesting things may happen (as opposed to learning to be passive and acquire “learned helplessness”).

Through the use of videotaping and video feedback, parents participating in the MISC are helped to form positive cycles of communicative interactions with their children. Mothers (or caregivers) and children are videotaped during various caregiving and play activities. The dyad’s emotional behaviors (eye contact, smiles, vocal responses, expressions of joy or stress, level of body tension, etc.) are identified. The relationship of those behaviors to the child’s general state and to the parent’s behavior is identified in cooperation with the parents. Parents are encouraged to initiate and maintain positive cycles of interaction as a goal of itself and as grounds for continued mediation.

### **Parental Mediation Behaviors Which Constitute the Roots of Future Learning Experiences**

In addition to the ABC of love and the basic messages mentioned earlier, the tree metaphor includes five essential characteristics of teaching behavior mediation, represented as the trunk of the MISC tree.

Mediation learning refers to the intentional teaching—the cognitive behaviors of the adult during the interaction with the child. Studies regarding the cognitive development of young children have dealt with questions such as: What characterizes the process of information transfer in adult-child interactions? What are the teaching behaviors that enhance the child’s emotional and cognitive development and increase flexibility of mind and the ability to learn effectively from new experiences? Based on the theory of cognitive modifiability (Vygotsky, 1978;

Feuerstein, 1979, 1980), several basic characteristics of adults’ behavior necessary to create experiences of positive mediated learning for young children were empirically defined and identified.

The following basic components of quality mediation (i.e., teaching behaviors) were empirically defined (Klein & Alony, 1993; Klein, 1996; Tzuriel, 1999) and are considered as basic determinants of quality mediation to young children:

#### **Focusing**

Any adult act or sequence of acts which appear to be directed toward focusing a child’s attention and achieving a change in the child’s perception or response (e.g., selecting, exaggerating, accentuating, scheduling, grouping, sequencing, or pacing stimuli)

#### **Affecting**

Adults’ behavior expressing naming and/or verbal or nonverbal excitement, appreciation, or affect in relation to objects, animals, or people or concept and values

#### **Expanding**

Adults’ behavior directed toward the broadening of a child’s cognitive awareness, beyond which is necessary to satisfy the immediate need which triggered the interaction

#### **Rewarding (Mediated Feelings of Competence)**

Verbal or nonverbal behavior of an adult expressing satisfaction with a child’s behavior or identifying specific components of the child’s behavior which the adult considers as successful

#### **Regulation of Behavior**

Adult’s behavior that models, demonstrates, and/or verbally suggests to the child how to do things better in relation to the specific requirements of a task or to any other cognitive process required prior or during an overt action (for clarification and examples, see Tables 16.1 and 16.2).

Following videotaped daily situations of adult-child interactions (e.g., play, bathing, feed-

**Table 16.1** Definition and examples of basic criteria of mediation

| Definition of criteria  | Examples   |
|---|--|
| <p><i>Focusing:</i> Any act or sequence of acts of an adult that appears to be directed toward affecting a child’s perception or behavior. These behaviors are considered reciprocal when the infant or child in the intervention responds, vocally, verbally, or nonverbally</p> | <p>Selecting, exaggerating, accentuating, scheduling, grouping, sequencing, or pacing stimuli. Talking or handing a toy to a child is seen as focusing only when it is apparent that the adult’s behavior is intentional and not accidental and when there is an observable response from the child that he or she saw or heard the intentional behavior. Examples of intentionality might include a parent making a visible effort to change his or her behavior and the environment by (a) bringing an object to the child, moving it back and forth, observing the child, and continuing to adjust the stimulus until the child focuses on it; (b) moving a bottle or a particular food item in front of the infant’s eyes until he or she focuses on it; (c) placing toys in the bath water; (d) placing oneself in front of the child to obtain eye-to-eye contact; and (e) placing objects in front of the child at a distance requiring that he or she will attempt to reach them</p> |
| <p><i>Affecting:</i> An adult’s behavior that expresses verbal or nonverbal excitement, appreciation, or affect in relation to objects, animals, concepts, or values</p>  | <p>These behaviors may include facial gestures or prelinguistic expressions (e.g., a sigh or scream of surprise), verbal expressions of affect, classification or labeling, and expressions of valuation of the child’s or adult’s experience (e.g., “look, I am washing your foot now,” “see how long this macaroni is,” “look at this beautiful flower,” or “this cup is special, it belonged to grandfather”)</p>   |
| <p><i>Expanding:</i> An adult’s behavior directed toward the expansion of a child’s cognitive awareness, beyond what is necessary to satisfy the immediate need that triggered the interaction</p>  | <p>Talking to a child about the qualities of the food during feeding is beyond what is necessary to assure provision of nutrition; exploring body parts or the characteristics of water during bathing is not necessary for bathing. Expanding may be provided through expressions implying inductive and deductive reasoning, spontaneous comparisons, clarification of spatial and temporal orientation, noting strategies for short- and long-term memory, or search and recall memory activities</p>   |
| <p><i>Rewarding:</i> Any verbal or nonverbal behavior of an adult that expresses satisfaction with a child’s behavior and that identifies a specific component or components of the child’s behavior which the adult considers contributive to the experience of success</p>      | <p>Such identification can be achieved, for example, by careful timing of a verbal or gestural expression of satisfaction, through repetition of a desired behavior, or through verbal and nonverbal expression (i.e., saying “good,” “wonderful,” “great,” and “yes” or clapping hands and smiling when the child successfully completes a task or part of it)</p>  |
| <p><i>Regulation of behavior:</i> Adult behaviors that model, demonstrate, and/or verbally suggest to the child regulation of behavior in relation to the specific requirements of a task or to any other cognitive process required prior to overt action</p>                    | <p>Behavior is regulated on a mediational basis by the process of matching the task requirements with the child’s capacities and interests, as well as through organizing and sequencing steps leading toward success. For example, “it is hot; cool it first before putting it in your mouth,” “Let’s wash your face carefully, so that no soap will get into your eyes,” “slowly! Not so hard! It is delicate, do it gently,” or “first, turn all the pieces over, then search for the right piece.” Mediated regulation of behavior may be related to the processes of perception (e.g., systematic exploration), to the process of elaboration (e.g., planning behavior), or to the processes of expressive behavior (e.g., reducing egocentric expressions and regulating intensity and speed of behavior)</p>  |

**Table 16.2** MISC program: intellectual and social-emotional needs in relation to mediation

| Mediation processes                          | Examples of the process  | Intellectual needs   | Social-emotional needs   |
|--|--|--|--|
| 1. Focusing                                  | Making the environmental stimuli compatible to the child's needs, e.g., bringing closer, covering distractions, repeating, sequencing, grouping, helping the child focus, see, hear, and feel clearly            | Need for precision in perception (vs. scanning exploration)<br>Need for precision in expression  | Need to focus on and decode facial and body expressions of emotion<br>Need to modify one's own behavior or the environment in order to mediate to others (to make the other person see or understand)                                |
| 2. Affecting mediated meaning and excitement | Expressing excitement vocally, verbally, or nonverbally over experiences, objects, people, etc.<br>Naming, identifying   | Need to search for meaningful new experiences (i.e., listen, look, taste things that remind one of past experiences)<br>Need to respond in a way that conveys meaning and excitement (sound, look, and feel excited)<br>Need to invest energy in meaningful activities                       |  |
| 3. Expanding                                 | Explaining, elaborating, associating, and raising awareness to metacognitive aspects of thinking<br>Relating past present and future experiences<br>Relating to physical, logical, or social rules and framework | Need to go beyond what meets the senses.<br>Seek out further information through exploration<br>Request information from other people and from other sources<br>Need to seek generalizations<br>Need to link, to associate, to recall past information, and to anticipate future experiences | Need to think about one's own feelings and the feeling of others<br>Need cause and effect sequences in social interaction<br>Need to associate between experiences, to recall past information, and to anticipate future experiences |
| 4. Encouraging                               | Praise in a way that is meaningful to the child<br>Clear isolation and identification of the reasons for success<br>Well timed in relation to the experience   | Need to seek more success experiences<br>Need to summarize one's own activities and determine what led to success  | Need to please others and gain more mediated feelings of competence<br>Need to identify what pleases different people<br>Need to provide others with mediated feelings of competence   |
| 5. Regulation of behavior                    | Regulation with regard to timing, speed, precision, force, and preferred sequence of activities  | Need to plan before acting, e.g., need to consider possible solutions prior to responding<br>Clarifying goals, meeting subgoals.<br>Need to pace one's activities<br>Need to regulate the level of energy invested in any given task   | Need to control one's impulses in social situations<br>Learn acceptable ways of expressing one's emotions (i.e., regulate the pace and intensity of one's social responses to anger and joy)   |



ing), the trainer creates a personal profile of the parent's style of mediation. The profile reflects the frequency of each of the five basic teaching components during the interactions with the children. This process allows the trainer to quantify the quality of the caregiver-child interaction and design a training plan.

### The MISC Intervention Program and Its Effects: Empirical Data

It was found that the factors of quality mediation in infancy predicted cognitive outcome measures at 4 years of age, better than the children's own cognitive test scores or other presage variables related to pregnancy and birth histories and to mothers' education (Klein et al., 1987). Similar findings were reported for low SES American (Klein et al., 1987) and Israeli mother-infant samples (Klein, 1984).

Since these studies were correlational and could not lead to cause and effect conclusions, another study was designed to examine the sustained effects of modifying the mother-infant mediational interaction on infants' cognitive test performance and behavior.

A small, low SES, urban, high-crime rate community in Israel was singled out for intervention by the Ministry of Education and the Office of Welfare, because children in this community had poor school readiness records, experienced school failure, and had high rates of school dropout. A sample of 68 mother-infant dyads was selected out of this population based on randomly selected birthdates. This group was randomly assigned to an experimental and a control group.

Activities developed for the experimental group were based on the MISC. These activities were designed to improve maternal mediation to her child. The level of mediation was defined by the frequency of appearance of empirically defined maternal mediating behaviors and their children's responsiveness. The training of mothers was carried out in the homes by paraprofessional trainers ("mediators") and supervised by developmental psychologists. Control group

dyads received basic information on child development.

Intervention in both groups was terminated when mothers could verbally define the basic components of the parental behaviors targeted by the intervention, i.e., in the experimental group, these behaviors were represented by the criteria of mediation and, in the control group, by basic aspects of a responsive, nonpunitive yet demanding environment.

Mediation processes affect children's cognitive input, elaboration, and output processes. It was expected that maternal behaviors of focusing, affecting, and expanding would increase children's language ability and abstract reasoning and, in general, prepare the children to perform better in situations requiring "new learning" such as tasks requiring immediate sequential memory.

A comparison of the two groups on the separate components of each mediation factor three years following the intervention revealed that the experimental group mothers showed significantly more mediation behaviors across all components of mediation (Klein & Alony, 1993).

The average PPVT IQ for the experimental group was 101 ( $SD = 15.5$ ) and for the control group 84 ( $SD = 14.1$ ).

One of the most interesting findings in the follow-up study was the relationship found between maternal mediation behaviors and children's test performance. Mothers' expanding and rewarding behaviors were found to be most frequently correlated with children's cognitive measures. Within these two criteria, *maternal request for expansion of ideas* (rather than provision of information) and *rewarding with explanation* (rather than simply saying "good," "fine," etc.) were singled out as most significantly related to the children's cognitive performance at age 4. These findings coincide with those reported by Collins (1984), identifying the variable of "demandingness" as one of the most essential determinants of the quality of "good" family environments.

Children's expressions of affect were related to more factors of maternal mediation than any of the other variables of children's behavior and

were mostly related to maternal encouraging behaviors, maternal expansion of ideas, maternal request for affect, and expression of feelings. Focusing behavior was positively and significantly related to all variables of child's expression of affect.

A noteworthy relationship was found between the children's nonverbal expression of feelings and mothers' expression of feelings.

The MISC applied in the follow-up study was not designed directly to improve children's performance on specific cognitive tasks. Yet, 3 years following the termination of the intervention, children in the experimental group out-scored the children in the control group with regard to language performance as measured by the PPVT and two measures of verbal reasoning. These findings suggest that those low SES children who participated in the experimental group were brought well within the normal range of verbal performance.

Mothers in the experimental group expressed higher aspirations for their children's intellectual growth, but they also expressed a more flexible and balanced view of what factors were important for their children's future development.

It has been well established in psychoeducational literature that children from poor families generally score lower on a variety of cognitive measures related to intelligence and academic performance as compared to middle-class children. Mother's intelligence or years of schooling were repeatedly pointed out as a powerful predictor of children's future cognitive performance. The following findings from the MISC intervention and follow-up study are of special interest in view of the above facts. The correlation between mother's years of schooling and their mediation to their infants and young children prior to the intervention was almost identical in the intervention and the control group. Three years following the intervention, the correlation between mothers' years of schooling and their mediation went down in the intervention group while remaining almost constant for the control group. These findings suggest that the quality of maternal mediation can be modified, and once modified, the link

between maternal schooling and mother's behavior toward her child can be modified as well resulting in a breakup of the commonly found linkage between mothers' education and children's cognitive achievements. Poorly educated mothers can improve their mediation and contribute to their child's cognitive development as well as middle-class mothers.

### **Long-Term MISC Intervention Effects on the Mothers**

In a follow-up study carried out 6 years following the MISC intervention in Israel, it was found that 75% of the mothers in the intervention group and 20% of the mothers in the control group found a job and were working out of home. Working out of home was coupled with higher satisfaction with one's self. This could be viewed at least partially as related to the empowerment effect of the intervention. Those mothers who initially viewed themselves as helpless and as having little potential to affect their child's development as well as their own lives gained an awareness of some basic elements of effective interaction with others. Mothers clearly expressed in interviews or written reports that they began to use the criteria of mediation in their everyday life in relation to other members of the family as well as friends and authority figures.

The distribution of parents' perception of what they wanted their children to become showed that more parents in the intervention group following the MISC program wanted wiser children, children who can learn better, whereas parents in the comparison group expressed wanting more disciplined children.

Parents who participated in the intervention program expressed feeling more capable of affecting their child's development as compared to parents in the comparison group (Klein & Alony, 1993). Based on mother's interviews 6 years following the MISC intervention, it appeared that mothers felt more competent about their parenting as well as their interaction with school authorities and with other adults in general.

Several studies examined the differential effects of various types of interaction on the quality of mediation received by the infants and toddlers. For example, the duration of physical contact, eye contact, expression of positive emotions, and length of communication chains were found to be significantly longer during musical interactions as compared to play interactions. Musical interactions between mothers and their infants were found to provide more opportunities for positive emotional arousal and synchronization which are basic characteristics of quality interactions and essential for future child development (Mualem & Klein, 2012).

In a recent study on social mediation (Shufer, Klein, & Yablon, 2014), it was found that providing toddlers with a reason or an explanation regarding behavior in social situations (“regulation of behavior”) is significantly related to pro-social behavior at home and in daycare. It was also found that when mothers or caregivers expressed negative and critical attitudes toward the toddlers’ social behavior or when they frequently commanded their infants or toddlers to do something, without explaining why, higher frequencies of aggressive behavior were noted in the interactions of these infants with other adults or children. In addition, more encouraging of positive social relations resulted in more pro-social adaptive behavior and less violent behavior.

### **Effects of Direct Parental Mediation of Emotions**

Based on analysis of video observations of parent-infant (or toddler) interactions carried out by the first author, in Israel, the USA, Norway, Sweden, Ethiopia, and Sri Lanka, three basic types of situations in which feelings are mediated to infants and young children were identified. These situations may be described as (a) face-to-face interchange of affect, (b) affect directed toward anything or anybody else in the environment, and (c) face-to-face mediation of affect interpretation and empathy. These three types of

situations differ also in the tacit message mediated through each:

1. “I love you.” Face-to-face interchange of affect. During the initial stage of face-to-face interchange of affect, the objective of mediation is to convey to the infant the message “I love you.” This message is expressed through physical closeness, warm contact, and satisfaction of basic physical needs. The more abstract general message mediated is the association between the presence of a particular person (most frequently a parent) and a sensation of pleasant comfort and positive satisfying sensations experienced with another person.
2. “Look how exciting it is.” Affect directed toward the environment. During this phase the objective of mediation is to focus the child’s attention to exciting objects or people in his/her environment. The adult mediating to the child the beauty, the meaning, and the significance of things shares his own appreciation and joy of experiencing something, with the child.
3. “Look how I feel.” Developing empathy and understanding of emotions. At this phase the objective of mediation is to expand children’s understanding and empathy toward other peoples’ emotions, as well as toward one’s own emotional experiences. This type of mediational experience requires the prerequisites of both previously mentioned types of mediated affect, helping children “read” and label feelings and reach a finer differentiation of feelings within themselves and others and identify cause and effect relationships, namely, conditions leading to various feelings.

### **Effects of Indirect Parental Mediation of Emotions**

Emotions may be regarded as “seeing as.” One’s emotional reaction reflects how one sees a situation. Shades of emotion change with each way one views the situation. The description of a situation to oneself is crucial in terms of the emotional effect it triggers.

Thus, by helping a child “know” or understand, one also helps him/her differentiate and develop feelings. In this context, parents as mediators have an effect on children’s early development through implicitly constructing the experimental pool into which all future experiences will fall and be coded.

With the emergence of the child’s language skills, parents can rely more on words to affect emotional development through mediational behaviors of affecting and expanding, i.e., labeling experiences, explaining, and relating them to events in the past and in the future. Another avenue for indirect parental influence on emotional development is imitation. Imitation may be designed by parents and facilitated by their intention to mediate. Inviting children’s imitative behaviors may include contrasts, repetitions, and exaggerations. Few are aware that emotions as well as actions are copied. A mother’s complaint about her work may convey a message of negative feelings around work in general.

Ethics are also mediated to a large extent as emotions. Mediation is extremely important in development of both emotions and ethics since these are open ended. There are subtle relations between the two. For example, a member of the family tends to express emotions about something. Even if he/she does not clearly say “x is good” or “x is bad,” his/her intonation and expression present a value judgment which is adopted by a young child at a stage when he cannot yet judge for himself.

From this point of view, it becomes clear that parental effects on the emotional development of their children do not occur independently of their effect on their motor and cognitive development. Positive human emotions, such as feelings of love or elation, are often associated with or result from thoughts which are related in some form with variation of phrases such as “this is good” or “this is bad.” Parents as well as professionals are more aware of educational goals related to teaching children new skills or ideas and less conscious of mediated feelings.

An optimal organization of affect exists when a person experiences a rich variety of developmentally advanced affects that are selectively

used in response to internal and external stimuli (Greenspan, 1989). A less optimal capacity in displaying advanced and selective use of affects occurs when the person is under stress. In more severe disturbances, usually a few affects predominate and are representative of parental concerns, for example, emptiness, rage, envy, and pseudo-warmth. In the most severe disturbances, the affect system is not fully developed, resulting either in a lack of affect or in inappropriate affect.

In order to have the opportunity for emotional development, a young child needs guided experience, adult mediation that is stable, consistent, and positive. These experiences include both direct and indirect mediation of emotions.

In conclusion, the importance of early experiences is in the primacy of their occurrence, in the fact that they set the basis, the frame of reference, or the disposition for later experiences.

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### **An Outline of the Intervention Program Procedure**

The MISC has been used cross-culturally with different groups of children, for example, very poor children in six cultures (Klein, 1996), children with sensory processing and regulatory disorders (Jaegermann & Klein, 2010), as well as gifted children (Klein, 1992). Recently, it has been used to improve neurocognition in preschool Ugandan HIV-exposed children and children with human immunodeficiency virus (Boivin, Bangirana, Nakasujja, et al. 2013; Boivin, Bangirana, Page, et al. 2013). Despite these differences in target groups, the MISC includes a structured and an unstructured component. The structured component relates to the training of mediators (MISC trainers) who are expected to carry out the intervention. The unstructured component is related to the cultural interpretations of the objectives and the content through which the MISC criteria are introduced and demonstrated in the homes.

A MISC trainer must have a basic knowledge of general principles and landmarks of child development, an appreciation of individual differences in development, and a deep understanding

of the cultural and socioeconomic reality of the population he or she work with. The trainers should be capable of forming an empathic relationship with the mother or caregivers and function in a supportive, caring, and non-authoritative manner. They are expected to encourage rather than criticize or evaluate and to convey enthusiasm and hope regarding the role of the parent (or caregiver) in promoting the chances of child development.

The following section will present the basic characteristics and procedures of the MISC intervention as a home-based program that has been followed and implemented in various research projects in Ethiopia (Tefferra et al., 1996), Uganda, and Kenya (Boivin, Bangirana, Nakasujja, et al. 2013; Boivin, Bangirana, Page, et al. 2013)

- A. Every participating family is visited at home prior to the onset of the program. During these visits mother-child interactions during feeding, bathing, and play are observed and videotaped. Based on these observations and on an interview with the mother (assessing attitudes toward the child, educational philosophy, and objectives of child rearing and an overview of what happens to the child throughout the day), a typical profile of the mediation provided to the child in each of the families is constructed (and if possible, including a focus on the type of mediation provided by each of the family members); a general outline of the plan of intervention is then drawn up.
- B. In some families the primary emphasis of the intervention may be to establish a positive cycle of expressive adult-child interaction. Such a relationship is necessary for the formation of a sound basis for mutual acceptance and an affective bond between the adult caregiver and the child he/she cares for. This form of intervention is required for the establishment of intentionality and reciprocity in the adult-child relations.
- C. To begin with, only positive aspects of the parents' interaction with their children are pointed out. This leads parents to become more motivated and interested as they gain

feelings of competence as caregivers. The latter is most important for the long-term effects of the program. In every family the trainer begins by mediating feelings of competence to the mother regarding those behaviors in which she mediated most successfully and demonstrated the highest frequency of mediation criteria (as found during the initial observation). That specific criterion is brought to her attention and labeled using mediation criteria concepts. Once a criterion is identified and clarified, the mother is helped to find more ways to demonstrate it in her everyday life with her own child at home or in the community.

- D. Every session begins with a review of the criteria of mediation and examples presented at the previous meeting and ends with a summary of mediational behaviors presented in the current session. Every family participating in the program is visited periodically once a week or less frequently, as needed, by an assigned mediator. Each trainer reviews the session with an instructor (supervisor) and prepares a summary of the session as well as objectives and plans for the next session.
- E. There is a possibility of combining individual and group sessions. General meetings are held monthly or bimonthly for all participating parents. During these meetings parents are asked to analyze videotaped mother-child interactions and suggest alternative ways of mediating.
- F. Parent-infant dyads may differ with regard to the number of sessions required to achieve behaviors that define quality interaction and communication cycles. However it is not recommended to introduce all of the information mentioned earlier in less than six sessions.

### **A Sample of Intervention Strategies Used**

- 1. Components of the basic criteria of quality interaction and mediation are clarified to the mother or caregiver, first focusing on situations from adult daily life. Following this



initial stage, the criteria are identified as they appear in daily interactions with young children at home and expanded to other possible ways of expressing the same criteria in different interactions with the child. For example: *Your mother-in-law comes to visit, you make an effort to clean the house, cook a good meal, wash and dress the children. Your mother-in-law does not say anything. In other words after all the work you have done you do not get any mediated feelings of competence. How do you feel? There are other possibilities: your mother-in-law says: Thank you I enjoyed my visit, or another possibility: Thank you I love to see you and the children look so nice. Both possibilities provide you with feelings of competence, it does feel good to hear good things said about yourself, however, only the second possibility is specific enough and provides you with an idea that may help you do things more efficiently next time. In other words, if your mother-in-law enjoyed seeing you and the children look nice, why put much effort into cleaning the house or cooking?* Following examples such as the one presented here, pertaining to the criteria of mediation in adult life, the same criteria are discussed as they appear in the interaction between the adult and the child. For example: *Your child scribbles on a piece of paper and brings it up to you, don't ignore it, provide mediation of competence. Tell her that it is beautiful and why you consider it to be beautiful (provided you want her to do it even better next time): It is very nice, I see you have used many colors, or, you have filled the entire page "your comments depend on what you consider a desirable goal in your child's development and future behavior."* We have found that it is easier for mothers to identify with and remember better the criteria of mediation as they are represented in their own life and, only later, to view these in relation to their own interactions with their children.

Mothers have been found to develop the ability to use the criteria of mediation in order

to evaluate the ongoing mediation between different members of their family and their young child as well as between daycare workers or kindergarten teachers and their child.

2. Role playing. Mediating to the mother the possibility of understanding the child's behavior if placed in his/her position. For example: *Let us suppose that you are the child. The entire family is in the room, and you are taken away to a dark room and asked to go to sleep, how do you feel?*

In order to help the mother realize how the child feels, it is sometimes necessary to start role playing with her in her regular role as mother, with the trainer as the child. In the role of the child, the trainer can verbalize how the child feels or what he/she thinks, helping the mother gain insight regarding her child's behavior. This procedure is primarily helpful when mothers view their child's behavior as caused by negative intentions.

3. Sharing, verbal or nonverbal demonstrations of the thinking processes, overt behavior sequences, or methods one uses in different situations, e.g., *when I look at this kind of question I feel confused and so I ask myself first ... and then ....*

Sharing is primarily important in focusing mothers' attention on their own feelings and on their causes and consequences. Through the process of sharing, one can share "cultural wisdom" in the form of folk sayings, stories, or efficient strategies for expression of affect or for mediating cognitive processes such as memory, planning, evaluation, etc. For example: *When I want to remember something I try to see it very clearly and vividly in my mind, in full detail and color and in the funniest way ... that helps me remember it later.*

4. Use of stories, nursery rhymes, songs, dance, and music that are typical to a culture and may be reactivated and used to improve mediation to young children. Mothers are encouraged to tell stories or sing and dance with their children and helped to identify elements of quality mediation within this type of interaction.

## Affecting Caregivers' Perception of the Child

Parents' normative conceptualization of their children is normally part of a cultural tradition and practice that needs to be respected. In fact, it is impossible to expect long-term sustainable effects of any intervention if we do not cooperate and work within these cultural norms. Still, we assume there are certain universal basic conceptions, feelings, and attitudes in the relationship between caregiver and child that are crucial for optimal development of a child in any culture. Examples of these basic attitudes and feelings are:

1. I gave birth to a wonderful human being.
2. I am very important to my child. He/she loves and needs me.
3. I can help my child develop physically and mentally.

What can be done to achieve the above attitudes of parents toward their children (sample activities)?

- Compliment the parent for having a nice baby; point out special features such as beautiful lively eyes, shiny hair, soft skin, delicate hands, fingers, etc. (In some cultures compliments should be stated carefully. In Ethiopia, for example, compliments are considered dangerous since they may elicit jealousy and the "evil eye." In addition, praise is viewed as unnatural in an authority-based adult-child interaction. Thus, working with the Ethiopian population, special care was given to avoid mediating competence in the presence of strangers.)
- Indicate positively similarities between the child and the parent in the way they look and smile.
- If the parent has photos of the child, these may be used to enhance positive feelings for the child and to demonstrate how much the child has grown since the picture was taken (stress-

ing that "you are a good mother; see how well he develops").

- Provide parents with a simple basic view of sequential development of infants and children in various areas, so they can become aware and enjoy even small steps in their child's development. (In order not to overwhelm parents with information, be aware of what they consider as important areas in child development and relate primarily to these areas.)
- Demonstrate to the parent that their baby responds to them more than to anybody else. For example, let the mother call the baby; point out the response. Ask the mother if the baby would go to anyone else when she holds him/her. Again, stress the special relationship between the two.
- Point out the positive qualities that may be found in the parents' existing child-rearing practice and interaction with their child.

## Establishing a Positive Cycle of Early Caregiver-Child Interaction

The following is a simplified practical approach to identify and encourage behaviors which promote the formation of a positive cycle of interaction between an infant/young child and the adult caring for him or her. Establishing a cycle of positive expressive interaction is a necessary condition for mediation.

Adults should help infants and young children learn that the world around them is predictable and responsive to their signals of distress as well as to behaviors expressing positive excitement, i.e. vocalization, facial expressions, and other bodily signals.

The infant needs experiences showing that it is worthwhile "to do something" and to be active rather than to be passive, frightened, uninterested, or apathetic (behavior which is typical of children who have suffered from a lack of responsive human contact in infancy). The infant is born equipped to learn the basic signs for human interaction, but he/she needs medi-

ated learning experience to further develop these communicative skills and the needs for such communication.

### **Sample Activities for Establishing a Positive Cycle of Interaction**

In order to establish and maintain communicative cycles of interaction, with an infant or young child, it is necessary to interpret one's partners' behavior as if it is intentional, namely, expressing the wishes, needs, and ideas of the communicative partner (and not just as an accidental or a mechanical movement). An awareness of the child's intentions is an important factor determining the quality of interaction with that child. It is quite usual to hear caregivers say that there is no point in talking/communicating with a young child because he does not yet understand. This may be true in a sense, but the point is, what the child needs, from birth onward, sensitively adjusted expressive communication in order to form an attachment to other people so that he can develop socially and cognitively.

One way for a caregiver to start such a cycle of expressive communication with a baby is to acquire the attitude that the baby is intentionally expressing a "message" through his/her gestures and that he or she "understands," in a way, sensitively adjusted "replies" from the caregiver. Such an interpretive attitude, which most mothers intuitively hold, makes communication with a baby natural and easy.

Parents are encouraged to ask questions such as: What is the baby doing now? What is he or she trying to tell you? What are his or her initiatives?

Beyond the need to satisfy their basic physiological needs, most babies want to touch and feel, see, hear, and experience the world around them, but, most of all, to experience human warmth and closeness to one loving person and to receive confirmation of this contact through the adult's expressive behavior. Through the MISC, the parents are helped to identify the specific message their baby may be trying to convey at any particular moment.

Parents are also encouraged to respond to their baby's initiative through the following behaviors:

- Maintain eye contact with the baby, smile at her, and respond to her behavior including movement and vocalizations, for example, by patting or by making similar sounds to her own. Reflect her behavior in a positive confirming and reassuring way.
- Assure that while interacting vocally or otherwise they tune in and "dance in rhythm," "taking turns," waiting, and respecting each other's turns. "Once he has a go, then you go and follow his initiative."
- Express their own happiness and excitement in being with the baby, and respond to him or her by making happy faces or happy sounds.

It should be noted here that these examples relate to the establishment of a positive communication cycle and are not sufficient for quality mediation. The latter includes the additional elements of mediation: exciting, conveying meaning, expanding, associating, encouraging, and regulating behavior.

### **Termination of the Intervention**

The MISC intervention is terminated when mothers (caregivers or educators) can verbally explain in their own words criteria of mediation as well as demonstrate this understanding in their actual daily interactions with their children. In most of the participating families, mothers demonstrated a change in behavior toward their children before they were capable of verbally explaining what they were doing. One may claim that if the natural sequence is action before conceptualization, then perhaps one should use more modeling techniques first rather than try to explain and help conceptualize. The basic idea behind the MISC intervention is not to teach mothers and educators specific behaviors, but rather to help them identify behaviors which exist within their own repertoire and explain why behaviors of this nature may help their child develop. The objective is to

overcome the difficulties of generalization and transfer which plague many educational programs. It seems that clarifying to the parents behaviors that are essential for a quality mediational interaction and mediating competence to them helps them learn to use those behaviors more frequently and internalize them as decontextualized knowledge which can be applied in many situations.

The parents not only use these types of behaviors more frequently; they also learn to match their own behaviors with signs of initiation or reciprocity from their child. Explaining, demonstrating, and focusing the child's attention may be a "wasted" educational experience or worse, a disturbing experience if the child is interested in something else, tired, or overexcited. Parents learn to act in synchrony with the child's behavior. This synchrony cannot be readily learned by repeating modeled behavior. It is learned through a process of developing insight about one's own behavior in relation to the child's. It seems that this insight was expressed in actual improvements in the quality of mediation and only later crystallized into words. The objective of the intervention should be to reach the stage of verbal representation of the criteria of quality mediation and not to be satisfied with a change in behavior only. Mothers or caregivers who can verbalize clearly what constitutes quality mediation (independent of specific contexts) could be expected to use it in different situations as their child grows and encounters new experiences.

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### **An Overview of the International Experience with the MISC Approach**

As noted earlier, one of the basic features of the MISC intervention is its relative independence of specific contents, materials, and contexts in which it can be applied. Rather than providing caregivers with structured instructions or materials, the program presents a means of sensitizing caregivers in relation to four domains: (1) their own conceptions of their children, of them-

selves, of their power to affect children's development, and of their objectives of child rearing; (2) the need for "emotional literacy" in order to establish and maintain an expressive communicative cycle of interaction with the child; (3) the unique characteristics and needs of infants, toddlers, and young children, especially in relation to sensory processing, self-regulation, and temperament; and (4) an awareness of basic patterns or criteria of adult-child interaction which constitute a mediated learning experience for young children. These experiences consequently create needs or predispositions that promote flexibility of mind and enable the child to learn from future experiences. These aspects of the sensitization were introduced in training the trainers and mothers in each of the MISC programs applied cross-culturally.

Despite relative uniformity in the general outline of the basic training, the intervention itself was applied differently in various countries. Each team that went through the training was expected to modify and design the actual intervention in line with their own cultural orientation and the living conditions of the population they were planning to work with. It was not merely a process of translating or even of choosing examples from everyday life within their community, but beyond that, it was a process of analyzing one's own cultural philosophy of education resources of stories, songs, music, regional customs, values, etc. and building the intervention on the basis of this understanding.

Several interesting philosophical questions became apparent in comparing, for example, Hundeide's experiences with the MISC intervention in Indonesia and Fuglesang and Chandler's experiences in Sri Lanka (Fuglesang & Chandler, 1996; Hundeide, 1996). Whereas Hundeide passionately stresses the need to return to storytelling and other cultural means of mediation contrary to introducing "modernity" or "Western" analytical types of mediation, Fuglesang and Chandler advocate the need to integrate both as a necessary goal growing out of the people's own needs for cultural transmission and for survival

and adjustment to this rapidly changing “modern” world.

It appears that the MISC mediational approach allowed a variety of interpretations and adaptations to needs of people in different cultures as well as of populations with special needs across cultures. Despite the belief in the universality of the basic criteria of mediation, those were ranked differently in terms of their perceived importance in various countries. It may be concluded that the mediational approach to early intervention was generally accepted across different cultures and implemented in different settings with promising results. Sensitizing caregivers, providing them with “emotional literacy,” as well as giving them tools for observing the children and their own interaction with them were found to be an effective means of intervention with infants, young children, their families, caregivers, and educators.

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## A Culturally Sensitive Approach to Promoting Initial Literacy Development in Africa: Ongoing and Planned Research and Development at the University of Zambia's Centre for Promotion of Literacy in Sub-Saharan Africa (CAPOLSA)

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### Applied Developmental Science: Convergence of Two Complementary Perspectives

Cultivation of literacy in children is recognized as an important activity across a broad spectrum of nations in the contemporary world, despite the wide variety of economic, ecological, and cultural conditions that characterize their societies. Becoming literate is a core defining goal on the agenda of basic education, access to which is increasingly regarded as a universal human right (UNESCO, 1990, 2000). Moreover, a single model of institutionalized public basic schooling (IPBS) has been adopted by most national governments as the principal mode of delivering relevant instruction for the achievement of basic literacy, through an age-graded curriculum (Serpell & Hatano, 1997). The languages and scripts used for this purpose vary across societies, as does the level of funding allocated to early grades of the public education sector. But virtually all nations publish a curriculum, train teachers to implement it, and

conduct formal assessment of literacy learning outcomes for purposes of certification. What then is the case for applied developmental scientific research in this field?

Like other widely endorsed social goals such as economic development and democracy, literacy tends to be a very loosely defined concept. Scientific research can help to remedy this weakness through systematic analysis and synthesis. Analysis can help to dispel myths and prejudices by sharpening distinctions and replacing global categories with more elaborately nuanced accounts of the various processes involved. In order to contribute usefully to practical activity, the complementary insights of multiple disciplinary perspectives must be integrated in the design of professional practices and institutional arrangements. A key resource for such coordination and synthesis is the statement of explicit theory. Theory is often misconstrued as an esoteric preoccupation of ivory tower academics. However, a powerful rationale for applied developmental science is that “there is nothing so practical as a good theory” (Lewin, 1960, cited in McGuire, 1973). Another theme of applied developmental science has been the articulation of rigorous principles for selection among alternative practices, based on empirical evidence of their effectiveness, rather than relying on historical tradition or on intuitively advocated innovation. Some educational planners and policymakers have welcomed this approach with a commitment to giving priority attention to “evidence-based practices.”

The research and development program described in this chapter has been informed by a convergence of two complementary perspectives, one originating from Western culture and technological developments based in the Northern hemisphere and the other grounded in a sociopolitical agenda widespread in the Southern hemisphere, especially in countries formerly oppressed by exogenous colonial domination. From the science and technology culture of the North, this research was informed by the desire to test and extend universalistic theories and principles of professional practice for the optimization of initial literacy acquisition. From the national devel-

opment perspective of a Third World postcolonial state, the research was motivated by the political challenge of poor literacy outcomes of mass basic schooling in Zambia.

The goal of attaining and disseminating universal truths is widely recognized in the scientific tradition launched in Western Europe in the period of the Enlightenment (Berlin, 1956). A philosophical commitment to systematic methods of inquiry is credited with many of the conspicuous advances in human control over the environment in the domains of engineering and medicine, such as the use of satellites and vaccines. Many cognitive and developmental scientists derive inspiration from those achievements in their programmatic search for optimal methods of supporting children’s literacy development. One such program originates from a longitudinal study of dyslexia by Lyytinen, Ronimus, Alanko, Poikkeus, and Taanila (2007) in Finland that gave rise to a computer-based instructional phonics game (GraphoGame™) (Lyytinen, Kujala, Ojanen, & Richardson, 2009), whose educational effectiveness has since been empirically confirmed for large samples of school-going children in Finland (Saine, Lerkkanen, Ahonen, Tolvanen, & Lyytinen, 2011) and in England (Kyle, Kujala, Richardson, Lyytinen, & Goswami, 2013). From this perspective, the research and development program described in this chapter was an attempt to test the generalizability of a scientifically grounded, technologically sophisticated, instructional resource as an effective educational intervention in an African society where different linguistic and educational conditions obtain from those in which its effectiveness had been established in Western Europe.

A complementary source of motivation for the program was growing dissatisfaction in Zambian society with the very limited success rate of government efforts to achieve the ultimate goal of the Education for All movement, namely, “improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills” (UNESCO, 2000). In this chapter, we

describe some of the preliminary research findings and reflect on their implications for educational policy, technology development, and dissemination. We also briefly describe some of the efforts by CAPOLSA (the Centre for the Promotion of Literacy in Sub-Saharan Africa established in 2011 at the University of Zambia) to mobilize action to implement the practical implications of our research. We conclude with an analysis of the technical challenge of delineating the intersections between cognitive and developmental science and sociocultural constraints on effective educational planning.

### **The Political Challenge of Poor Literacy Outcomes of Mass Basic Schooling in Zambia**

At independence in 1964, Zambian society inherited from 50 years of British colonial rule and a longer period of European cultural influence through various Christian missions a system of public schooling with many administrative, curricular, and instructional characteristics derived from the Western educational paradigm (Coombe, 1967; Snelson, 1974). Individual progress within this system was constrained by a highly selective “narrowing staircase” designed to extract from the rural masses a talented elite into an urban, industrialized, modern sector of the economy, where the benefits of literacy are more evident than in the subsistence agricultural economies that prevail in the rural areas (Serpell, 1993).

When the national economy entered a deep recession in the 1980s and 1990s, the resource base of this system shrank so dramatically that the widespread postindependence optimism was significantly undermined, relative to formal education as a passport to individual prosperity and societal progress. Considerable progress was made between 1999 and 2005 in expanding the enrolment of children between the ages of 7 and 15 in schools, raising the gross enrollment rate from 85 to 119% and the corresponding net enrollment rate from 71 to 96% (World Bank, 2007). However, this was achieved at a cost of huge increases in class size in many schools,

combined with grossly inadequate supplies of teaching materials and teacher salaries. Literacy outcomes at the end of primary schooling fell far below acceptable levels (Hungu et al., 2010).

The principal medium of instruction in upper primary classes in Zambia has always been English, which is also the sole medium of secondary and tertiary education in the country. Educational policy in Zambia has been burdened, like that of many post-colonial states, by the need to confront the complex mixture of benefits and troubles that have accrued to so-called developing societies from the exponential growth of English as the global “language of power” over the course of the twentieth century (Erling & Seargeant, 2013). Shortly after independence in 1964, the government introduced the English Medium Scheme (McAdam, 1978), under which children received initial literacy instruction from grade 1 in the medium of English, a language claimed as a mother tongue by less than 1% of adults in the 1969 national population census (CSO (Central Statistical Office), 1973). Several problems were identified with this policy during a national educational reform debate (Alexander, 1982; Serpell, 1978), giving rise to a formal proposal to reintroduce seven of the indigenous languages as the medium of instruction in the early grades (1–4) (MoE (Ministry of Education), 1976).

However, the English Medium Scheme remained in place for another 20 years, until the government published a landmark new policy document, stating that “all pupils will be given an opportunity to learn initial basic skills of reading and writing in a local language” (MoE (Ministry of Education), 1996, p. 40). In order to implement this policy, a new curriculum was developed, based on an adaptation of the Molteno Project (<http://www.molteno.co.za/>), under the title *New Breakthrough to Literacy (NBTL)*. Pilot testing in several different rural zones showed that first-grade children who received initial literacy instruction in the locally predominant language made better progress than those immersed in English from the start (Linehan, 2004; Tambulukani, Sampa, Musuku, & Linehan, 2001). In light of these findings, a new generation of teachers was trained in the new curriculum (Kanyika, 2004; Sampa, 2005).

Over the following decade (2003–2013), however, a growing crisis of public confidence has emerged. While some initial gains in reading skills have been reported in the Zambian languages, the overall literacy profile of Zambian children in grades 5 and 6 of government primary schools has remained very poor (MoE (Ministry of Education), 2012).

## African Multilingualism

Communicative competence (Gumperz & Hymes, 1964) in most African cities involves knowing how to deploy several different languages or dialects in accordance with local social norms. Zambia's profile as a multilingual nation is often misrepresented as having 73 indigenous languages. Analysis of the core vocabulary among various subsets of the 80 Bantu language varieties claimed as a mother tongue by respondents to the 1969 national census of population generated 14 clusters (Kashoki & Mann, 1978). Varieties within each cluster are popularly perceived as dialects of a single language, such that only ten different languages are at all widely recognized. Seven of these have been adopted since the colonial era for basic education in a given region, and two particular varieties are widely used as *lingua francas*: Town Nyanja and Town Bemba (Kashoki, 1972; Spitulnik, 1998). Furthermore, even the distinct language varieties share many commonalities and porous borders.

In Zambia, individual multilingualism is the norm especially in urban areas (Kashoki & Mann, 1978; Underwood, Serlemitsos, & Macwang'i, 2007). In addition to acquiring literacy, children growing up in such a society are expected to acquire competence in several speech varieties, and their progress in doing so is monitored by the family, peer group, and school in different ways. This has implications for both assessment and instruction in urban school settings (Serpell, 2014a). A child whose competence is assessed formally with the use of a standardized or teacher-made test may appear much less competent than s/he would appear if observed in informal communication with his/her peers (Labov, 1969). In urban Zambian settings, code-switching and

mixing are very common in everyday discourse (Moody, 1997; Serpell, 1980). Indeed, for some members of such multilingual speech communities, multilingual talk may represent "one code in its own right" (Meeuwis & Blommaert, 1998) such that "the insistence on two distinct languages as the frame of reference for this form of speech is not helpful in terms of interpreting it" (Bailey, 2006, p. 265).

A coherent system of educational policy, curriculum development, and teacher training for effective initial literacy instruction in Zambia's urban schools requires a multilevel, multidisciplinary theoretical framework to coordinate the phenomena of societal diversity and individual versatility (cf. Kramsch, 2012). For instance, while power and prestige in the public sphere are invested in the use of English, everyday discourse on private matters, especially concerning the lives of families and children, is mainly conducted in one of the indigenous languages (Underwood et al., 2007).

Another challenging issue is the design of orthography: the particular system of spelling adopted as standard for a given language. The learning challenge posed by the irregularity of English spelling has long been recognized, but attempts at reform have been vigorously resisted. As a result, the most widely written and most widely taught language in the world remains paradoxically one of the most difficult for beginners to learn to read and write, because its orthography is "opaque," requiring a knowledge of many different rules and exceptions (Aro & Wimmer, 2003). The Bantu languages of Southern Africa, by contrast, are highly "transparent," with each letter of the alphabet typically corresponding to one single phonemic category of sound in the spoken language. However, the particular codification of each transparent orthography was generally influenced by the spelling system of a missionary's particular European home language, giving rise to anomalous variations in the standard for a given African language across the borders between nation states defined in the colonial period (Legere, 1996). The Centre for Advanced Studies of African Society (CASAS) has sponsored technical analysis of the design features of alternative orthographies, in search of consensus-building for



orthographic reform and harmonization among the orthographies of Bantu languages across the South-Central African region (Banda et al., 2008).

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### The Reading Support for Zambian Children (RESUZ) Project: The Core Study

The initial focus of the research program described in this chapter was defined around the field-testing of GraphoGame, an ICT-mediated intervention designed to promote initial literacy learning in the indigenous Zambian languages in the early grades of public primary schools.

### Theoretical Rationale

Why might computer-assisted learning hold the key to preventing such widespread failure? The reasons and logic behind the development of the game are described by Lyytinen et al. (2009) as originally motivated by search for an effective method of intervention early enough in the life of children at risk for dyslexia to prevent the development of full-scale disability.

As with many contemporary computer games, one major theme in the development of the GraphoGame has been creation of an environment in which repetitive practice is made attractive to the learner by engaging his or her playful motivation. If the necessary learning can be prompted by the computer program while a child is playing, the time and efforts of teachers can be directed elsewhere. Thus computer-assisted learning environments have become an intensive field of development in educational technology. In addition to motivating children to practice, GraphoGame focuses the child's attention on what has been identified as a bottleneck in the progress of initial literacy learning. Detailed analysis of the performance profiles of Finnish children enrolled in the Jyväskylä Longitudinal Study of Dyslexia (Lyytinen, Eklund, & Lyytinen, 2005) led them "to choose phonemic differentiation as the first and most important target for preventive training that a child at-risk for dyslexia needs" (Lyytinen et al., 2009, p. 671).

The Finnish prototype of the GraphoGame™, known as *Ekapeli*, was designed specifically to train "the child to differentiate the relevant phonemic space represented in the language" (op. cit., p. 671). The instructional method is simple and repetitive: "the player listens to one spoken item per event which requires his/her response. The player then connects the item heard to its written counterpart by choosing from several alternatives presented usually as falling balls to increase the game-likeness" (op. cit., p. 671). "Because it is intended for children for whom reading acquisition is a real challenge, the most important goal was at first to make it sufficiently enjoyable to keep children interested in playing for long enough to attain the learning goal. The most natural reward for playing is the experience of success." (op. cit., p. 671) Success on each trial is signaled by a combination of visual and auditory stimulation, which seems adequate to maintain children's engagement across many trials. The sequence of learning tasks "follows the known phonics approach by systematically introducing first the spoken phonemes, then syllables and words" (op. cit., p. 671).

After refining the game, it was posted on the Internet (see <http://www.lukimat.fi>). "When the opportunity to try the game free of charge was advertised, it soon become very popular in Finland" (op. cit., p. 671). The authors "have recommended to kindergartens where all children in Finland have their pre-school year just before school, that the game should be used during the last two months (April–May) and preferably with massed practice. This means short 5–15 min periods several times per day for as long as children require to learn the letter-sound connections and, if possible, also the basic alphabetic principle in terms of how letter-sounds can be connected to assemble words" (op. cit., p. 672). To date, more than 200,000 children in Finland have tried the game.

Systematic research has since shown the game to be an effective resource for the support of initial literacy acquisition in Finnish (Saine et al., 2011) and, with adaptation, in English (Kyle et al., 2013). Comparison of the rates of initial literacy acquisition across large, national school-based samples in various Western societies has shown that the spell-

ing system (orthography) of English is exceptionally difficult for young children to master, because of its superficial irregularity (Aro & Wimmer, 2003). Since the Bantu languages designated as media for initial literacy instruction in Zambia's public schools all have a highly transparent, regular orthography, one might expect Zambian schoolchildren to master basic literacy with relative ease. However, a multinational comparison of systematically collected national statistics revealed an exceptionally low rate of attainment of literacy in Zambia (Hungu et al., 2010).

Hence, Lyytinen and his team decided to explore the potential of GraphoGame as an educational resource in Zambia and undertook a pilot study of a small sample of Lusaka schoolchildren using a ciNyanja version of the GraphoGame mounted on desktop computers. Ojanen (2007 unpublished, cited by Lyytinen Erskine Kujala Ojanen & Richardson 2009) reported that the greatest difficulties manifested by these children in mastering the letter-sound correspondence rules of ciNyanja were encountered with those letters which correspond to sounds in ciNyanja that are incompatible with the sounds cued by the English letter names used in instructing English. They inferred from this that Lusaka teachers may be misapplying instructional methods based on teaching English to teaching initial literacy in ciNyanja. Acknowledging that computers are unaffordable in most educational settings in Zambia, Lyytinen developed a version of the game for mounting on cell phones, an ICT device that had become affordable by most families by 2008, and invited the University of Zambia to set up a field study to explore the applicability and usefulness of GraphoGame as a way of preventing reading failure among first-grade learners in Zambian schools.

### Field Testing Methodology

The RESUZ study began with an intervention project in the capital city of Lusaka, introducing a ciNyanja version of the GraphoGame™ (GG), mounted on handheld cell phones with headphones, to first-grade children. The learners were assembled at their schools in groups of six to play

the game individually under the supervision of a trained student research assistant. On each day of exposure, a child was given six short play sessions with the game, lasting 7–9 min and separated by rest intervals of 1–10 min. There were two phases of exposure, one in Term 2 for an average of 18 play sessions spread over 3 days and the second in Term 3 for 30 sessions spread over 5 days. The cumulative total amount of direct interaction with the game averaged about 90 minutes, only about half of the targeted duration. We drew a random sample of 42 (about half) of the city's government schools, which are primarily patronized by low-income families, and recruited children randomly within each first-grade class. Classes were assigned randomly to various intervention conditions. In one condition, only the participant children were exposed to the game, in another only their class teacher was exposed, and in yet another both the children and their teacher were exposed concurrently, while a control group of children were enrolled in classes where no exposure to GG was offered. We developed four individually administered tests, based on locally validated prototypes (Fink, Matafwali, Moucheraud, & Zuilkowski, 2012; Ojanen et al., 2008; Stemler et al., 2009) to assess the cognitive skills of children in Term 2 before the intervention and again at the end of Term 3.

### Impact of GraphoGame in Context

A total of 585 children (about half of them girls) participated in this core study (Jere-Folotiya et al., 2014). Statistical analysis of the results revealed that exposure to GG in any of these ways generated a significant improvement in performance gains on the most relevant of our cognitive measures, a dictation test that required the child over several trials to select among four printed items the one that matched the aural stimulus of a letter-sound, syllable, or word. The scores on this test by children in the conditions that exposed only the child or only the teacher to the game were approximately equal and superior to those of children in the control condition, while the condition in which both child and teacher were

exposed was the best. Children in all conditions showed gains from Term 2 to Term 3 on this test and on our tests of orthographic awareness and arithmetic. But only the dictation test showed greater gains among the children who experienced the GraphoGame™ intervention.

Thus a reliable and selectively beneficial impact of the game was found in this representative sample of low-income, urban Zambian children, using one of the major languages of instruction. It should be noted, however, that the proportion of variance in initial literacy learning accounted for by exposure to the game was quite small (partial  $\eta^2 = 0.04$ ), indicating that other factors contribute greatly to how well Zambian school-going children learn to decode the transparent writing system of ciNyanja. Five complementary sub-studies were undertaken with a focus on the same cohort of children, some of which have provided indications of what those other factors may be: variations in children's home literacy environment, in the quality of teaching they receive, and in biological factors influencing their cognitive abilities. Before leaving the topic of GraphoGame™, a number of constraints should be acknowledged that are likely to have reduced the magnitude of its impact: limited duration of interaction with the game, frequent absenteeism, environmental noise at the schools, and culturally unfamiliar game format. Improving the input from each of these factors in future trials may be expected to enhance the impact of exposure to GG on initial literacy learning and thus to confirm the generalizability of its effectiveness as an educational intervention beyond the Western world.

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### **The Home Literacy Environment of First-Grade Learners from Lower-Income, Urban Zambian Homes**

Many studies in the Western world have shown that home environmental factors account for a large part of the variance in children's educational progress (Wigfield & Asher, 1984). The influence of socioeconomic status on children's educational achievement has been confirmed

among minority ethnic groups in Western countries and in a few studies in Africa (Kanyongo, Certo, & Launcelot, 2006; Leseman & de Jong, 1998; Ngorosho, 2009; Silvia, Verhoeven, & van Leeuwe, 2008; van Steensel, 2006; Willenberg, 2004). But "social address" variables such as material wealth and parental educational attainment are less theoretically informative than more "proximal" variables that mediate the influence of social class on a child's learning opportunities (Bronfenbrenner & Crouter, 1983). A longitudinal study by Serpell, Baker, and Sonnenschein (2005) in the American city of Baltimore, with public schoolchildren of varying ethnicities and social classes, probed beneath the social addresses to figure out what really makes a difference in homes that promote literacy successfully. Aspects of a family's "intimate culture" that accounted for a significant proportion of variance in children's literacy development included the child's engagement in various literacy-related activities at home, the parents' orientation toward the significance of literacy for early child development, and various routines of family life (Serpell, Sonnenschein, Baker, & Ganapathy, 2002). Another longitudinal study was conducted by Sénéchal and Le Fevre (2002) with a sample of middle and upper SES English-speaking families in the Canadian city of Ottawa. These authors found that parental storybook reading and literacy teaching were two distinct domains in the home. Book reading had a direct association with children's language skills and not literacy skills, while parents' direct teaching of literacy was related to children's phonemic awareness.

Chansa-Kabali (2014) set out to explore with a mixture of methods the influence on early childhood literacy development of the kind of reading activities that take place in low-income Zambian homes. Her study focused on the families of 72 children enrolled in the RESUZ project core study, at nine of the schools. She conducted a questionnaire survey of their home literacy environments and in-depth interviews with the parents of six low and six high achievers on the core study tests.

Results showed that many of these lower-income families in the city of Lusaka understood

the importance of reading in their children's educational process. Parents who reported a strong practical emphasis on literacy-oriented activities in their families had children whose independently measured literacy development was more advanced than parents who did not. The parents who reported a stronger positive attitude toward reading organized their children's literacy environment with more opportunities for literacy learning, by providing children's reading materials, paying for extra tuition classes, and encouraging other family members to be engaged in the process of teaching the target child.

The principal language of communication at home is another strong theoretical candidate for influencing children's literacy learning in Lusaka government schools. According to national census statistics, only 51% of Lusaka residents in 2000 reported that one of the varieties of ciNyanja was their predominant language of communication, while 8% reported their predominant language as English, and 22% one of the other major indigenous Bantu languages (iciBemba, chiTonga, or siLozi) (CSO (Central Statistical Office), 2003). In the core study, an index of familiarity with ciNyanja was developed based on questions addressed to each child about his/her home language background. Scores on this index were positively and significantly correlated with the learners' performance on our baseline tests of emergent literacy skills, letter-sound decoding, ciNyanja vocabulary, and arithmetic, confirming the expectation that children with less exposure at home to the language used as medium of instruction would perform less well on cognitive measures administered in that language than children with greater home exposure. However, the magnitude of the correlations was quite low (ranging from 0.12 to 0.16), showing that even children with lower home exposure to ciNyanja were able to demonstrate some competence in that language (Jere-Folotiya et al., 2014).

Further light was thrown on this by Chansa-Kabali's sub-study. Parents reported separately the language that the child spoke before starting schooling and in the last term of grade 1. Test results showed that those children who spoke ciNyanja before schooling significantly outper-

formed those who spoke another local language. However, when analysis focused on the language that the child spoke at the end of grade 1, the groups did not differ in literacy outcomes. Thus it appears that children who did not speak ciNyanja at home before entering school learned enough of it in the contexts of play and school to be able to cope with it as a medium of instruction. Further investigation of this dynamic pattern is needed to establish whether, as has been found in the USA, home language that matches the medium of school instruction in grade 1 gives children a significant start-up advantage that persists into later years (Storch & Whitehurst, 2001).

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### **Beliefs, Attitudes, Knowledge, and Practices of First-Grade Urban Zambian Teachers Responsible for Initial Literacy Instruction**

Causes of low reading levels among Zambian third graders were identified by Ojanen, Kujala, Richardson, and Lyytinen (2013) as poor teaching methods, lack of teaching and learning aids, overcrowded classrooms, and inadequate teacher training curriculum. A number of researchers on educational quality have noted that individual characteristics of teachers are more important than the institutional setting of the school (e.g., RAND, 2012).

Jere-Folotiya (2014) explored several aspects of beliefs and practices of first-grade teachers using mixed methods. The study was conducted within the RESUZ core study sample, with a view to identifying aspects of the current curriculum, New Breakthrough to Literacy (NBTL), that were perceived by serving teachers as difficult or problematic. The study also sought to determine the beliefs of teachers on several theoretically significant dimensions, which included teaching approaches, motivation, and their personal theories of teaching. Research on teacher characteristics elsewhere has highlighted the significance of a teacher's philosophy of teaching, including her hierarchy of goals, the degree of importance she attaches to individual differences among her pupils (Akkari, Serpell, Baker, & Sonnenschein,

1998), and whether it prioritizes a pupil-centered over a teacher-centered orientation in the delivery of instruction (Schweisfurth, 2011). The study further sought to ascertain whether GraphoGame would interact with the identified teacher beliefs and practices to influence literacy acquisition of learners.

During the economic recession of the 1980s and 1990s, the morale of the teaching profession in Zambia declined dramatically, especially in the primary sector. Salaries were never adequately adjusted in this period to keep pace with inflation, the personnel establishment was not increased adequately to keep pace with increases in enrolment, and the housing stock was not expanded to keep pace with the growing number of teachers employed. Furthermore, the HIV and AIDS pandemic took a heavy toll on the health of the nation's teaching force, leading to high levels of absenteeism and many deaths (Beyani, 2013). To maintain a posture of professional dedication to duty under the resulting circumstances became exceedingly difficult. Given this scenario, another dimension selected for analysis was teachers' motivation (cf. Thoonen, Oort, Peetsma, Geijsel, & Slegers, 2011; van den Berg, 2002), including its emphasis on intrinsic relative to extrinsic rewards (Ryan & Deci, 2000) and the degree to which it reflects an internal or external locus of control.

Jere-Folotiya's (2014) sample comprised 63 first-grade urban teachers, ranging in age from 25 to 54 and 288 of the learners in their government school classes (age range 6–9 years). The study began by posing a wide-ranging set of open-ended questions and inviting teachers to participate in focus group discussions about the challenges experienced with NBTL. Thematic analysis revealed the following complaints: inadequate time within which to complete the literacy lesson (1 h); incomplete NBTL teaching kits; inadequate pupil books; advanced vocabulary for first-grade learners in some books; the use of a rural dialect (ciCewa) rather than Town Nyanja in the curriculum; and too many learners in the classroom, thereby making it difficult to effectively implement the curriculum. Based on these exploratory probes, Jere-Folotiya went on to

design a more focused questionnaire that generated scores on several theoretically driven dimensions.

Responses by a sample of 63 grade 1 teachers in government schools, whose pupils participated in the core study, showed that all the teachers supported the NBTL curriculum's emphasis on imparting basic literacy skills in the local languages. When asked more specifically about the NBTL, 92% endorsed the belief that children learn to read faster in a local language than when they are taught in English. Ninety seven percent (97%) believed that the use of letter-sound correspondence in the NBTL is effective in helping children learn how to read. But 83% believed that the rural standard dialect of ciNyanja used in the NBTL program is very difficult for Lusaka learners, who use the urban dialect, Town Nyanja, as their language of play. Most of these teachers (68%) did not believe that it is difficult for children to learn to read in ciNyanja if it is not their mother tongue. However, they were quite evenly divided on whether teaching in ciNyanja is difficult for teachers for whom it is not the mother tongue.

With regard to their personal teaching philosophies, the teachers believed that not every child can learn (94%) and that learners should be treated as individuals with unique characteristics (98%). Regarding the concept of learner-centered education, the teachers appeared ambivalent. On the one hand they reported that pupils' opinions matter in the classroom (97%) and that learners are more important than teachers in the learning process (56%). On the other hand, they believed that teachers are the only providers of information in the classroom (95%) and that the teacher alone should be in control of the learning process (91%). This ambivalence may be attributed to the practical difficulties of managing very large classes, with limited teaching and learning materials and no teaching assistants to support the teachers.

The teachers appeared more intrinsically than extrinsically motivated. They reported deriving satisfaction from imparting knowledge and observing their learners excel (100%). They also reported feeling responsible for the education of



every learner they taught (87%). However, they also reported that their salaries were inadequate in relation to the amount of work they are expected to do as first-grade teacher (78%). This was not surprising given the high learner-teacher ratio (often over 70:1) and the poor conditions of service that teachers have to contend with. In 2013, after the RESUZ study was conducted, the government of Zambia made significant improvements in the provision of teacher salaries, allowances for accommodation, and transport. However, more needs to be done to improve the working environment in which the teacher operates.

Several researchers have concluded that beliefs are far more influential than knowledge in determining how individuals organize and define tasks and problems (Kagan, 1992; Nespor, 1987; Pajares, 1992). Therefore teachers' beliefs about what is relevant may have a significant influence on what knowledge is gained by the learners in their care. However, analysis of the Lusaka teachers' self-reports of their beliefs and practices revealed no significant impact of these on literacy acquisition of the learners.

Jere-Folotiya conducted moderation analyses to examine how the intervention with GraphoGame interacted with teacher variables and found that GraphoGame exposure interacted with (a) the number of learners in the classroom and (b) years of teacher experience teaching literacy in the local language. The beneficial impact of GraphoGame intervention was greater for teachers with larger numbers of learners in the classroom and for teachers with fewer years of teaching experience. This finding may be a result of changes in the literacy curriculum over the preceding two decades. Before 2000, teachers were trained to teach initial literacy in English. Therefore teachers in this study who had taught for more than 10 years had received their basic training in English immersion, followed at a later stage by in-service retraining to implement the new local-language-medium curriculum. Teachers with less teaching experience were trained to teach literacy in the local languages from the onset of their training. It is possible that for the longer-serving teachers, their initial train-

ing to teach literacy in English may have interfered with their later understanding of how literacy should be taught in the local languages.

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### **Identification and Intervention of Developmental Dyslexia among Zambian First Graders**

Some children have difficulty learning to read due to specific causes such as dyslexia, despite having sufficient general cognitive readiness and a supportive home environment. An intervention sub-study by Jonathan Munachaka (Department of Educational Psychology, Sociology, and Special Education, UNZA) has attempted to assist first graders who were identified as dyslexic or at risk for dyslexia to learn to read using a dynamic assessment application of the GraphoGame.

Munachaka identified the lowest-scoring 10% of children in the main RESUZ study cohort as manifesting severe difficulties in learning to read. The performance of these 56 children was assessed as possibly indicative of being at risk for dyslexia, based on their weak decoding skills on the paper and pencil tests of spelling and orthographic knowledge as well as their performance on GraphoGame. These children received intensive training on the letter-sound correspondence rules of ciNyanja, through individually tailored administration of the GraphoGame. The goal was to test the limits of the training regimen when it is strengthened by dynamic assessment, which focuses the training in real time to areas needing further practice. The assessment reveals core bottlenecks such as difficulties in perceiving specific differences between speech sounds that the learner needs to connect fluently to corresponding graphemes. On the basis of such information, it guides training to give the learner practice with differences that have not yet been mastered, using letters as a medium for differentiation of the learners' phonemic space to help him or her to learn all letter-sound correspondences. Six of the participating children were still receiving intensive support for learning to read in grade 3 as they had not profited from the intervention and were

thus identified as dyslexic or at serious risk for dyslexia.

The interventions with GraphoGame for these special needs children were administered via home visits, a procedure that gave rise to many logistical challenges. Some parents experienced difficulties with operating the phones and headphones in readiness for their children to play. Many parents were skeptical of the researchers, in spite of their introduction by the Ministry of Education. Some thought the researchers were Satanists bent on bringing evil into their homes. Others refused to allow their child to participate on religious grounds. Some requested material assistance with food, money, or school uniforms for their children or asked to be allowed to keep the cell phones after the interventions. Because their residences were scattered across many locations, reaching them for individual, home-based intervention was very time-consuming. Some parents never assisted or encouraged their children to play the game in the absence of the researcher and the research assistants. There were many distractions in some of the home settings. As a result, the original sample was significantly reduced, and for those who remained, there were wide variations in actual playing time. Nevertheless, preliminary findings indicate that the mobile version of GraphoGame mounted on a handheld cell phone is usable in Zambia, under favorable conditions, to identify resistance to treatment as a criterion for the diagnosis of dyslexia and to train children slowly but reliably to overcome their bottlenecks in learning to read.

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### **Instructional Program Development and Teacher Training for Initial Literacy Instruction in Zambian Schools**

Despite the difficult working conditions described above, the occupation of teaching in a government school continued to attract many high-school graduates as one of the few formal sector employment opportunities, and the curriculum of teacher education colleges has been revised several times. The teacher education curriculum for

the Zambia Primary Course designed in 1971 to implement the English Medium Scheme adopted a behaviorist approach for promoting the teaching of English, subjecting trainee teachers to extended, repetitive practice with a view to automatizing their instructional routines. A critical review concluded that teachers' creativity had been stifled by handbooks that prescribed exactly what was to be taught. In order to correct this, a new curriculum (ZBEC) was introduced in 1992, which stressed that language was a means of communication, rather than a system of grammatical structures and rules. It gave teachers freedom and flexibility to organize their work, replacing handbooks with teacher's guides (MoE (Ministry of Education), 1992). Although ZBEC emphasized the systematic teaching of spellings and introduced a phonic approach to reading, it continued to prescribe the teaching of basic reading and skills in English in the first grade. Under this approach, the look-and-say method remained the principal method of introducing new reading items, despite its inadequacies.

A further revision of the nation's basic school teacher education curriculum was formally completed in 1998 as the Zambia Teacher Education Course (ZATEC) (MoE (Ministry of Education), 2008). The curriculum was delivered through a two-year program that included attachment to a school for teaching practice. Its main feature was introduction of a literacy component called the Primary Reading Programme (PRP) to teach initial literacy skills to first graders in a familiar local language (MoE (Ministry of Education), 2001). The PRP prescribed a combination of the look-and-say method and the phonic approach and the grouping of pupils in learning sets based on their level of literacy skills achieved (MoE (Ministry of Education), 1998).

Despite rolling out of the PRP to all public schools in the country in 2000, learners continued to experience difficulties in learning to read at grade level, as evident in National Assessment Reports (MoE (Ministry of Education), 2008, 2012) on literacy levels among grade five pupils whose performance levels still fell below acceptable levels. The approach to understanding this unsatisfactory outcome adopted by Christopher

Kyakukaisha Yalukanda (Zambia National Union of Teachers/Ministry of Education) has been informed by the empirical findings of Ojanen et al., (2009). One dimension of Yalukanda's ongoing research has been the search for an understanding of which cognitive impediments may be responsible for teachers deploying inappropriate instructional methods such as teaching English letter names while introducing learners to ciNyanja letter-sound correspondence rules.

Most, if not all, of the teachers of grade 1 classes in Lusaka are multilingual. By virtue of living in the city of Lusaka, most of them have fluent oral competence in Town Nyanja, and their formal education has imparted to them fluent reading and writing competence in English. Depending on their family background, early education and migration history, they have varying degrees of competence in reading and writing ciNyanja, as well as one or more other Bantu languages. A challenge for research is to establish which elements of their repertoire of linguistic and literacy skills are either faulty or being misapplied in their pedagogical practices. One possibility is that these teachers lack an adequate cognitive representation of the phonology of ciNyanja, the language in which they are required to teach their pupils initial literacy. Another is that they lack adequate metacognitive awareness of the differences between the phonology of English (the language in which they are themselves most literate) and the phonology of ciNyanja. Yet a third possibility is that they find it difficult to keep separate the letter-sound correspondence rules that they have mastered to become highly literate in English and the letter-sound correspondence rules of ciNyanja that they are expected to teach their pupils as the basis for the children's initial literacy.

According to Lyytinen et al. (2009), the training of teachers to impart initial literacy in the transparent orthographies of the Zambian Languages can benefit from the methods used in teaching children how to read in Finland. As described by Aro (2006) and Share (2008, p. 597), once Finnish children have stored the sound each letter represents, they are able to sound out any new words they come across by

means of assembly. Teaching reading using phonics is very important in first grade, because it involves experimentation with letter-sound relations. In a transparent orthography, knowledge of grapheme-phoneme correspondences and mastery of phonemic assembly can be effective and sufficient tools for decoding any kind of word (Holopainen, Ahonen, & Lyytinen, 2001). Bos, Mather, Dickson, Podhajski, and Chard (2001) explain that teachers need to know how to use effective teaching methods and instructional programs that promote phonemic awareness, phonic skills, and application of phonics to reading text. The GraphoGame may therefore be a valuable tool to help learners and teachers master letter-sound rules in an enjoyable and efficient way through repeated practice. Thus, Yalukanda's work includes the use of GraphoGame not only for assessing the emerging literacy skills of young initial literacy learners and as an instructional tool for supporting their learning but also as an assessment instrument for diagnosing teachers' phonological awareness and as an instructional tool for enhancing teachers' pedagogical skills.

### **Curriculum and Instructional Strategy for the Transition from Learning to Read in Local Languages to Learning to Read and Write in English**

Long-standing debates around the world on how best to design educational curricula well suited to the needs of bilingual children have revolved around two pivotal issues: (1) whether the goal is to foster additive or subtractive bilingualism and (2) whether the use of a familiar language to introduce literacy is conceived as a transitional process, aimed at facilitating the learner's mastery of a different, official language as the ultimate educational goal or as the beginning of a parallel process of imparting literacy competence in two languages, in which case the first to be taught must also be maintained (Cummins, 2001). Several different curriculum models have been described for the introduction of English in

primary school education for children in a society where English is seldom spoken to young children at home. Zambia's current curriculum follows a transitional model that aims at a single target language at the end of the school, English which is the official/foreign language. This is an "early exit" model where learners begin to read and write in a familiar local language in the first year in grade one and then gradually move to learning to read and write in English. Until the latest curriculum revision was introduced in 2013, although children were given an opportunity to learn to read and write in a local language, the medium of instruction was English from grade 2 onward and the teachers' guides and learners' books were all written in English except those intended for teaching reading in local languages.

Francis Sampa, one of the project leaders of the RESUZ project, has been involved in the Zambian government's curriculum development for initial literacy learning since the 1990s, and during the life of the project, he has assumed a leading position in the USAID-sponsored Read-to-Succeed (RTS) program that is supporting the government's efforts to achieve better national literacy learning outcomes. Data collected by Sampa and by RTS in 2012 has enabled the CAPOLSA research team to track the progress in grades 2 and 3 of the cohort of Lusaka schoolchildren recruited for the RESUZ project in 2011. Longitudinal follow-up of this cohort is expected to throw light on the degree to which exposure to GraphoGame during initial literacy learning in ciNyanja impacts on learners' subsequent learning to read in English.

The early exit curriculum model followed by Zambia may be an important causal factor behind the poor levels of reading skills achieved by learners in grades 5 and 6. In the additive education model, the learner's first language (L1) is never removed as a medium of instruction. The target is a high level of proficiency in that language plus a high level of proficiency in the official/foreign language. Research in Nigeria (Bamgbose (1984), the USA (Thomas & Collier, 2002), and South Africa (Heugh, 2000) has shown that students who receive L1 education up

to the end of primary school perform better than students in monolingual, subtractive, or transitional systems. Students perform better in their first language, in the official/foreign language, and in other content subjects. In addition, they show a higher level of social tolerance across linguistic groups. The additive model envisages a transfer of cognitive processes from the L1 to the official/foreign language, but this cannot occur if the first language is removed as a medium of instruction, because essential scaffolding has been removed from the education process.

Reflecting on this international evidence and the poor outcomes of Zambia's 10 years of experience, the ministry acknowledged the need for further reform (MoE (Ministry of Education), 2012) and embarked on a further revision of the primary curriculum extending the use of local languages as medium of instruction from grades 1 to 4. Following successful piloting in 2013, the program is being phased in gradually beginning with grade 1 in 2014. In an effort to ensure proper coordination of various education stakeholders and guide their efforts in improving literacy, the ministry also launched a National Literacy Framework (MoE (Ministry of Education, Science, Vocational Training and Early Education), 2013) that focuses on teaching five key skills of reading: phonemic awareness, phonics, fluency, vocabulary, and comprehension.

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### **Complementary Instructional Resource Development at CAPOLSA (Centre for the Promotion of Literacy in Sub-Saharan Africa, University of Zambia)**

Zambia's linguistic diversity is an important part of the nation's cultural heritage. According to Mtenje (2009, p. 63), the "linguistic and cultural diversity of most African countries has for a long time been perceived as a problem rather than an asset for language planning." CAPOLSA, however, acknowledges the cultural strength of Zambia's indigenous linguistic heritage and seeks to promote wider public appreciation of the utility of indigenous languages for promoting

initial literacy acquisition. The following projects have been undertaken by the center to date to advance that agenda.

### **Creation of Child-Friendly Reading Materials in the Indigenous Languages of Zambia Approved as Languages of Instruction for Early Grade Learners in Public Schools**

The aim of this project is to create, collate, and disseminate child-friendly reading materials for young children enrolled in the early grades of primary schools to exercise and extend their new literacy skills in the Zambian languages. The project began with the Kalulu Story Writing Competition which was an initiative of GraphoRead in 2011 (<http://grapholearning.info/>). The competition attracted over 700 stories and poems. CAPOLSA assembled a panel of local language experts to review and adjudicate the submissions. On that jury's recommendation, 14 authors were awarded prizes, and their prize-winning stories and poems were adopted for publication by CAPOLSA. In order to prepare them for a readership of young minds, the texts were subjected to a number of editorial refinements in consultation with various expert referees, notably abbreviation and grammatical and orthographic corrections. A local publisher was then contracted to produce collections of the edited/translated stories in each of four languages widely used for initial literacy instruction (*details of which are listed on the CAPOLSA page of the University of Zambia website*<sup>1</sup> <https://www.unza.zm>). The publisher engaged local artists to design attractive illustrations for the booklets.

<sup>1</sup>*chiTonga book1 ISBN:978 998,212,475 1, chiTonga book2 ISBN: 978 9982 12,472 0, ciNyanja book1 ISBN:978 9982 12,474 4, ciNyanja book2 ISBN:978 9982 12,471 3, iciBemba book1 ISBN:978 9982 12,473 7, iciBemba book2 ISBN:978 9982 12,470 6, KiKaonde Book 1 ISBN: 978 9982 2409 70, Lunda Book 1 ISBN: 978 9982 2409 87, Luvale Book 1 ISBN: 978 9982 2409 94, siLozi book1 ISBN:978 9982 12,476 8, siLozi book2 ISBN 978 9982 12,469 0)*

The early grade readers are currently undergoing evaluation across some Zambian schools. This is because the spelling system adopted for the readers departed slightly from the orthography approved by the Ministry of Education (MoE (Ministry of Education, Republic of Zambia), 1977). The approach adopted for this evaluation was determined in consultation between curriculum experts at the Ministry of Education and CAPOLSA. The evaluation which started in 2014 is being conducted in collaboration with teacher education colleges. The groups whose evaluation is being sought are teachers and parents of children enrolled in grades 1–4 of government schools and the children themselves. Participants have all been given adequate time to familiarize themselves with the readers. The questionnaires and interview guides include a mix of open-ended and multiple-choice questions. Views from the respondents will help all interested parties learn whether the simplified and harmonized spelling system adopted for the readers is helpful for young developing minds. It is hoped that the outcomes of the evaluation will further steer discussions among policy makers regarding the direction to take in making the orthography simpler and more harmonious across the Bantu languages of Zambia.

Several scholars have shown the benefits of stories to young minds. Carroll, Bowyer-Crane, Duff, Hulme, and Snowling (2011) and Beck and McKeown (2007) indicate that children exposed to stories develop an expanded vocabulary which lays a foundation for comprehending larger units of speech, abstract reasoning, and synthesizing text and thus increasing their intellectual capacity. CAPOLSA has endeavored to further increase the production of stories by conducting writers' training workshops in indigenous languages of Zambia approved as languages of initial literacy instruction in schools. During the 3 days of workshops, a number of texts were developed and handwritten in small booklets, handmade by participants. Language and literature experts from UNZA, Government's Curriculum Development Centre (CDC), and other renowned authors of books in local languages have led the workshops. Four training workshops have taken place since



2013, one each in the medium of *iciBemba*, *ciNyanja*, *siLozi*, and *chiTonga*. Future workshops are envisaged in the other Zambian languages. The aims of the workshops were to:

1. Enhance upcoming writers' narrative composition skills for developing stories that are comprehensible to young children and engaging of their imagination.
2. Expose writers to research-based information regarding language and its dynamics.
3. Familiarize writers with the simplified orthography adopted for publishing child-friendly reading materials for early grade readers and with its rationale.
4. Provide writers with skills to help them work effectively in their communities.
5. Help to reawaken the practice of writing in local languages.

### **Harmonization of Orthographies of the Seven Languages Used for Initial Instruction in Schools**

As we noted earlier in this chapter, the Bantu languages of Zambia share a number of common features, but their current standard orthographies differ. CAPOLSA aims at developing guidelines for the harmonization of orthographies across these languages, with a view to reducing the difficulty of initial literacy acquisition posed by the prevailing inconsistencies. Drawing on the guiding principles outlined by the CASAS harmonization project (Banda et al., 2008), CAPOLSA's goals are:

1. To iron out disagreements existing among linguists of the region as regards the spelling system; to harmonize and put in place a common orthography that consists of similar rules applicable to all languages approved by the Ministry of Education as official languages of education in order to facilitate the acquisition of literacy among early learners; to bring harmony between sound pronunciation and the graphic representation of the consonants and syllables within and across languages so that

one spelling consistently represents each given sound; to generate transparent texts (with special symbols and diacritics avoided as much as possible) that children from different regions of Zambia should be able to read without difficulty.

2. To attain these goals, CAPOLSA convened an orthography harmonization workshop prior to the publication of any reading materials, in view of the shortcomings of current orthographies relative to the aforementioned principles. Leading participants were indigenous language experts from the University of the Western Cape, the Centre for Advanced Studies of African Society, South Africa, the University of Zambia, and Zambian government's Curriculum Development Centre (CDC).

The workshop made several recommendations that were followed in compiling the first set of books published by CAPOLSA in 2013, to ensure that their texts are child friendly, not only in content, but also in their use of a simplified and transparent spelling system that matches the prevailing language situation in Zambia. The next, ongoing phase of CAPOLSA's work in this area is to evaluate the first set of readers. Preliminary indications suggest that there is widespread support for the simplified and harmonized spelling system. But, as was to be expected, that support falls short of unanimity. Adults who learned to spell a given language one way generally perceive new ways of spelling that language as strange or incorrect. If teachers and/or parents perceive the reformed spellings as inauthentic, they are likely to be less than fully supportive of the learning agenda for children in their care, and that will be a disadvantage for the children's acquisition of literacy. For that reason, CAPOLSA has sought to strike a judicious balance between an orthography that adheres to the principles outlined above and responsiveness to opinions voiced by literate "native-speakers" of each of the languages in question, especially writers and teachers. We anticipate that the process of orthographic reform will be a gradual one and that some changes that carry important advantages

from the perspective of simplicity, transparency, or harmonization will command greater acceptability in the future, as successive generations come to appreciate those criteria.

## **Creative Writing Devised at CAPOLSA in Indigenous Languages**

### **Translation of Stories Across the Indigenous Languages**

The early grade readers published by CAPOLSA include stories and poems that were originally composed in ciNyanja, chiTonga, iciBemba, and siLozi by prize winners in the Kalulu Story Writing Competition and later translated across the three languages. CAPOLSA encourages the art of translating from one Zambian language to other. Most of the translators we have engaged initially expressed some uncertainty as to their competence in one or the other of the languages in question. We therefore encouraged them to work in pairs, where one member of the pair was very fluent in each of the two languages. These pairs have consistently reported that this mode of translating proved to be much easier than translating between English and their dominant local language, an activity with which they were all very familiar. The same approach of translating from one Zambian language to another has been followed with the prize-winning stories that were originally written in the kiKaonde, Lunda, and Luvale languages that originate from the North-Western Province of Zambia. These readers are scheduled for publication in the course of 2015.

### **Controlled Writing with Emphasis on Core Bantu Vocabulary**

The high degree of mutual intelligibility among the various indigenous Zambian languages raises the possibility of composing stories that use a shared vocabulary. A controlled writing workshop was convened that identified the shared vowels, consonants, syllables, and words across chiTonga, ciNyanja, and iciBemba. The workshop went on to generate a number of child-

friendly short stories, each of which shared over 70% of its vocabulary across these three distinct Zambian languages. The hope is that exposure to such texts during the early grades will support the promotion of children's cognitive development in Zambia's multilingual society and reduce their perception of linguistic diversity as problematic. Building on the output of the controlled writing workshop, it has been proposed to develop a Bantu version of the GraphoGame, comprising vowels, consonants, syllables, words, and short sentences shared across the aforementioned indigenous languages, as well as short interesting stories for first graders.

### **Exploring the Potential of Multiple Media for Dissemination of Literacy Materials**

In addition to print, CAPOLSA has embarked on the distribution of early grade reading materials via digital, electronic media. In 2013, some were mounted on tablet computers that were pilot tested as a classroom resource in government schools of Lusaka (Walubita et al., 2015). A select group of grade 1 teachers developed several alternative ways of deploying a small number of tablets in such a way that most of the children in their overcrowded classrooms were able to gain sufficient exposure to the GraphoGame to make a significant contribution to their early literacy learning. Results suggested that this may be an effective and increasingly affordable way of going to scale with distribution of appropriate reading materials to the nation's large number of initial literacy learners, who are widely scattered across the country.

CAPOLSA has also ventured into the development of entertaining methods of promoting phonemic awareness in young minds. The center commissioned productions by a local popular music group of vowel songs, namely, AEIOU and Nyama (vowels represented by animal sounds) and an alphabet song coined as A-Be-Ci. Some of these are accessible on the Internet under the index name of CAPOLSA on YouTube. These are designed to appeal to young minds in

the early grades and preschool settings. Rather than singing the ABC English version of the alphabet, we propose to encourage teachers to use the local language version that reflects the correct letter-sound correspondence rules that children must master to become literate in any of the Bantu languages. Other projects under development include mounting competitions among schools in performance mastery of the CAPOLSA spelling system, in playing GraphoGame routines, and in singing the A-Be-Ci and AEIOU vowel songs. Beyond the actual competitors, we envisage that many children will gain a boost to their literacy acquisition by watching the competitions on television, another electronic resource that is rapidly growing in accessibility around the nation.

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## Conclusion

The research described in this chapter lies at the interface between a scientific paradigm informing experimental and developmental studies of cognition and instruction; a humanistic tradition informing studies of culture, language, and social change; and a systemic approach to social and educational planning.

Several strands of the research we have presented illustrate the benefits of mixed methods. The well-known strategic benefits of the quantitative paradigm in terms of precision and reliability come at a cost that can be mitigated by qualitative methods that serve to “make the familiar strange and make the strange familiar” (Spiro, 1990, 47). Many psychologists in countries outside the West have noted that qualitative methods have the particular attraction of allowing egalitarian cross-cultural communication among investigators with uneven degrees of familiarity with the constructs and formats of Western psychology (Serpell & Akkari, 2001). As Yoshikawa, Weisner, Kalil, and Way (2008), pp. 346–7) have explained, mixing qualitative and quantitative research in developmental science is especially helpful, among other goals, for “integrating the study of beliefs, goals, and practices in socialization and development ... exam-

ining reciprocal relationships between contextual and individual-level factors ... and exploring causal associations and their mechanisms.”

The research we have presented is multidisciplinary, drawing not only on psychology’s traditional allies of biology, linguistics, and sociology but also on political science, history, and literary studies. These disciplines, less familiar to many psychological researchers, in our view have much to offer in answering the sometimes overlooked, yet fundamental question “Literacy for what?” For instance, they can readily engage with a concern frequently expressed in Zambia’s popular press concerning the quality of Zambia’s “reading culture.” Collaboration with experts on literature on the design of writers’ workshops, with graphic artists for illustration of the early grade readers, and with musicians on the design of songs to promote phonological awareness has prompted CAPOLSA to include aesthetic dimensions among its quality assurance criteria.

The agenda of applied developmental science rests on the premise that scientific theory should in principle be helpful in deciding what kind of contextual modification is most appropriate for achieving desired developmental outcomes such as literacy. However, in practice, educational programs in the real world tend to deviate in a number of ways from the precise implications of any one theoretical model. Understanding why this is so calls for more than experimental control. Rather than conceiving context as a pattern of external stimulation, developmental researchers have increasingly recognized that humans, like other species, are inextricably embedded in ecological systems (Bronfenbrenner, 1979; Sameroff, 1983). Reviewing the mix of successes and setbacks reported by four large-scale programs of early childhood intervention in India, the Netherlands, Turkey, and the USA, Serpell (1999, p. 54) posited three alternative explanations for why intervention programs tend to deviate from the precise implications of any one theoretical model:

Incomplete or eclectic assimilation of theory into practice; Organizational adaptability as a pragmatic requirement of going to scale; Multiple goals as a reflection of systemic interdependency.

The technical desire to test and extend universalistic theories and principles that motivates one perspective of our team's North-South collaboration tends to favor the first of those explanations, whereas the more practical motivation that informs the other, complementary perspective tends to favor the second. In order for a social intervention program to "go to scale" from a pilot project to a general cultural practice sustained by public policy, it is seldom effective to push for implementation of an idealized blueprint. Widespread appropriation of a programmatic concept is more likely to come about through a gradual "learning process approach." This calls for "organizations with a well-developed capacity for responsive and anticipatory adaptation—organizations that (a) embrace error; (b) plan with the people; and (c) link knowledge building with action" (Korten, 1980, p. 498).

The need for such adaptations highlights the importance of a complementary, qualitatively different set of goals from those of a universalistic cognitive science. "The nested organization of systems of social activity (families and schools, within neighborhoods and districts, within nations and their public policies) and the relativity of symbolic meanings to particular cultural frameworks of interpretation (narratives; curricula; and ideologies of work and play, gender roles, intergenerational relations, etc.) demand that the impact of an enterprise as complex as an early education program be appraised quite differently in each particular sociocultural setting" (Serpell, 1999, p. 59).

Sensitivity to culture in applied developmental research demands attention to three complementary ways of interpreting the role of culture. Culture structures the context of human development in a fashion that resembles a womb; through language and other semiotic means, culture informs human cognition; and over the course of history, culture constitutes a forum for the debate of alternative approaches to the improvement of the human condition (Serpell, 2000).

Thus, in the Zambian context, the efficacy of GraphoGame should be appraised in terms of a broad constellation of factors that include:

- a. Optimizing the stimulation provided by the game in response to the child's evolving cognitive needs for achievement of a given curricular goal (a design task for the computer programmer, informed by psychological assessment of the child and linguistic analysis of the target language and script)
- b. Orientation and training of teachers to incorporate the game appropriately within their pedagogical practices and adaptation of teacher education curricula to that end
- c. Mutually informative consultations with the national government and other large-scale providers of early education regarding optimal strategies for integrating the game within the nation's emerging educational policy and curricula
- d. Mutually informative consultations with linguists, creative writers, and other cultural experts regarding optimal orthographies for local languages and, if necessary, their adaptation for early literacy learners
- e. Mutually informative consultations with ICT developers, mass media providers, educational publishers, and other agents of macro-societal change regarding optimal ways of disseminating GG and other literacy learning resources

While underlining the importance of mutually respectful interaction between researchers, professional practitioners, and policymakers, we also acknowledge that applied developmental scientists have a duty to advocate innovative policy initiatives that avoid pitfalls identified by research, such as those of rigid orthodoxy, cultural homogenization, and the socially extractive definition of educational success. For applied research to fully earn its name, it should generate understanding that is not only relevant to action in the real world but also effective as a stimulus and guide to such action, hence our inclusion in this chapter of a section on the interventions undertaken by CAPOLSA to realize the implications of research.

Such interventions depend for their success on cooperation with and strengthening existing institutions engaged in literacy promotion (Serpell, 2014b). Thus CAPOLSA has established an Advisory Board on which a wide range of literacy promotion stakeholder organizations are represented. More concretely, CAPOLSA interacts with several key Zambian institutions and has combined project activities on its own agenda with capacity building of other institutions, for instance, by contracting language experts to undertake translation and editing of its publications in Zambian languages. In the future, CAPOLSA hopes to collaborate with two existing centers in Zambia for professional, neuropsychological assessment of special educational needs, one at UNZA's School of Education and the other at the Zambia Institute of Special Education (ZAMISE). A mix of adapted Western instruments and locally developed methods are currently used at these centers, designed to help understand subtle deficiencies in the central nervous system that interfere with learning. CAPOLSA's activities have the potential to contribute to the systematic identification of learners with special educational needs and the programmatic delivery of appropriate assistance to them through refined assessment methods and innovative instructional resources such as GraphoGame.

The conception of applied developmental science envisaged by these various types and levels of activity thus embraces observation and analysis of the world as it is and systematic action on many different fronts to advance toward a better world.

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# Community-Based Rehabilitation for Human Development in Sub-Saharan Africa

# 18

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Human development supports are about enabling people to lifelong, healthy, and creative lives to advance other goals which they value (UNDP, 2011). Concerning disability, supports may need to counteract the effects of social disadvantage from community barriers to participate in activities typical of others. The *World Disability Report of 2011* estimates that there are now over 1 billion people with disabilities in the world (World Health Organization, 2011). This translates to 15% of the world population, and, of this num-

ber, 110–190 million experience very significant difficulties. With a population close to a billion, at least 15 million people living in sub-Saharan Africa (SSA) have significant disability. The report further notes that 80% of people with disabilities live in low-income countries, mostly in Africa and Southeast Asia. People with disabilities face marginalization from mainstream society due to stigma-laden beliefs about their right to full citizenship and their ability to make meaningful contributions to decisions that affect their lives (Chan & Chiu, 2007; Minkowitz, 2006; Mpofu, Chronister, Johnson, & Denham, 2012).

A large proportion of people with disabilities in sub-Saharan Africa (SSA) live in chronic poverty and often are excluded from community development activities such as literacy programs. Moreover, they are at elevated risk for exclusion from nonformal education and income generation schemes (Dutch Coalition on Disability and Development, 2006; Groce et al., 2011; Thomas, 2011; Makuwira, 2013). A universally endorsed vision for the social inclusion for people with disabilities is contained in various disability rights statements, such as Article 19 of the United Nations (UN, 2006) Convention on the Rights of Persons with Disabilities (UNCRPD), which provides for equal opportunity to participate in the affairs of the community to persons with disabilities. The obstacles to participation and the challenges of daily living experienced by people with disabilities also affect their families,

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acquaintances, and friends through the process of courtesy stigma (Whyte and Muyinda, 2002; Mitra, 2005). This dynamic occurs when families that have a member with disability experience social exclusion due to their association with the family member with disability (Bwana & Kyohere, 2002). Article 32 of the UNCRPD provides for international development organizations to include people with disabilities in their processes and programs in order to improve their quality of life. People with disabilities should be accorded their educational, social, cultural, religious, economic, and political rights in order to unlock their potential and be able to participate fully in communities.

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### **Disability Social Inclusion as Child Development Support**

Children living with disabilities are among the most socially excluded persons in Africa (UNICEF, 2012).; This occurs largely due to their status as dependent minors and also to limited legal and social protections for them (Ndawi, 2002). For example, about 90% of children with disabilities do not go to school in many low-income countries (United Nations Educational, Scientific and Cultural Organization: UNICEF, 2005a, b), and many SSA countries lack enforceable legal instruments for the equalization of opportunities for children with disabilities (Ndawi, 2002; Mutepfa, Mpfu, & Chataika, 2007). This is despite the fact that the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (2005a) considers inclusive education as a child development and rehabilitation strategy “to address the learning needs of all children, youth and adults with a specific focus on those who are vulnerable to marginalization and exclusion” (p. 1). Community-based rehabilitation (CBR) holds the key to opening up the world of opportunities for children with disabilities in sub-Saharan Africa through social inclusion, which in turn supports human development. For instance, a South African study reported disability social inclusion of children in playing structured indigenous Zulu games to

reinforce their social skills and cognitive skills (Roux, Burnett, & Hollander, 2008). In another study, 50% of Ugandan children in an inclusive program achieved improved physical and mental health (UNESCO, 2001). Mpfu (2003) reported that school social inclusion with disability inclusive leadership roles enhanced social acceptance and participation of Zimbabwean early adolescents with physical disabilities. Furthermore, Wanderi, Mwisukha, and Bukhala (2009) observed that inclusion of persons with disabilities in physical education and sports, which are adapted to suit their physical ability to attain total physical fitness, enhances their cognitive, psychomotor, and affective development.

With disability social inclusion, children with disabilities are fully integrated into their communities, including participation in establishing and maintaining reciprocal relationships with others as well in employment. Involvement in the community also comes with the access and use of community resources: recreation, leisure, church, and volunteer service opportunities. The United Nations Development Program (UNDP, 2011) asserts that social inclusion should be a core human development strategy, aimed at the equalization of opportunity for all and regardless of social attributes. Full community inclusion is a developmental right of children with disabilities (United Nations, 2007).

According to the ecological model of human development (see Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006), children are nested within families, and families are nested within their communities. Children and families participate in intersecting social circles, in which they imbue as well as enact social attitudes with their relatives, friends, and peers. The quality of relationships within the social circles influences the child’s self-concept and ongoing socialization into typical community activities over the developmental period (Bronfenbrenner, 1994; Levers, 2012). Actual peer social acceptance of Zimbabwean adolescents with disabilities was similar to that of same gender teenagers from the social networks in which the teenagers with disabilities were involved (Mpfu, 1999). This socio-ecological network implies numerous and



complex reciprocal relationships for supporting the development of children to their potential. Development supports could be at the individual, family, and community levels. At each of these levels, the same development support needs can be addressed differently, resulting in the same desired ultimate goal, which is to equip children, regardless of disability, to participate meaningfully in their communities.

In the SSA context, the levels at which families are involved in disability social inclusion support for a child member with disability vary according to their residence (rural vs urban), type of disability in their family member, socioeconomic status (SES), and the parent (or guardian) relationship (Whyte & Muyinda, 2002; Mutepfa et al., 2007). Overall, children with developmental disabilities would have lower community participation access than typical others, as family members tend to monitor their movements relatively more closely than they would to other typical children. Children with disability in rural SSA are relatively more integrated into their communities than those in the cities. This is because others in the rural village community are mostly kin, with culturally expected parenting responsibility over all children in their community, regardless of disability status. However, children with a severe disability who reside in a rural district would also be at risk for significantly lower community participation than for typically developing other children; this is due to the lack of access to resources needed to treat associated medical conditions that require ongoing monitoring or for social participation in the broader society beyond their own village (Devlieger, 1998; Whyte & Muyinda, 2002; Mpofo, 2004). Families with more material resources have affordances to provide greater access to and participation in the community for the child with disability than for less advantaged others. Parents with a disability may be more aware of disability supports for child development than others without a history of disability (Whyte & Muyinda, 2002).

The notion of inclusive communities entails structures and procedures that facilitate the inclusion of people with disabilities, rather than

expecting people with disabilities to change to fit in with existing arrangements (ILO, UNESCO, WHO, 2004). “Community” is a multilevel construct that is inclusive of schools, support groups, local administrative units, and other social affiliations (Geiser & Boersma, 2013). In the SSA context, social inclusiveness is likely to involve CBR initiatives that address the following interconnected aspects: poverty, human rights, community participation, empowerment, and sustainability of community development action (ILO et al., 2004). Every community engages in some form of community action for its own development. When properly conceived, community action offers one of the best ways to optimize a community’s resources (people, technology, natural resources, and supplies) in the service of its members’ health and well-being.

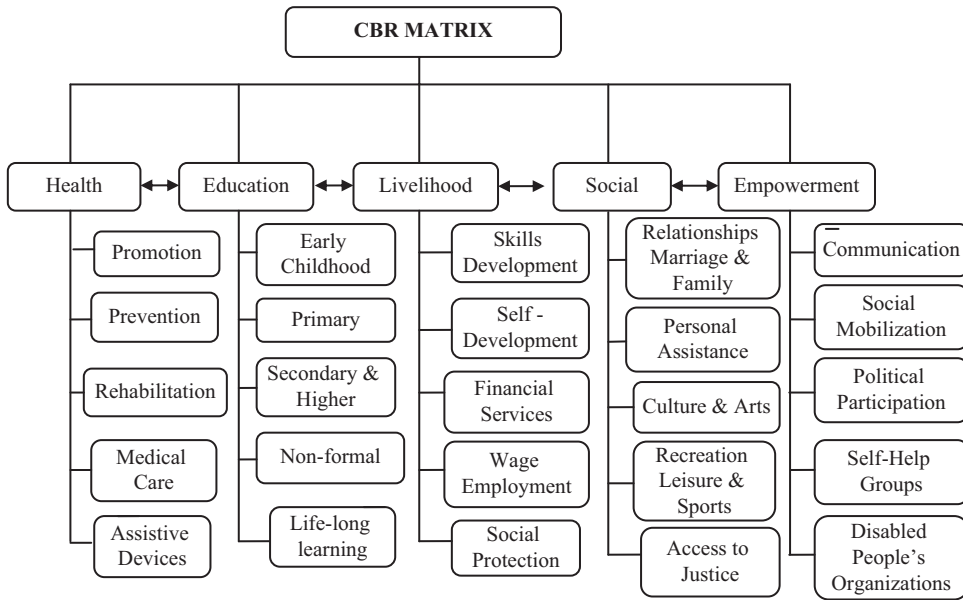
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### **Community-Based Rehabilitation as a Human Development Framework**

Community-based rehabilitation (CBR) is the strategy endorsed by the World Health Organization for general community development for the rehabilitation, poverty reduction, equalization of opportunities, and social inclusion of all PWDs (World Health Organization, 2010a). It is a strategy which targets social inclusion across five broad areas of participation: health, education, livelihood, social, and empowerment (See Fig. 18.1).

These are typical life domains in which people seek to overcome activity limitations and participation restrictions, thus improving their lifestyle. CBR is defined as “a strategy for rehabilitation, equalization of opportunities, poverty reduction and social inclusion of people with disabilities” (ILO et al., 2004, p. 2). Within this framework, the major objectives of CBR are:

1. To ensure that people with disabilities are able to maximize their physical and mental abilities, to gain access to regular services and opportunities, and to become active contributors to the community and society at large



**Fig. 18.1** CBR Matrix. Source: World Health Organization (2010b, p. 25)

2. To activate communities to promote and protect the human rights of people with disabilities through changes within the community, for example, by removing barriers to participation

The CBR strategy’s strength lies in the promotion of collaboration among community leaders, people with disabilities, their families, and other concerned citizens in providing equal opportunities for all people with disabilities and their organizations. It promotes multi-sectoral collaboration, to support community needs and activities, as well as collaboration among all groups that can contribute to meeting its goals. A well-planned CBR can have a positive impact on the various aspects of quality of life by increasing self-esteem, empowerment and influence, self-reliance, and social inclusion.

CBR can be distinguished from community rehabilitation (CR). CBR seeks to achieve rehabilitation outcomes for people with disabilities through context-sensitive interventions and support systems with full participation of the community and for full community inclusion (Umeasiegbu, Mpofu, & Mpofu, 2013). CR is about the delivery of rehabilitation services to

community settings, and not necessarily with the community. For example, a home care nursing service would be a CR option, whereas interventions to make social service facilities accessible to people with disabilities would be a CBR activity.

Over the years, the push has intensified to include disability as a part of the global development policy agenda, especially with CBR as a relevant community response (Albert, Dube, & Riis-Hansen, 2005; Kett, Lang, & Trani, 2009). CBR promotes human development through a humane approach to health and well-being, while encouraging full educational, social, cultural, religious, economic, and political participation of those with disadvantage (Anderson, 2004; ILO et al., 2004). CBR, as used for social inclusion, seeks to address major human development barriers such as poverty reduction, universal primary education, major public health problems, gender equity, and environmental sustainability (Dutch Coalition on Disability and Development, 2006). The link between disability and poverty is robust (Mitra, 2004, 2005), and the majority of people with disabilities live in material poverty (Coleridge, 2007). Because poverty typically leads to increased disability, and disability in turn

may lead to increased poverty, this issue has strong implications across the life span. However, conditions associated with poverty can be mitigated by full community inclusion of people with disabilities, through the vehicle of CBR. By removing the barriers to development for people with disabilities, as well as to their access to and use of social services, CBR helps to reduce poverty and improves the lives of everyone in the community (Heinicke-Motsch, 2013). As a human development strategy, CBR enables access to social capital that enhances community interdependence resourcing across the life span. For example, the United Nations (1998) has recommended that the following components be included in a CBR program: (1) creating a positive attitude toward people with disabilities; (2) provision of functional rehabilitation services; (3) provision of education and training opportunities; (4) creation of micro and macro income-generation opportunities; (5) provision of care facilities; (6) prevention of the causes of disabilities; and (7) management, monitoring, and evaluation. These are qualities of social programs designed to support human development across the life span.

The World Bank's "Global Partnership for Disability and Development" encourages developing countries' governments and international cooperation agencies to integrate people with disabilities into their poverty eradication efforts. Fewer opportunities to attain access to education and employment serve to relegate people with disabilities into deeper poverty, which in turn increases the risk of disability (Hartley, Finkenflugel, Kuipers, & Thomas, 2009). In order to break this vicious cycle of the "poverty-disability trap," specific action is needed that is geared toward including people with disabilities in every area of society and in every development activity (Coleridge, 2007; Mitra, Posarac, & Vick, 2011).

### Illustrative Programs

Various methods from the CBR model are used for development in SSA: (a) Community Rehabilitation Village (CRV), (b) Family-Based

Rehabilitation Program (FRP), (c) Community Integrated Program (CIP), (d) Neighbourhood Day Centre (NDC), and (e) Outreach Mobile Team (OMT). The CRV is a system in which the whole village or community is involved in the rehabilitation process. The FRP involves some outreach support from outside the village or community. The CIP is a variation of the CRV, whereby people with disabilities and the rest of the community are collectively involved in a joint project, for example, a communal garden to ensure village food security and storage. Finally, the NDC brings together people with different disabilities, and sometimes carers, to a common location within the community to work, counsel each other, gossip, and rejoice (see Musoke & Geiser, 2013). An important aspect of these programs is that they are not residential; thus participants return to their respective families and are not isolated from the community. The OMT is a rehabilitation outreach program, whereby specialist staff members from a nearby institution such as a hospital or a school visit individual homes, day centers, or clinics; these staff members are similar to itinerant community health care providers. It is important to note that these approaches are not mutually exclusive; CRV and CIP can operate simultaneously, likewise so can CIP and FRP, and all of these models can be used with OMT coordination. The possible models or combinations that are designed entirely depends upon the people involved using the "participatory" approach and the circumstances of each situation.

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### Influences on the Design and Implementation of CBR for Development

The use of CRB is interpreted and implemented in a variety of ways globally, and this is paralleled throughout SSA (Cornielje & Bogopane-Zulu, 2008). CBR activities may range from giving personal assistance to those needing appliances, such as crutches or hearing aids, to political lobbying for inclusive education or other forms of human rights that people with disabilities deserve (Asindua, 2002).

Influences on the design and implementation of CBR programs for development in the SSA context include the mission and values of the sponsors of the specific programs. For instance, in some cases CBR programs are initiated and led by NGOs that are supported by international partners. In other cases, the lead agency may be a government ministry. The CBR programs scenario in Zimbabwe is a case in point. In that country, CBR may be delivered either by the Ministry of Social Welfare and Development or by the Ministry of Health (Ndawi, 2002; Mpofu et al., 2007). In Malawi, the government established the Ministry of Persons with Disabilities and the Elderly, which leads the CBR for the development agenda (Makuwira, 2013). In large measure, CBR for development programs across SSA typically is funded and managed by donor or multilateral agencies, rather than a part of standard policies for social inclusion by the national and local governments. With few exceptions, CBR for development programs, supported by the national governments, often reflect the choices and priorities of government policy or decision-makers, with variable input by people with disabilities or their organizations.

### Scope of CBR for Human Development

Historically, CBR was associated with the health sector, because many programs started within that sector and used primary health care workers as the liaisons with people with disabilities and their families (Rifkin & Kangere, 2002; World Health Organisation, 2003). Ministries or Departments of Health established rehabilitation services units, mostly hospital based and some with community outreach (Mpofu et al., 2007). Subsequently, CBR was adopted for community outreach work with marginalized groups, including people with disabilities.

Currently, CBR is based firmly within a community development framework (Heinicke-Motsch, 2013). Constraints to CBR, as a human development tool in the sub-Saharan African context, include its limited scope of design, lack

of sufficient human and material resources, and lack of enough focus on sustainable community action planning. As an example of a design limitation, CBR programs in SSA have tended to be disability-group specific rather than inclusive (such as projects specifically directed at people with intellectual, physical, sensory impairments, or age groups [e.g., children, elderly people] (Makuwira, 2012). Also, organizations can be identified that offer a specific type of assistance or specific rehabilitation (e.g., medical, vocational, educational). Organizations have their own backgrounds and missions and are often part of, or related to, ministries or NGOs with a specific interest in certain aspects of disabilities. In some cases, the selection of people with disabilities to be included in a CBR project is apparently done according to the criteria set by stakeholders external to the community and not by the people with disabilities themselves (Fefoame, 2013), which take away from the long-term sustainability of such externally driven programs. The Mpumalanga (South Africa) and Busia (Uganda) CBR programs are notable exceptions.

With the Mpumalanga CBR, Disabled People of South Africa (DPSA) works in liaison with the Department of Health as CBR consultants. These consultants are all people with disabilities, and they provide peer counseling and access to government-provided services through information sharing and referral to these services such as rehabilitation and assistive devices (Rule, Lorenzo, & Wolmarans, 2006). The CBR consultants who are people with disabilities provide a positive role model to others. They also provide context-sensitive disability social inclusion support peer counseling, and referrals are provided at the home of the person with a disability. The Busia CBR engages paraprofessional CBR providers to deliver community supports in the local villages, and using tricycle transportation services, the paraprofessionals offer access to other resources outside of the local community.

Manpower resource limitations also hinder the success of some CBR programs across the SSA region. As an example, a comparative study on rehabilitation service access and use across seven SSA countries reported differences in

scope and quality of services by the availability of trained personnel to deliver the services (Mpofu et al., 2007). Countries with higher levels of personnel preparation and resourcing (i.e., South Africa and Botswana) had superior scope for delivering rehabilitation services in the community than comparison peer countries (e.g., Cameroon, Zambia, Zimbabwe). In another study, CBR programs in Ghana and Guyana were less successful, compared to those in South Africa, due to having lower human resource support (WHO and SHIA, 2002). Poverty or material scarcity at the community level also might influence the success of CBR for development, but not in an absolute sense. Poorer communities might be able to customize their CBR services, prioritizing actionable plans and accessible materials.

Country approaches to implementing CBR vary a great deal, but they have some elements in common that contribute to the sustainability of their CBR programs. These include (1) national level support through policies, coordination, and resource allocation; (2) multi-sectoral collaboration, including collaboration with DPOs, NGOs, and government sectors; (3) recognition of the need for CBR programs to be based on a human rights approach; (4) the willingness of the community to respond to the needs of their members with disabilities; (5) integration of CBR within government, with allocation of adequate resources, (6) the presence of motivated community workers; and (7) availability of resources and support, from outside the community (ILO et al., 2004; Cornielje, Majisi, & Locoro, 2013). Most CBR programs do not operate in an environment where all these preconditions are fulfilled. To address these important elements of CBR, action is needed at national, intermediate/district, and local levels in order to ensure that people with disabilities, their families, and communities benefit from CBR programs for improved lifestyle. This entails ongoing reviewing of strategies by all stakeholders to increase commitment and collaboration among all sectors and levels of government and civil society to optimize outcomes from CBR as a human development instrument.

## Multilevel Analysis of Partner Organizations

Three levels of analysis and intervention are relevant to understand the resourcing of CBR in sub-Saharan Africa for sustainability: inter-organizational, intraorganizational, and social-psychological. At the **interorganizational** level, there is a need to appreciate the fact that there are many players at the ground level (government-supported programs, programs by international multilateral agencies, and local not-for-profit organizations) (Fefoame, 2013). CBR for sustainable human development supports, in the SSA region, would need to assess and promote coalitions that support social inclusiveness of community action programs for disability. Careful attention, which has been hitherto paid to the organizations themselves, now needs to be paid to the processes as well (including organizational and community policies). Such processes have evolved in ways that can nourish and sustain these coalitions, with a view toward strengthening those policies and processes that translate into actual social inclusion outcomes for people with disabilities, their families, and communities. At the **intraorganizational** level, each CBR partner should self-audit to understand how its *structural* behavior supports or impedes disability-inclusive human development for people with disabilities, their families, and communities. For instance, while poverty and lack of access to basic services are two of the many major obstacles to community social inclusion by people with disabilities, not many agencies explicitly connect their objectives of CBR to the mainstream development policies (Heinicke-Motsch, 2013). At the **social-psychological** level, the behavior, attitudes, and dispositions of organizational members and other community residents may support or impede disability social inclusion. Often, strategies may need to be engaged to minimize the negative or unwanted effects on human developmental potential from misaligned inter- and intraorganization disability support priorities.



### Allied Services

CBR programs in SSA have been resilient in responding flexibly to local sociocultural demands and building on existing community traditions, structures, and networks such as the extended family system and local development committees (Fefoame, 2013). However, the community-based nature of CBR does not mean that all services are provided by the community itself. While it is currently estimated that 70–80% of rehabilitation needs can be met within the local community, the fact is that some people still need referrals to specialized services at a higher level for the provision of prostheses or other appliances such as customized wheelchairs. Less than 5% of people with disabilities in low-income countries have access to formal or structured rehabilitation services (Makuwira, 2013), which underscore the importance of CBR as a tool for human development in low-resource settings like sub-Saharan Africa. Exemplary CBR for human development programs in SSA tends to have referral networks through which various needs can be addressed by utilizing local resources, people, low-cost materials, and adequate financing (Whyte & Muyinda, 2002).

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### The Futures of CBR for Human Development in SSA

For CBR to thrive as a human development strategy in the SSA context, strategies must be in place to increase the knowledge base about disability-related rights and their enforcement by state government entities (Lansdown, 2002; Makuwira, 2012). This may require some level of development education to governmental and local authority social service providers for them to fully appreciate that disability rights are human rights (Hicks, 2004; Makuwira, 2013). As some studies have shown (see Kandyomunda, Dube, Kangere, & Gebretensay, 2002; WHO & SHIA, 2002; Cornielje et al., 2013), the promotion of empowerment is the key to self-development, and it requires that local community people be a part of development programs' decision-making processes and, more importantly, in controlling

resources for community participation (Kandyomunda et al., 2002; Ingstad & Grut, 2007). Part of this process is to provide people with the resources, opportunities, knowledge, and skill needed to increase their capacity to determine their own future. These abilities are important for the full community inclusion of people with disability or disadvantage, taking into account culture relevance (Hartley et al., 2009). Similarly, empowerment of people with disabilities in SSA for development, inclusive of their families, entails involving people with disabilities in activities to increase control of their lives and to contribute to important decisions that affect their destiny (Anderson, 2004) or supporting people with disabilities to find solutions to their own problems and to access available resources themselves (Asindua, 2002).

Far too often, CBR for development programs in SSA is sporadic and disorganized (Ndawi, 2002; Fefoame, 2013); then there are those actions which are foisted upon the community by outside agencies (public, private, and multilateral). Neither sporadic, community-driven actions nor well-organized ones that are foisted from outside would yield positive and sustainable human development. By paying attention to the locality of CBR programming and its grounding to support community action, human development outcomes for children in SSA, for example, would be tremendously enhanced. These positive outcomes are likely when CBR for development programs attempt to build on activities that currently are occurring in the community. This way, community ownership—an indispensable attribute to sustainable human development—is secured.

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### Summary and Conclusion

CBR is an inclusive human development framework and widely adopted in the SSA context. As a tool for human development, CBR addresses the support needs of vulnerable populations, like people with disabilities. In the SSA context, influences on the scope and function of CBR for human development include the mission and val-

ues of the partner organizations are aligned to the needs of the partner communities. Moreover, the success and sustainability of CBR as a human development resource for those with disability in the SSA region would depend on the extent to which the design and implementation of related activities are informed by people with disabilities themselves. A number of grassroots-level CBR endeavors are successful in SSA and model what could be achieved with CBR as a human development framework in other low-resource settings. National and international CBR partner agencies would be better able to support people with disabilities in their developmental needs in partnership with the people with disabilities, their families, and communities. CBR for development models with evidence of success in other SSA national or international settings, could be adapted for replication and use in other similar contexts with historical disadvantage.

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## Education for All or Literacy for All? Evaluating Student Outcomes from Save the Children's Literacy Boost Program in Sub-Saharan Africa

Elliott Friedlander, Amy Jo Dowd, Jarret Guajardo, and Lauren Pisani

In 2010, primary school enrollment reached 90%, up from 82% in 1999, and there were 95 literate girls for every 100 literate boys (United Nations, 2013). Developing nations around the world were well on their way to fulfilling the commitment to the second Millennium Development Goal (MDG) of “ensur[ing] that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary school” (United Nations, 2013). Clearly progress was being made toward the goal of education for all.

While the world trumpeted the success of increased access during the later years of the last decade, another alarming trend was emerging—more and more children were reaching higher grades without learning how to read. In countries across sub-Saharan Africa (SSA), such as Mali and the Gambia, 50% or more of grade 2 children could not read one word of connected text in studies conducted from 2008 through 2009 (Gove & Cvelich, 2010). At the beginning of grade 2 in Malawi, 95% of students could not read a word

of connected text in their mother tongue (Dowd, Weiner, & Mabeti, 2010). Over two-thirds of students in grade 3 in Kenya, Tanzania, and Uganda failed to pass basic tests in Kiswahili designed for grade 2 students (Uwezo, 2012). In Ethiopia, 40% of grade 3 students could not read a single word from a high-frequency word list (Guajardo, Wubeshet, McVitalis, Ochoa, & Dowd, 2012). In northern Uganda, none of the grade 2 students assessed could read a single word of connected text (Friedlander, Candiru, & Dowd, 2010). These national and regional datasets, collected by governments, international nongovernmental organizations such as Save the Children and international initiatives such as Uwezo, have highlighted the need to focus not just on access to but also on the quality of education. If children are attending school in higher numbers but are failing to learn to read, the most basic of skills required for educational success, is increased access to schooling really an achievement to trumpet? How do we best enable children not only to access school, but to achieve a quality education?

In response to these questions and a set of learning studies in its own sites in 2007–2008, Save the Children turned to the research literature on the best methods for improving children's reading development. Using reports that synthesized reading research, such as the National Reading Panel's

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*Teaching Children to Read* (National Reading Panel (US), 2000), and *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998), program designers at Save the Children created a program called Literacy Boost®. First piloted in 2009, this program couples existing research findings from the developed world with rigorous reading assessment and other data collected in the developing world to address the problem of children struggling to learn to read. The focus of this program is not only to boost reading achievement rates for school-going children, but to ensure that all children, regardless of sex or disadvantages they may experience, have ample opportunity to learn to read with comprehension.

This chapter reflects upon how a program, based on findings from mainly developed world literature, functions when it is placed in the SSA context. The data come directly from schools in three countries in SSA. In this chapter, we first describe Literacy Boost and outline the research upon which Literacy Boost was designed. Following this, we summarize briefly the research on two of the dimensions of equity which Literacy Boost seeks to address, namely, the achievement gap between sexes and the poor access to reading resources experienced by children in rural, developing world settings. We then put forth the questions around equitable outcomes that Literacy Boost hopes to address. We present in detail our data and methods for analysis. Following a discussion of the immediate findings, we consider the implications of using developed world research in developing world settings and examine the implications for future practice in literacy programming across the continent. We then turn back to the literature and reflect on how well research findings from the developed world apply to the developing world, as well as how applicable our own findings are across the sub-Saharan region.

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## Literacy Boost

Literacy Boost is Save the Children's innovative, evidence-based program to support the development of reading skills in young children. The pro-

gram was Save the Children's response to data that revealed an emerging crisis in education—while children were attending school in ever greater numbers, fewer and fewer of them were reaching upper grades with the ability to read independently (Friedlander et al., 2010; Gove & Cvelich, 2010; Guajardo et al., 2012). The program subscribes to Save the Children's Life-Wide Learning approach, which views the child's entire waking day as full of opportunities to learn and grow, as opposed to only focusing on the few hours that a child may attend school.

The Literacy Boost program is made up of three complementary components: a teacher training component to provide teachers with research-proven reading pedagogy skills, a community action component to provide children fun and motivating reading experiences as well as to provide parents and other community members more knowledge and activities with which to support children's learning, and an assessment component to understand where children begin and how they grow through the course of the program. Each of these components was created based on existing research on children's reading acquisition conducted almost exclusively in the developed world. Table 19.1 provides an overview of the program.

The teacher training component engages teachers in monthly to bimonthly training sessions where teachers learn a) about the five key skills identified in the research as important to children's reading growth and b) pedagogical techniques to best teach those five skills. This content is primarily derived from developed world research (including, but not only, Adams, Foorman, Lundberg, & Beeler, 1998; Beck, McKewon, & Kucan, 2002; Block & Pressley, 2001; Kame'enui & Simmons, 2001; National Reading Panel (US), 2000; Pressley, Gaskins, & Fingeret, 2006; Snow et al., 1998).<sup>1</sup> In addition,

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<sup>1</sup>One of the original contributors to the teacher training manual also drew on her experiences in Latin America, working with organizations such as the Amigos del Aprendizaje program in Costa Rica ([www.ada.or.cr](http://www.ada.or.cr)), the Un Buen Comienzo ([www.unbucomienzo.cl](http://www.unbucomienzo.cl)) program in Chile and the Escola Que Vale ([www.escolaquevale.org.br](http://www.escolaquevale.org.br)) program in Brazil.

**Table 19.1** Literacy Boost overview

| Literacy Boost component | Activity                    | Description of activity   | Frequency                 | Meeting length | Duration               | Features  |
|--------------------------|-----------------------------|---|---------------------------|----------------|------------------------|---|
| Teacher training         | Teacher training            | In-service teacher training on reading pedagogy   | Biweekly to monthly       | 4–6 h          | One school year        | <ul style="list-style-type: none"> <li>• Held locally to reduce costs and improve attendance</li> <li>• Teachers reflect on previous training session and the successes and challenges of implementing the new techniques in the classroom</li> <li>• Teachers create sample lesson plans to use in their classrooms going forward</li> <li>• Students share books and reading</li> </ul> |
| Community action         | Reading buddies             | Shared reading between older, more competent readers and younger students                 | As often as possible      | n/a            | During the school year | <ul style="list-style-type: none"> <li>• Students play games, read books, and make materials to use at home</li> </ul>  |
|                          | Reading camps               | Students gather in the community to play fun games around reading                         | Weekly or more frequently | 1–2 h          | All year               | <ul style="list-style-type: none"> <li>• Provides community members with varied ways to support children's learning, regardless of literacy abilities of the community members</li> </ul>   |
|                          | Reading awareness workshops | Workshops to educate community members on ways to support children's reading and learning | Weekly or bimonthly       | 1 h            | Approximately 3 months | <ul style="list-style-type: none"> <li>• Placed in both the school and in the communities</li> <li>• Used to support all Literacy Boost activities</li> <li>• Community members are encouraged to supplement materials by creating materials using local resources</li> </ul>   |
| Assessment               | Book banks                  | Supply of local language books and reading materials                                      | n/a                       | n/a            | n/a                    | <ul style="list-style-type: none"> <li>• Allows for the careful tracking of student reading skill growth</li> <li>• Provides insight into mediating background factors such as the home literacy environment</li> </ul>   |
|                          | Reading assessment          | Measurement of a range of student reading skills  | Twice annually            | n/a            | n/a                    |   |

*n/a* not applicable

teachers also learn about formative assessment, the importance of the print environment, and strategies for teaching reading in multilingual classrooms, again all grounded in the research literature (including, but not only, Birdyshaw, 2001; Hudson, Lane, & Pullen, 2005; Pearson, Hibert, & Kamil, 2007; Scarborough, 2001). Teachers meet on a regular basis to learn manageable amounts of new skills and techniques and then have the opportunity to go back into the classroom and practice these skills. When they return for the next training session, they first share about their successes and challenges from the previous month, another practice that is derived from the literature on successful teacher training (Elmore, 2002; International Reading Association, 2007).

The community action component provides a customizable menu of activities to take place outside of the school walls. Some of the activities included in this component are reading awareness workshops, where parents and other community members gather to learn about supporting children's reading development; reading buddies, where older, more competent readers are paired with beginning readers in order to read together; and reading camps, where children are led by a local volunteer in reading activities, including the reading and discussion of a story as well as a make-and-take activity where children create some sort of small book or drawing which they can then take home. These activities are all designed to encourage enjoyment during reading, to motivate children to read more and more often, and to provide scaffolding outside the school walls so that children understand that reading is not a skill that is only learned and used in school. Again, these activities and their underlying aims all arise from literature on supporting children's reading growth, much of which is from developed world settings (Goldenberg, Rueda, & August, 2006; Hess & Holloway, 1984; Pang, Muaka, Bernhardt, & Kamil, 2003; Snow et al., 1998; Sylva et al., 2011; Wagner, 1993).

Finally, the assessment component provides guidance on the creation of baseline and endline assessments for the rigorous evaluation of the

program, most often pursued through quasi-experimental evaluation approaches using treatment and control groups. While this component serves the purpose of evaluation, baseline results also feed into initial program design. This component as well draws on the existing literature (Birdyshaw, 2001; Chicago Public Schools Office of Accountability, 2002; Hasbrouck & Tindal, 2006; Pearson et al., 2007). Children are assessed individually by one of a team of assessors at baseline in order to ascertain what reading skills they possess. At endline, usually a year after the baseline, the same children are assessed again to provide estimates on the value added of the Literacy Boost program versus a control group of children attending schools and living in communities not included in the program.

In each of the countries where Literacy Boost is implemented, a significant adaptation process is undertaken to ensure that the program meets the local needs of the community Save the Children serves. It also serves to enhance, and not replace, the existing government curriculum. Since the goal of Literacy Boost is to help all children learn to read, during the baseline assessment, children are asked a series of questions about themselves and daily life so that we can take a critical look at who precisely is achieving to what level prior to Literacy Boost. Through this information, we identify several possible subgroups to monitor to ensure that equitable outcomes are achieved by all. These subgroups include girls, students from the most economically impoverished homes, students from homes with low home literacy environments, and students who have large amounts of physical labor/work in addition to their school work.

In order to narrow our scope, the rest of this chapter will focus on two of these disadvantaged groups, girls and students from low home literacy environments. The chapter will examine in what ways, if any, Literacy Boost helps their reading development. We now turn to a brief literature review on what has been found to date on girls' reading achievement and the role of the home literacy environment in literacy develop-

ment from both the developed and the developing worlds.

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### **Research on Dimensions of Equity of Girls' Achievement Across the Globe**

Although there is some debate, ample literature from the developed world suggests that girls actually are quicker to master reading than boys (Coley, 2001; Lummis & Stevenson, 1990; Phillips, Norris, Osmond, & Maynard, 2002; Ready, LoGerfo, Burkam, & Lee, 2005). In one of the largest scale international comparative assessments conducted, Ogle et al. (2003) found that in 2001, girls outperformed boys in the 4th grade on the Progress in International Reading Literacy Study (PIRLS). This finding was replicated in the 2011 PIRLS study as well (Mullis, Martin, Foy, & Drucker, 2012). No SSA countries were included in the study.

In SSA and other parts of the developing world, there are more mixed results. RTI studies show that while Kenyan girls typically outperform boys in reading, in neighboring Ethiopia, boys are more likely to be better readers (Piper, 2010a, 2010b). Larger-scale studies, such as Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) I, II, and III, have shown the same mixed results on a country-by-country comparison (Saito, 2004). Focusing on reading, out of 14 countries assessed, Saito (2004) found that girls performed significantly better in four countries, statistically equivalent in nine countries, and significantly worse in one country. While concluding these results as evidence that there is no difference in reading achievement between boys and girls, the author fails to account for the disparities in challenges faced by girls in reaching the sixth grade, well documented by Fentiman, Hall, and Bundy (1999). It may well be that of the girls who started first grade only the most tenacious remained in school to take the test, and as a result the evidence of no gap is actually the result of selection bias. Furthermore, these

results are from nationally representative samples, and may obscure disparities related to sex between urban and rural youth or between different regions within the same country.

Recent research studies that do consider these disparities paint a slightly different picture of reading achievement in SSA. Using the Early Grades Reading Assessment (EGRA), RTI conducted literacy achievement tests in several countries in SSA with findings best described as "mixed." For instance, in Kenya, it was clear that girls performed significantly better in almost all sub-skills of reading tested. However, the greatest achievement gaps in Kenya were between the urban and rural, with urban students of comparable grades at times achieving twice the score of rural students (Piper, 2010a). In other places, girls did not fare as well in terms of literacy achievement. In Liberia, the boys significantly outperformed girls on nearly all sub-skills (RTI International, 2009). In Uganda, Piper (2010c) compared two regions and found that in the Central region, there was no statistical difference between the sexes, but the same did not hold true in the Lango region; girls generally performed significantly worse on assessments than boys did. These findings suggest that other factors such as location, language, culture, and/or urbanity are at play that may interact with sex and lead to inconclusive findings on girls' versus boys' learning.

The studies listed above are a handful of the many recent reading assessments conducted in sub-Saharan Africa and represent the mixed nature of the findings. It is not clear that girls' reading acquisition in SSA follows the same pattern as it does in developed world settings, nor is it clear that it should give the extreme linguistic and cultural variations both within SSA and when comparing SSA with more developed country contexts. Given the extreme variability in literacy findings as pertaining to gaps among boys and girls or among advantaged and disadvantaged groups, the solution to tackling the problem of learning achievement gaps first lies in knowing where the problem is. Once gaps are identified, tailored approaches that address either the low-

quality education overall or the gaps that exist are necessary to bring about a possible reduction in attrition rates and equity within educational outcomes and learning achievement.

## Home Literacy Environment

Many researchers have examined in depth the home literacy environment (HLE) and the ways that it relates to a child's reading and/or academic achievement. While many different definitions exist, we use Hess and Holloway's (1984) five dimensions of the HLE. In a review of the literature, Hess and Holloway posit that there are five different dimensions of the HLE that have an impact on children's learning. Those dimensions are:

- *Value placed on literacy*: This dimension quantifies the amount and quality of reading habits that surround the child.
- *Press for achievement*: This dimension measures parental expectations and the way that parents encourage children to succeed in school and learning.
- *Availability of reading and print material*: This dimension provides insight into how much access children have to written words to practice their nascent reading skills.
- *Reading with children*: This dimension examines to what extent parents and other members of the household directly engage children in joint reading experiences.
- *Opportunities for verbal interaction*: This dimension measures the exposure children have to oral language, given its critical role in the process of learning to read.

Despite the various ways that different researchers define the home literacy environment, there is a clear consensus in the developed world literature that the home literacy environment is positively associated to a child's early literacy development (Bradley et al., 1989; Bus, Leseman, & Keultjes, 2000; Bus, van IJzendoorn, & Pellegrini, 1995; Dunning, Mason, & Stewart, 1994; Evans, Shaw, & Bell, 2000; Payne,

Whitehurst, & Angell, 1994; Sénéchal & LeFevre, 2002). Results from these studies and many others in the developed world indicate that print-rich environments where children actively engage in reading and are actively encouraged to read predict better reading achievement.

In the developing world, fewer studies have been conducted that specifically examine the HLE. A handful of peer-reviewed studies examine the overall HLE and its association with reading achievement in various SSA countries (Dowd & Pisani, 2013; Wagner et al., 2012), in Arabic-speaking Israeli families (Korat, Arafat, Aram, & Klein, 2013), or as predictors of achievement across a range of developing countries (Friedlander, 2012). Many studies looked at individual dimensions of the home literacy environment, such as the relationship between parental attitudes and reading achievement (Park, 2008) and the relationship between the availability of print materials and reading achievement (Elley, 1992; Evans, Kelley, Sikora, & Treiman, 2010; Spratt, Seckinger, & Wagner, 1991). In all of these studies, better quality HLE is associated with higher reading scores.

Extant research leads us to conclude that there is an important association between the HLE and student achievement. However, none of the studies reviewed explore the differences between the HLE in the developed and the developing worlds and whether a high HLE in a developing context can have the same impact as a high HLE in the developed world. Nor is there yet conclusive evidence that efforts to change the HLE in the developing world can also change children's reading scores. Nonetheless, given the importance that the HLE seems to play in the early reading achievement of young children, it is critical to assess how the HLE interacts with programs designed to boost children's reading abilities. This chapter will show how Save the Children uses evaluation data to do precisely that: Assess how the HLE is associated with reading achievement at baseline and to chart how children from differing HLEs respond to a holistic reading intervention.



## Research Questions

This chapter addresses the following research questions:

1. How has Literacy Boost, a program conceived from reading development research in the developed world, influenced the overall student achievement in the SSA areas where it has been implemented?
2. Prior to Literacy Boost, do girls and children from low home literacy environments experience systematic disadvantages when it comes to reading acquisition in our sub-Saharan African populations?
3. Do girls and children from low home literacy environments benefit disproportionately from Literacy Boost?
4. How do girls and students from deprived HLEs benefit from Literacy Boost as compared to similar peers in comparison schools?

The answers to these questions are vitally important to Save the Children's goal of helping all children to learn to read. Findings provide insight into how well a program, based on largely developed world research findings, works in developing world systems and cultures to create learning impact.

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## Data

The data for this analysis come from three countries in SSA where Literacy Boost has completed a full, year-long program cycle at the time of writing: Malawi, Ethiopia, and Zimbabwe. Literacy Boost in these countries was implemented within specific regions, typically both rural and economically marginalized. The program was initially implemented in approximately 10–15 schools in each country, and a complementary number of schools, matched as best as possible on demographics, size, location, and other pertinent variables, serve as comparison schools to chart growth over time. Except for two skills in Zimbabwe, children in these two groups

at baseline score statistically equivalently in terms of reading skills and a variety of background factors.

In each of the three countries, data from different school grades (sometimes called primary levels or standards) were collected. The grade selected depended on the interest of the program staff and local education authorities, as well as where pilot assessments indicated that students were struggling the most. This means that while Malawi and Zimbabwe both collected reading assessment data for grade 2 students, Ethiopia collected data on grade 3 students and Malawi collected additional data on grade 4 students. The same type of by-country variation is also true for the sub-skills assessed in each assessment. For instance, in Malawi, the project team prioritized the measurement of student's writing skills. In Ethiopia, pilot testing revealed that grade 3 students still struggled with letter identification, so a letter identification subtest was included.

Endline evaluations revealed that the program overall achieved large effect sizes across half or more of the sub-skills assessed. For a brief overview of each sample, we refer to Table 19.2. For the specific sub-skills assessed in each country, the sample size and the grade assessed, see Table 19.3 in the findings section. For full reports by country of each Literacy Boost project, refer to Dowd et al. (2010), Friedlander et al. (2012), and Pisani and Chinyama (2013).

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## Method

### Data Collection

The data collection team in each country set out to sample 20 students from the target grade(s) at each of the Literacy Boost and comparison schools. Students were randomly selected where there were more than 20 children in the classroom. Ten boys and ten girls were targeted for assessment. While this approach is not necessarily equivalent to proportional, representative sampling, it ensured that boys and girls would each comprise 50% of each school sample.

**Table 19.2** Participant background characteristics

|                        | Ethiopia | Malawi grade 2 | Malawi grade 4 | Zimbabwe |
|------------------------|----------|----------------|----------------|----------|
| Sample size            | 314      | 233            | 215            | 149      |
| Grade level            | 3        | 2              | 4              | 3        |
| % female               | 49.2%    | 45.5%          | 50.7%          | 52.1%    |
| Average age (in years) | 11       | 10.4           | 10.8           | 9.5      |
| Attended ECD           | 7.3%     | n/a            | n/a            | 72.0%    |
| Repeated grade 1       | 4.7%     | n/a            | n/a            | 34.7%    |
| Repeated grade 2       | 3.5%     | n/a            | n/a            | 22.0%    |
| Repeated grade 3       | 0.3%     | n/a            | n/a            | 8.1%     |
| Family size            | 6        | 4.0 siblings   | 3.9 siblings   | 4.1      |
| Had breakfast          | n/a      | 28.8%          | 36.3%          | 82.7%    |

n/a not applicable

**Table 19.3** Outcomes and learning effect sizes (Cohen’s d gauging performance differences between students after participation to Literacy Boost and comparison students) by country

| Test                                      | Ethiopia: grade 3<br>(N = 314) | Malawi: grade 2<br>(N = 233) | Malawi: grade 4<br>(N = 215) | Zimbabwe: grade 2<br>(N = 149)                      |
|---|--------------------------------|------------------------------|------------------------------|---|
| Letter knowledge                          | 0.41**                         | na                           | na                           | 0.50**, <sup>a</sup>                                |
| High frequency word reading               | 0.59**                         | Ch: 0.56***<br>Eng: 0.45***  | Ch: 0.14<br>Eng: 0.27        | Sh: 0.04<br>Eng: 0.44*                              |
| Fluency (words per minute read correctly) | 0.64***                        | Ch: 0.44**<br>Eng: 0.20      | Ch: 0.00<br>Eng: 0.27        | Sh: 0.67***<br>Eng: 0.66***                         |
| Accuracy (% of words read correctly)      | 0.55***                        | Ch: 0.47***<br>Eng: 0.29*    | Ch: -0.03<br>Eng: 0.35*      | Sh: 0.38*, <sup>a</sup><br>Eng: 0.39*, <sup>a</sup> |
| Reading comprehension                     | -0.01                          | Ch: 0.61***<br>Eng: 0.18     | Ch: 0.35*<br>Eng: 0.20       | Sh: 0.20<br>Eng: 0.08                               |
| Writing                                   | na                             | Ch: 0.68***<br>Eng: 0.35**   | Ch: 0.21<br>Eng: 0.14        | na  |

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

Ch skill assessed in Chichewa language (Malawi only), Eng skill assessed in English language (Malawi and Zimbabwe only), Sh skill assessed in Shona language (Zimbabwe only), na skill was not assessed

Shaded squares indicate no significant effect size was found

<sup>a</sup>For these skills in Zimbabwe, students started out with scores marginally greater than the 0.25 effect size threshold set forth by the What Works Clearinghouse (2008) for acceptable differences between groups at baseline, and so these growth/learning effect sizes should be interpreted with caution

## Measures

The students in the sample in each country were asked about their background characteristics (age, household possessions, household building materials, etc.). During the creation of these questions, local and global research staff applied a standard set of guidelines in each country. However, in order to maximize variance in the data, the individual questions varied by local context and culture. Students were also asked about their family members and their reading habits in the week prior

to the assessment (who they had seen reading, who had read to them, etc.). After collecting this background data, all students were also given a literacy test composed of a mixture of the following reading sub-skills: concepts about print, letter awareness, reading of high-frequency words, reading fluency and accuracy (words per minute read correctly and total percentage of passage read correctly), writing, and reading comprehension questions for those who could read independently. In Zimbabwe and Malawi, high-frequency word reading, fluency, accuracy, and comprehension

were conducted both in the child's mother tongue as well as in English. In Ethiopia, the assessment was only conducted in Afaan Oromo, which was the language of instruction as well as the students' home language. All assessment instructions were given in the students' home language.

## Analysis

Although it would be ideal to combine all students into one master dataset and proceed with analysis from there, the differences in culture, language, education systems, and the students' grade and age when comparing the three SSA countries preclude this option. Therefore each country is analyzed individually, and we look for trends across the countries and across the reading sub-skills. For each country, we first engage in data reduction processes to create indices of SES and HLE. To create these indices, we first look at the relevant variables and correlations between them. The variables that feed into the SES indicator vary by country and context intentionally. Variables that feed into the HLE index, on the other hand, reflect an evolution in our understanding of the HLE and how to measure it well. For instance, Malawi was the country with the first Literacy Boost program, and the index is created by the presence of books in the home (yes/no) along with whether the student's guardian has been seen reading in the last week. In Zimbabwe, we realized we needed more in-depth information and collected more data than we did in Malawi. Hence, in Zimbabwe, the index is the percent of the family that reads to the student interacted again with the number of types of reading materials at home. Realizing that even more information on the HLE was needed, in Ethiopia, more and different data were collected, and the index is the variable quantifying the different types of reading materials in the home interacted with the presence of readers in the home and the percent of individuals that read to the student. The implication of the evolving way to measure the HLE is discussed further in the discussion section. The SES and HLE indices are control and predictor, respectively, in our models.

To answer the question about the overall effect of Literacy Boost, we use difference-in-difference regressions controlling for sex, age, SES, and HLE to estimate standard deviation effect sizes to quantify the value added of Literacy Boost in each country and to make cross-country comparisons easier. All regressions use standard errors clustered by school. Following this, we next examine whether our subgroups, girls and those from low HLE homes started off at baseline with statistically significantly different scores than their peers. We do this by using multivariate regressions of the full baseline sample of treatment and comparison students, again with the standard errors clustered by school. To answer the third and fourth research questions for each individual country, we fit another set of multivariate regression models of learning gains controlling for the same variables mentioned above that (1) interact Literacy Boost treatment with sex and HLE to discover if Literacy Boost helped disadvantaged groups catch up with their more advantaged peers and (2) confine the difference-in-difference analysis to the traditionally disadvantaged groups to discover if those disadvantaged groups benefited from Literacy Boost when compared with control students.

Results from these models were considered robust enough to report if they met the following criteria: Results should form a 'trend' of at least two reading skills with statistically significant findings (at the  $p < 0.05$  level) of the same sign within a given country. While these relatively stringent criteria were applied to minimize false positives, given the small sample sizes, the probability of false negatives is also quite high.<sup>2</sup> Thus, where feasible, we report effect sizes regardless of statistical significance, since our work is still exploratory, and we do not want to overlook potentially important results that, due to small sample sizes, do not meet conventional criteria for significance yet are part of an overall pattern of meaningful results.

<sup>2</sup>For example, the largest sample size of 314 students implies only about a 40 percent chance of detecting a 0.3 standard deviation effect size and only about a 60 percent chance of detecting a 0.4 standard deviation effect size.

## Findings

We present the findings from our analysis in the order of the research questions asked above. At baseline, the end-of-year sample of students for all intervention/comparison groups presented in this analysis are similar across relevant, measurable characteristics (e.g., literacy skills, socioeconomic status, home literacy environment, etc.) and all differences presented between Literacy Boost and comparison groups are statistically significant ( $p < 0.05$ ). Table 19.3 presents overall effect sizes for each literacy skill assessed at baseline and then at endline.

### **Question 1: How Has Literacy Boost, a Program Conceived from Reading Development Research in the Developed World, Influenced Overall Student Achievement in the SSA Areas Where It has Been Implemented?**

As can be seen in Table 19.3, Literacy Boost students experienced significantly greater gains than comparison students across all countries, ranging in effect sizes from 0.29 to 0.68 standard deviation. This is true for multiple skills within each country, representing a general trend of greater improvement in Literacy Boost schools in each country in SSA where Literacy Boost has been implemented.

### **Question 2: Prior to Literacy Boost, Do Girls and Children from Low Home Literacy Environments Experience Systematic Disadvantages when It Comes to Reading Acquisition in Our Sub-Saharan African Populations?**

Tables 19.4 and 19.5 display the significant differences between girls and boys, as well as the significant differences between children from low HLE homes versus those from high HLE homes at baseline.

## Girls

The only three skills that showed statistically significant differences (significant at a  $p < 0.05$  level) at baseline were concepts about print and letter identification in Ethiopia and Chichewa high-frequency word reading for Malawi students grade 2. For the other 34 skills assessed across the three countries and four grade levels, girls scored at statistically the same level as boys did. Thus, on average, with the exception of students in our non-nationally representative sample population in Ethiopia and possibly girls in grade 2 in Malawi, girls in our samples were not systematically disadvantaged at baseline when compared to boys.

## Low Home Literacy Environment

As can be seen in Table 19.5, of all the different sub-skills assessed, children from the lowest two quintiles of the HLE index in Ethiopia and Malawi scored statistically the same as children from upper quintiles, with the exception of reading comprehension in Ethiopia where students from higher HLEs performed better. However, in Ethiopia, the effect sizes have relatively the same magnitude and are consistently negative, indicating that students from low HLE homes scored worse on these skills. While not statistically significant, this important observation is explored in the discussion section. In Zimbabwe, students from the lowest HLEs scored significantly worse than peers from better HLEs on every single skill assessed. Thus, on average, in some contexts children from low HLE environments are systematically disadvantaged in reading achievement at baseline when compared to children from high HLE environments.

### **Question 3: Do Girls and Children from Low Home Literacy Environments Benefit Disproportionately from Literacy Boost?**

In the multivariate models that include terms that represent the interaction between participation in LB and sex, as well as low HLE, we find no circumstances where the interaction between LB participation and sex or low HLE significantly predicts

**Table 19.4** Significant differences between sexes within Literacy Boost, by country at baseline

| Test                        | Ethiopia grade 3<br>( <i>N</i> = 390) | Malawi grade 2<br>( <i>N</i> = 340) |       | Malawi grade 4<br>( <i>N</i> = 272) |       | Zimbabwe grade 2<br>( <i>N</i> = 200) |       |
|-----------------------------|---------------------------------------|-------------------------------------|-------|-------------------------------------|-------|---------------------------------------|-------|
| Concepts about print        | -0.17*                                | -0.13                               |       | Na                                  |       | -0.02                                 |       |
| Letter identification       | -0.28*                                | Na                                  |       | Na                                  |       | 0.07                                  |       |
| High-frequency word reading | -0.21                                 | -0.20*                              | -0.03 | -0.02                               | -0.20 | -0.01                                 | -0.04 |
| Fluency                     | -0.24                                 | -0.10                               | 0.01  | 0.17                                | -0.09 | -0.07                                 | -0.15 |
| Accuracy                    | -0.20                                 | -0.01                               | -0.09 | -0.04                               | -0.15 | -0.04                                 | -0.12 |
| Reading comprehension       | -0.12                                 | 0.03                                | 0.11  | 0.04                                | -0.02 | -0.06                                 | -0.19 |
| Writing                     | Na                                    | -0.10                               | 0.06  | 0.01                                | 0.00  | Na                                    |       |

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

A negative sign [-] indicates the girls scored lower than the boys. “Na” indicates the skill was not assessed. Multiple effect sizes associated with a single skill indicate that students were assessed in multiple languages. The effect size on the left is always the local language (Chichewa in Malawi and Shona in Zimbabwe). The effect size on the right is always English

**Table 19.5** Significant differences between HLE quintiles within Literacy Boost, by country at baseline

| Test                        | Ethiopia grade 3<br>( <i>N</i> = 390) | Malawi grade 2<br>( <i>N</i> = 340) |       | Malawi grade 4<br>( <i>N</i> = 272) |       | Zimbabwe grade 2<br>( <i>N</i> = 200) |          |
|-----------------------------|---------------------------------------|-------------------------------------|-------|-------------------------------------|-------|---------------------------------------|----------|
| Concepts about print        | -0.17                                 | 0.02                                |       | Na                                  |       | -0.42***                              |          |
| Letter identification       | -0.18                                 | Na                                  |       | Na                                  |       | -0.32*                                |          |
| High-frequency word reading | -0.15                                 | -0.06                               | -0.02 | -0.18                               | -0.02 | -0.39**                               | -0.45*** |
| Fluency                     | -0.17                                 | -0.11                               | -0.08 | -0.19                               | 0.02  | -0.40*                                | -0.33*   |
| Accuracy                    | -0.20                                 | 0.01                                | 0.05  | -0.20                               | -0.08 | -0.35**                               | -0.33**  |
| Reading comprehension       | -0.20*                                | 0.07                                | 0.11  | -0.11                               | -0.16 | -0.25*                                | 0.17     |
| Writing                     | Na                                    | 0.00                                | 0.16  | -0.08                               | -0.04 | Na                                    |          |

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

A negative sign [-] indicates students from low HLEs scored lower than the students from high HLEs  
“Na” indicates the skill was not assessed. Multiple effect sizes associated with a single skill indicate that students were assessed in multiple languages. The effect size on the left is always the local language (Chichewa in Malawi and Shona in Zimbabwe). The effect size on the right is always English

reading achievement. That is, it does not appear that girls or students from the lowest tiers of the HLE index benefit any differently than do other students.

#### **Question 4: How Do Girls and Students from Deprived HLEs Benefit from Literacy Boost as Compared to Similar Peers in Comparison Schools?**

Tables 19.6 and 19.7 present the effect size estimates for both girls within Literacy Boost versus comparison girls, as well as Literacy Boost

students from low HLE homes versus equally HLE-disadvantaged peers from comparison schools.

#### **Girls**

Table 19.6 reported the overall effect size estimates from difference-in-difference multivariate regressions of learning gains controlling for age, SES, HLE, and other factors when comparing girls in Literacy Boost and comparison schools. In this table, shaded items indicate no significant effect of Literacy Boost was found, while unshaded (white) items indicate a significant difference.



**Table 19.6** Learning effect size estimates for LB girls versus comparison girls

| Test                                      | Ethiopia ( <i>N</i> = 152) | Malawi: grade 2 ( <i>N</i> = 106) | Malawi: grade 4 ( <i>N</i> = 109) | Zimbabwe ( <i>N</i> = 73)                       |
|---|----------------------------|-----------------------------------|-----------------------------------|---|
| Concepts about print                      | 0.46*                      | -0.25                             | na                                | 0.40  |
| Letter identification                     | 0.47*                      | na                                | na                                | 0.75**, <sup>a</sup>                            |
| High frequency word reading               | 0.61**                     | Ch: 0.47*<br>Eng: 0.37*           | Ch: 0.19<br>Eng: 0.32             | Sh: 0.17<br>Eng: 0.49                           |
| Fluency (words per minute read correctly) | 0.75**                     | Ch: 0.39<br>Eng: 0.16             | Ch: -0.06<br>Eng: 0.14            | Sh: 0.88**<br>Eng: 0.69*                        |
| Accuracy (% of words read correctly)      | 0.75                       | Ch: 0.54**<br>Eng: 0.19           | Ch: 0.09<br>Eng: 0.30             | Sh: 0.37 <sup>a</sup><br>Eng: 0.37 <sup>a</sup> |
| Reading comprehension                     | 0.29                       | Ch: 0.62***<br>Eng: —             | Ch: 0.35<br>Eng: 0.06             | Sh: 0.32<br>Eng: 0.37                           |
| Writing                                   | na                         | Ch: 0.59**<br>Eng: 0.19           | Ch: 0.08<br>Eng: -0.05            | na  |

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

*Ch* skill assessed in Chichewa language (Malawi only), *Eng* skill assessed in English language (Malawi and Zimbabwe only), *Sh* skill assessed in Shona language (Zimbabwe only), *na* not assessed

Shaded squares indicate no significant effect size was found. — indicates insufficient variance for effect size calculation

<sup>a</sup>For these skills in Zimbabwe, students started out with scores marginally greater than the 0.25 effect size threshold set forth by the What Works Clearinghouse (2008) for acceptable differences between groups at baseline, and so these growth/learning effect sizes should be interpreted with caution

**Table 19.7** Learning effect size estimates for LB low HLE students versus comparison low HLE students

|   | Ethiopia ( <i>N</i> = 133) | Malawi: grade 2 ( <i>N</i> = 100) | Malawi: grade 4 ( <i>N</i> = 82) | Zimbabwe ( <i>N</i> = 67)                       |
|---|----------------------------|-----------------------------------|----------------------------------|---|
| Concepts about print                      | 0.10                       | -0.03                             | na                               | -0.05   |
| Letter identification                     | 0.33                       | na                                | na                               | 0.21 <sup>a</sup>                               |
| High frequency word reading               | 0.51*                      | Ch: 0.19<br>Eng: 0.32             | Ch: 0.26<br>Eng: 0.38            | Sh: -0.10<br>Eng: 0.36                          |
| Fluency (words per minute read correctly) | 0.52*                      | Ch: -0.06<br>Eng: 0.14            | Ch: 0.20<br>Eng: 0.21            | Sh: 1.04***<br>Eng: 0.70**                      |
| Accuracy (% of words read correctly)      | 0.39                       | Ch: 0.09<br>Eng: 0.30             | Ch: 0.02<br>Eng: 0.28            | Sh: 0.13 <sup>a</sup><br>Eng: 0.54 <sup>a</sup> |
| Reading comprehension                     | 0.02                       | Ch: 0.35<br>Eng: 0.06             | Ch: 0.29<br>Eng: 0.07            | Sh: 0.55<br>Eng: -0.15                          |
| Writing                                   | na                         | Ch: 0.08<br>Eng: -0.05            | Ch: 0.53*<br>Eng: 0.41           | na  |

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

*Ch* skill assessed in Chichewa language (Malawi only), *Eng* skill assessed in English language (Malawi and Zimbabwe only), *Sh* skill assessed in Shona language (Zimbabwe only), *na* not assessed

Shaded squares indicate no significant effect size was found. — indicates insufficient variance for effect size calculation

<sup>a</sup>For these skills in Zimbabwe, students started out with scores marginally greater than the 0.25 effect size threshold set forth by the What Works Clearinghouse (2008) for acceptable differences between groups at baseline, and so these growth/learning effect sizes should be interpreted with caution

In all three countries, and in three out of the four grades assessed, we see that girls in the Literacy Boost group scored significantly better than girls in comparison schools, with effect sizes ranging from 0.37 to 0.75 of a standard deviation. However, no significant effect for girls is found at all in Malawi grade 4. Possible reasons for these outcomes will be discussed below in the discussion section.

### HLE

Very limited gains were experienced by students from low HLE homes when compared with comparison students from similar backgrounds. However, the significant effect sizes that are observed range from 0.46 to 1.04 of a standard deviation. Possible reasons for this lack of findings will be further explored in the discussion section, to which we now turn.

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## Discussion

We organize our discussion by the order in which questions were posed and the findings were presented.

### Question 1: Overall Impact

Literacy Boost is clearly associated with statistically significant impact on reading skills of children where it has been implemented and evaluated in SSA. It is true that the quasi-experimental design within a specific country may limit the causal inferences that can be made. One reason for this is that groups not randomly assigned may have preexisting differences that are not apparent at baseline, such as better teachers/schools, or somewhat different student SES. However, the replication of this impact in quasi-experimental designs across a range of countries in sub-Saharan Africa and elsewhere, such as Bangladesh, Nepal, Pakistan, and the Philippines, and Indonesia (see Badiable, Guajardo, Fermin, & Robis, 2013; Guajardo, Hossain, Nath, & Dowd, 2013; Mithani, Alam, Babar, Dowd, & Ochoa,

2011; Pinto, 2010) is a strong indicator that Literacy Boost is working to enhance early reading acquisition in young school-going children. Nonetheless, there is clearly work to be done, as in each country there are skills that do not show evidence of significant gains. In some cases such as grade 2 in Malawi, this might be an instance of a ceiling effect, where near complete mastery of the concepts about print by both Literacy Boost and control students obscured differential learning gains.

In Ethiopia and Zimbabwe, on the other hand, we failed to find significant gains in reading comprehension. The ultimate goal of Literacy Boost is to enable students to acquire the skills to read a text and fully comprehend it. Significant gains in letter knowledge, high-frequency word reading, and other reading-related constructs are encouraging, but ultimately meaningless if children are still failing to comprehend what is written.

Four possible explanations come to mind for the absence of significant findings in reading comprehension. The first is the reliability of the tool itself. In Ethiopia, comprehension was measured through four questions, asked verbally by an assessor after the child read a reading passage aloud. These few questions may not have covered the domain of reading adequately and may not have provided enough variance to discern significant gains over the course of the year. Further, comprehension is a hotly debated topic in reading assessment circles, with various academics and practitioners recommending different techniques (Fuchs, Fuchs, & Maxwell, 1988; Gellert & Elbro, 2013; Keenan, Betjemann, & Olson, 2008; Wade, 1990), so the style of the comprehension assessment may undermine the ability to detect significant differences between groups.

The second explanation for the lack of significant reading comprehension gains could be that the reading comprehension teacher training module is usually implemented toward the end of the school year. In this case, this means that teachers may not have had enough time in the classroom using their new pedagogical approaches to reading comprehension to impact student learning. It may also be the case that moving from knowing a

few letters to reading with comprehension within a single year of intervention is unrealistic. Lastly, it may simply be that the Literacy Boost program does not adequately address the skill of reading comprehension. Further research is required to know which of these possibilities, if any, is responsible for the lack of significant gains in comprehension.

The lesson learned here from firsthand data collection in SSA is that Save the Children and others must continue to explore all aspects of how well the program supports reading skills development, both in terms of content and in terms of assessment. Indeed, Save the Children and academics at the Stanford Graduate School of Education have begun to explore different and possibly more reliable and valid ways to assess reading comprehension. Qualitative data on teachers, parent/community engagement, and other aspects of the program are being collected to better understand how thoroughly Literacy Boost is implemented and learn about its strengths and weaknesses to revise module content or adapt implementation approaches.

### **Question 2: Systematic Disadvantages Prior to Literacy Boost**

Given the inconsistency of the research literature on girls, we began the analysis unsure whether girls included in our samples would be systematically disadvantaged when compared to boys. In two of the most basic skills in Ethiopia, girls did start out at a disadvantage. The variance in scores for the more difficult skills in Ethiopia may have not permitted further differences to be seen (e.g., the mean for fluency is 22 words per minute, but the standard deviation is 22.7 words per minute correct), so it is possible that differences may continue into more difficult skills as students gain more mastery of the more basic skills. In addition, one skill, high-frequency word reading in Malawi, showed up significantly different at baseline. Unlike Ethiopia, where the effect sizes are close in magnitude and consistently negative, in grade 2 in Malawi the effect sizes have a greater range

and are not consistently positive or negative, forcing us to conclude that the girls present at school who were assessed did not differ significantly from boys in terms of reading abilities.

Although girls did not show significant differences at baseline, the same is not true across the three countries for students from low HLE homes. In Ethiopia and especially in Zimbabwe, students from low HLEs have significantly lower literacy skills at baseline. While it is true that only one skill in Ethiopia showed up as significantly different, which we hesitate to call a trend, further examination of the nonsignificant effect sizes does show that all are consistently negative and nearly equivalent in magnitude. This leads us to suspect that the reason behind the lack of significant findings is not because they are not there, but rather because the sample size did not provide sufficient power to detect them. While these findings are only correlations, they indicate a clear, consistent relationship in Zimbabwe between the HLE and student achievement. More evidence generated from different research techniques is needed to determine whether a causal relationship exists between the two.

### **Question 3: Do Girls and Low HLE Students Benefit Disproportionately?**

The question of whether disadvantaged students are helped to catch up through participating in the Literacy Boost program is a vital one as the goal of the program is to help all children acquire necessary reading skills. We failed to see any significant interaction terms between girls and Literacy Boost participation, or low HLE and Literacy Boost participation. For girls in particular, there were no significant differences between them and the boys at baseline. Therefore, given the fact that programming was not differentiated to encourage greater female participation, there should be no reason why girls should fare better than boys.

The lack of significant findings for low HLE students is more worrisome. Literacy Boost

provides out-of-school activities for students and workshops for parents and community members in how to support their children to learn. Given that many significant differences were observed at baseline between those of low HLE and high HLE, it was hoped that through the activities and information sharing on positive home reading environments and practices, these students would be able to catch up with their more advantaged peers in terms of reading rates.

These out-of-school opportunities are optional, however, and have been observed in some settings not to be universally attended. On the one hand, Dowd et al. (2010) interviewed parents in Malawi who could not read themselves yet who were more interested than others to send their children to reading camps, while Brown (2013) observed in Indonesia that better readers at baseline had higher rates of attendance. From these Literacy Boost studies comes evidence that this part of the treatment could vary by ability, parental buy-in or other factors, which could induce selection bias in favor of those with strong HLE. The two lessons we take from these findings is first the need for comprehensive monitoring and other sources of data to understand how the program is accessed by participants and second the need to ensure these strategies and resources reach all children, especially those who start off in HLE-deprived circumstances.

#### **Question 4: Learning Gains of Literacy Boost Students when Compared to Comparison Students**

Although we find no evidence that Literacy Boost benefitted disadvantaged students *disproportionally* in Question 3, it is important to examine to what the extent these groups did benefit from the program. Summarizing Tables 19.6 and 19.7 overall, there are mixed findings when comparing the girls and those of the lowest HLE within Literacy Boost to comparison students. One broad reason for this could be simply that the

studies lacked sufficient statistical power to detect differences, particularly given that the lowest detectable significant difference was 0.37 of a standard deviation and other effects as large as 0.55 in Zimbabwe and 0.75 in Ethiopia are not small but nevertheless remain insignificant. Second, these models control for all other background characteristics and could be over-specified, leaving little variation for detecting this effect as well. Addressing these two caveats requires either a larger sample or a more specific study of the subgroup of girls or children with low HLE. Looking beyond these statistical limitations that apply to this analysis overall, we will now turn to examining the findings on Question 4 in a country-by-country approach.

#### **Girls**

We first discuss the findings related to girls. In Table 19.6, we see that 12 out of 38 skills assessed showed significant effect sizes between girls in Literacy Boost and comparison schools. Disregarding Malawi grade 4 due to possible selection bias issues (discussed below), the proportion of significant effect sizes when compared to all skills assessed increases to 12 out of 28 skills.

In Ethiopia, girls in Literacy Boost gained more reading skills over the course of the year when compared to comparison girls, for four out of the six skills assessed. These skills were largely the less difficult skills of concepts about print, letter identification, and high-frequency word reading. While gains were made in the more difficult skill of fluency, significant gains were elusive in accuracy and comprehension. As discussed above, more research into the comprehension measure is necessary to understand the reasons behind these findings.

In grade 2 in Malawi, we do see significant differences for every Chichewa language skill except concepts about print and fluency, indicating that the girls in Literacy Boost are gaining significantly more skills than comparison girls. English skills, on the other hand, apart from high-frequency words, did not show any significant gain. This may be a result of the fact that the

language of instruction in Malawi in that region is Chichewa, and children have not been sufficiently exposed to the deeper orthography of English to demonstrate many skills at all, so a lack in variation in scores makes detecting significant differences difficult.

In grade 4 in Malawi, we see no significant difference between girls in Literacy Boost and girls in comparison schools. This might be due to several reasons. Older girls may have more chores and work at home, and may not be able to fully take advantage of the opportunities Literacy Boost provides. Thus, by year's end, the girls in Literacy Boost schools do not outperform girls in comparison schools. By grade 4, there might already be a significant amount of attrition across all schools. The ensuing selection bias inherent in the non-attriters might mean that within both Literacy Boost and comparison schools, the girls represent the top tier of learners and having one group significantly outpace the other group is unrealistic.

Finally, in Zimbabwe for girls, we see some movement in letter identification and fluency scores. However, the small sample size means that only very large effect sizes can be detected. This leads us to conclude that there may have been a greater impact which was not detectable, especially considering the other nonsignificant effect sizes, five of seven of which are equal to or greater 0.37 of a standard deviation.

## HLE

Across all countries, we find a lack of a majority of skills showing significant improvement for those of the lowest HLE in all countries. Ethiopia and Zimbabwe have the most promising results of the three countries, with fluency scores for those from low HLE echelons significantly improving when compared to comparison peers, on average. In Ethiopia as well, a significant effect size was associated with high-frequency word reading.

While it is possible that there is a barrier for the lowest HLE students to thrive in the program, we believe that other factors are coming into play in these findings that obscure the

results. The first is in regards to sample size. Without a large enough sample, the possibility to detect significant effect sizes diminishes dramatically. With respective sample sizes of 133, 100, 82, and 67 students in Ethiopia, grade 2 and grade 4 in Malawi, and Zimbabwe, this may be the critical factor in the lack of significant findings.

The other factor possibly obscuring significant findings relates to the construction of the HLE index itself, using the data available from each country. The HLE variables account for, at best, three of the five dimensions that Hess and Holloway (1984) described, those being the *value placed on literacy*, the *availability of reading and print material*, and *reading with children*. At worst, in Malawi, it was a function of only *value placed on literacy* and the *availability of reading and print material*, and these variables representing those dimensions were only collected as binary, limiting variation across the Malawi sample. A better accounting of the HLE, with indicators for each dimension proposed by Hess and Holloway, might better define which students come from which homes and increase the validity of the index itself.

## Broader Implications

There are several broad implications that arise from this research and analysis. The first is the critical importance of testing assumptions prior to acting broadly on them. As we see in the findings, there is some evidence that the association between the HLE and reading achievement in the regions where we find our samples is similar to the association in the developed world. However, the research from the developed world concerning girls' precocity in reading development does not apply uniformly in SSA, and particularly in the areas in which our data were collected. Careful consideration of each assumption made, and multiple iterative tests of those assumptions in each new context, whether that new context includes a new country, a new language, or a new culture is warranted.



This leads us to our next implication. The data that fed the indices both varied by country and especially for the HLE index grew in scope and depth as we analyzed each country. A constant and iterative effort to refine data collection tools and processes is necessary as lessons are learned. Currently, reflection on the limitations of our HLE indicators has led to testing indicators of use of reading skills in life, literacy environment in the broader community, not just in the home, and assisting others to read. These indicators emerge out of our practice in SSA and would not be relevant in developed contexts where nearly everyone uses reading skills constantly and words, reading and writing are already an essential part of daily life.

As we consider the lack of significant interactions between Literacy Boost and girls/students from low HLEs, we come to another lesson that needs to be better incorporated into our own work as well as elsewhere. Baseline assessment results, rather than being stored away in anticipation of endline data analysis, need to be carefully analyzed and meaningfully incorporated into program design and alteration to effectively target disadvantaged groups and better ensure equitable results for all participants.

There are also limitations to our analysis. Assessment is a critical piece of any education quality-enhancement program, but it may not be enough to evaluate overall program impact. Hence, there may have been important outcomes in the programs that were not captured through student reading assessments and student interviews. The samples included in this analysis were small to begin with due to resource constraints, and the small geographic area in which the data were collected may mask broader inequities in the regions and countries in which we work. Instrument design, sampling method, and analysis should be carefully conducted in such a way as to understand who is disadvantaged in a par-

ticular context and how—and whether or not—the program’s impact was distributed to include the disadvantaged. Sampling was conducted at the school level, and hence missed out-of-school youth, which possibly further restricts the application of these results to broader populations. None of the samples come from urban populations, which are growing at rapid rates in SSA and present unique challenges (such as multilingual classrooms) and opportunities (such as access to electricity).

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## Conclusion

In the 5 years since Literacy Boost was first piloted in Malawi, Literacy Boost has adapted, grown, and spread to new countries, languages, and contexts. The three countries here represent those countries in SSA for which endline data was available at the time of writing. These endline results are extraordinarily encouraging: significant and meaningful effect sizes for a variety of reading skills have been observed across all countries in SSA. However, we recognize that many challenges remain in ensuring all children can read with comprehension. We have established a system of evidence-based programming to ensure program impact. This system offers frequent feedback for improving programs to better serve the needs of the populations we serve. Our job in the constant updating and capacity building for rigorous data collection, transparent analysis, and advocacy places us in a unique position to apply the latest research. Based on the research highlighted in this chapter, we now know that ensuring overall impact is not enough and that more work will need to be done to more effectively target identified disadvantaged groups to ensure equitable outcomes and ultimately to achieve the goal of assisting all children across the continent to learn to read.

**Appendix: Multivariate Regression Models by Country and Outcome**

**Ethiopia: Overall models predicting learning gains**

| Variables               | Concepts about print gain | Letters gain          | High-frequency words gain | Fluency gain        | Accuracy gain         | Reading comp gain   |
|-------------------------|---------------------------|-----------------------|---------------------------|---------------------|-----------------------|---------------------|
| LB school               | 0.0580*<br>(0.0247)       | 0.0669**<br>(0.0248)  | 0.207***<br>(0.0529)      | 12.89***<br>(3.015) | 0.210***<br>(0.0579)  | -0.00443<br>(0.156) |
| Sex (1 = Female)        | 0.0299<br>(0.0183)        | 0.0343<br>(0.0184)    | 0.0551<br>(0.0393)        | -0.453<br>(2.242)   | 0.0511<br>(0.0431)    | -0.158<br>(0.116)   |
| Age in years            | -0.00370<br>(0.00622)     | -0.00925<br>(0.00624) | -0.0263*<br>(0.0133)      | -1.522*<br>(0.761)  | -0.0248<br>(0.0146)   | 0.0232<br>(0.0393)  |
| Quintile of SES         | -0.00480<br>(0.00666)     | -0.00129<br>(0.00668) | 0.00780<br>(0.0143)       | -0.474<br>(0.814)   | 0.00696<br>(0.0156)   | 0.0175<br>(0.0420)  |
| Quintile of HLE         | -0.00134<br>(0.00630)     | -0.00392<br>(0.00632) | -0.00461<br>(0.0135)      | 0.971<br>(0.767)    | -0.000979<br>(0.0147) | 0.0588<br>(0.0398)  |
| Constant                | 0.0603<br>(0.0722)        | 0.120<br>(0.0724)     | 0.306*<br>(0.155)         | 26.00**<br>(8.845)  | 0.355*<br>(0.170)     | 0.0347<br>(0.456)   |
| Observations            | 317                       | 317                   | 315                       | 314                 | 314                   | 317                 |
| Adjusted R <sup>2</sup> | 0.0122                    | 0.0275                | 0.0577                    | 0.0609              | 0.0462                | 0.00109             |

Standard errors in parentheses

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001

**Malawi: Overall models predicting learning gains, grade 2**

| Variables        | Concepts about print gain | Chichewa high-frequency words gain | English high-frequency words gain | Chichewa fluency gain | English fluency gain | Chichewa accuracy gain | English accuracy gain | Chichewa reading comp gain | English reading comp gain | Chichewa writing gain | English writing gain |
|------------------|---------------------------|------------------------------------|-----------------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------------|---------------------------|-----------------------|----------------------|
| LB school        | 0.171<br>(0.320)          | 12.75***<br>(2.876)                | 7.117***<br>(2.002)               | 2.387***<br>(0.712)   | 0.676<br>(0.437)     | 9.884***<br>(2.715)    | 3.446*<br>(1.509)     | 0.621***<br>(0.130)        | 0.0539<br>(0.0404)        | 2.190***<br>(0.407)   | 0.402**<br>(0.147)   |
| Sex (1 = Female) | -0.0828<br>(0.321)        | 2.874<br>(2.875)                   | 0.702<br>(2.001)                  | -0.696<br>(0.712)     | 0.109<br>(0.437)     | -2.922<br>(2.714)      | -0.614<br>(1.508)     | -0.104<br>(0.130)          | -0.0674<br>(0.0404)       | -0.165<br>(0.407)     | -0.227<br>(0.147)    |
| Age in years     | 0.0682<br>(0.0716)        | 0.400<br>(0.651)                   | 0.280<br>(0.453)                  | 0.101<br>(0.161)      | 0.0734<br>(0.0989)   | 0.243<br>(0.614)       | 0.424<br>(0.341)      | 0.00969<br>(0.0294)        | 0.0112<br>(0.00915)       | 0.0812<br>(0.0921)    | 0.0488<br>(0.0333)   |
| Quintiles of SES | -0.0517<br>(0.108)        | 1.784<br>(0.962)                   | 0.508<br>(0.670)                  | 0.217<br>(0.238)      | 0.114<br>(0.146)     | 1.736<br>(0.909)       | -0.252<br>(0.505)     | 0.0681<br>(0.0435)         | 0.0207<br>(0.0135)        | 0.142<br>(0.136)      | 0.0637<br>(0.0492)   |

|                         |                  |                   |                    |                    |                    |                   |                   |                     |                     |                   |                   |
|-------------------------|------------------|-------------------|--------------------|--------------------|--------------------|-------------------|-------------------|---------------------|---------------------|-------------------|-------------------|
| Quintiles of HLE        | 0.349<br>(0.251) | 0.785<br>(2.273)  | 4.486**<br>(1.583) | -0.0917<br>(0.563) | -0.0588<br>(0.346) | -0.222<br>(2.146) | 1.583<br>(1.193)  | -0.00307<br>(0.103) | -0.0384<br>(0.0320) | -0.135<br>(0.322) | -0.220<br>(0.116) |
| Constant                | 1.088<br>(0.815) | -5.336<br>(7.445) | -7.124<br>(5.183)  | -0.772<br>(1.844)  | -0.844<br>(1.132)  | -4.086<br>(7.029) | -3.806<br>(3.907) | -0.167<br>(0.336)   | -0.112<br>(0.105)   | -0.495<br>(1.054) | -0.360<br>(0.381) |
| Observations            | 213              | 231               | 231                | 231                | 231                | 231               | 231               | 231                 | 231                 | 231               | 231               |
| Adjusted R <sup>2</sup> | -0.00498         | 0.0807            | 0.0753             | 0.0326             | -0.00607           | 0.0498            | 0.0187            | 0.0798              | 0.0152              | 0.0997            | 0.0426            |

Standard errors in parentheses

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001

**Malawi: Overall models predicting learning gains, grade 4**

| Variables               | Chichewa high-frequency words gain | English high-frequency words gain | Chichewa fluency gain | English fluency gain | Chichewa accuracy gain | English accuracy gain | Chichewa reading comp gain | English reading comp gain | Chichewa writing gain | English writing gain |
|-------------------------|------------------------------------|-----------------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------------|---------------------------|-----------------------|----------------------|
| LB school               | 4.309<br>(4.132)                   | 6.602<br>(3.452)                  | 0.0702<br>(2.764)     | 5.194<br>(2.731)     | -0.826<br>(4.443)      | 11.53*<br>(4.537)     | 0.649*<br>(0.260)          | 0.221<br>(0.157)          | 1.288<br>(0.868)      | 0.510<br>(0.514)     |
| Sex (1 = Female)        | 5.064<br>(4.034)                   | 2.407<br>(3.370)                  | -3.305<br>(2.699)     | -0.289<br>(2.667)    | 7.714<br>(4.338)       | 3.869<br>(4.430)      | 0.129<br>(0.254)           | -0.195<br>(0.153)         | 0.129<br>(0.847)      | -0.209<br>(0.502)    |
| Age in years            | -0.440<br>(1.087)                  | 0.0327<br>(0.908)                 | -0.175<br>(0.727)     | -0.288<br>(0.718)    | -0.620<br>(1.169)      | -0.527<br>(1.193)     | -0.0332<br>(0.0685)        | -0.0358<br>(0.0411)       | 0.155<br>(0.228)      | -0.0595<br>(0.135)   |
| Quintiles of SES        | 0.355<br>(1.399)                   | -0.349<br>(1.169)                 | -1.067<br>(0.936)     | -0.900<br>(0.925)    | 0.000480<br>(1.505)    | -2.298<br>(1.537)     | -0.152<br>(0.0883)         | -0.0785<br>(0.0530)       | -0.172<br>(0.294)     | 0.173<br>(0.174)     |
| Quintiles of HLE        | -1.739<br>(2.854)                  | 3.775<br>(2.385)                  | -0.343<br>(1.910)     | 1.382<br>(1.887)     | -2.239<br>(3.069)      | 0.140<br>(3.134)      | 0.00751<br>(0.179)         | -0.0875<br>(0.109)        | 0.0109<br>(0.599)     | -0.265<br>(0.355)    |
| Constant                | 14.40<br>(13.65)                   | 12.06<br>(11.41)                  | 20.78*<br>(9.135)     | 16.68<br>(9.025)     | 19.39<br>(14.68)       | 25.84<br>(14.99)      | 1.621<br>(0.859)           | 1.047*<br>(0.515)         | -0.231<br>(2.867)     | 1.669<br>(1.699)     |
| Observations            | 211                                | 211                               | 211                   | 211                  | 211                    | 211                   | 210                        | 209                       | 211                   | 211                  |
| Adjusted R <sup>2</sup> | -0.00655                           | 0.00632                           | -0.00937              | 0.00020              | -0.00547               | 0.0242                | 0.0246                     | 0.0168                    | -0.0102               | -0.00780             |

Standard errors in parentheses

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001

**Zimbabwe: Overall models predicting learning gains**

| Variables               | Concepts about print gain | Letters gain       | Shona high-frequency words | English high-frequency words | Shona fluency       | English fluency     | Shona accuracy       | English accuracy      | Shona reading comp gain | English reading comp gain |
|-------------------------|---------------------------|--------------------|----------------------------|------------------------------|---------------------|---------------------|----------------------|-----------------------|-------------------------|---------------------------|
| LB school               | 0.0496<br>(0.0464)        | 5.393**<br>(1.891) | 0.321<br>(1.355)           | 2.800*<br>(1.120)            | 10.04***<br>(2.676) | 11.70***<br>(3.017) | 0.149*<br>(0.0748)   | 0.146*<br>(0.0665)    | 0.0601<br>(0.0521)      | 0.0220<br>(0.0499)        |
| Sex (1 = Female)        | 0.000701<br>(0.0425)      | 0.273<br>(1.741)   | 0.00458<br>(1.248)         | 0.606<br>(1.031)             | 1.754<br>(2.383)    | 1.090<br>(2.758)    | 0.0664<br>(0.0666)   | 0.0519<br>(0.0608)    | -0.00173<br>(0.0480)    | -0.0233<br>(0.0459)       |
| Age in years            | 0.00516<br>(0.0176)       | 0.109<br>(0.716)   | -0.0931<br>(0.513)         | 0.168<br>(0.424)             | -0.142<br>(0.982)   | -0.698<br>(1.142)   | 0.0169<br>(0.0274)   | 0.00566<br>(0.0252)   | -0.00485<br>(0.0197)    | 0.0186<br>(0.0189)        |
| Quintiles of SES        | 0.000196<br>(0.0152)      | -0.387<br>(0.619)  | -0.602<br>(0.444)          | 0.0691<br>(0.367)            | 0.523<br>(0.846)    | 2.084*<br>(0.980)   | 0.000327<br>(0.0236) | -0.0110<br>(0.0216)   | -0.00455<br>(0.0171)    | -0.00231<br>(0.0163)      |
| Quintiles of HLE        | -0.0410*<br>(0.0159)      | -1.071<br>(0.655)  | 0.111<br>(0.470)           | -0.415<br>(0.388)            | 2.062*<br>(0.915)   | 0.907<br>(1.037)    | -0.0171<br>(0.0256)  | -0.000832<br>(0.0229) | 0.00284<br>(0.0181)     | 0.0113<br>(0.0173)        |
| Constant                | 0.0126<br>(0.182)         | 7.349<br>(7.369)   | 6.550<br>(5.282)           | 1.463<br>(4.364)             | -7.261<br>(10.18)   | 2.158<br>(11.77)    | -0.00451<br>(0.284)  | 0.117<br>(0.260)      | 0.0827<br>(0.203)       | -0.156<br>(0.194)         |
| Observations            | 147                       | 149                | 149                        | 149                          | 143                 | 148                 | 143                  | 148                   | 149                     | 149                       |
| Adjusted R <sup>2</sup> | 0.0273                    | 0.0524             | -0.0208                    | 0.0207                       | 0.111               | 0.116               | 0.00374              | 0.00704               | -0.0236                 | -0.0229                   |

Standard errors in parentheses

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

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**Part VI**

**From Research to Policy and Practice**

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# Using Research to Influence Policy and Practice: The Case of the Pathways-to-Resilience Study (South Africa)

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Linda C. Theron

In Sub-Saharan Africa (SSA), and elsewhere, developmental science researchers are typically involved in a scholarship of discovery. Accordingly, they strive to produce evidence that explains, predicts, or describes children's development and to make this knowledge public in journal and book publications and at conferences. In the academe in general, and higher education institutions in SSA in particular, publication of original knowledge is esteemed and considered crucial to the attainment of a PhD and promotion to professorship. Although the generation and dissemination of new knowledge are imperative, it should not be at the expense of a scholarship of application (McLoughlin, 2013).

Especially in SSA, where myriad psychosocial (and other) problems confound the optimal development of children and youth and challenge the realization of the millennium goals, researchers need to do more than to generate theoretical knowledge about child development, no matter how useful. Increasingly too, research-funding agencies are asking researchers to demonstrate that their research findings have influenced policy and practice (see, e.g., the funding framework for grants relating to human and social dynamics,

National Research Foundation, 2017). Put differently, there is an increasing expectation for social science researchers to engage in "researching to make a difference" (de Lange, 2012, p. S3) and to demonstrate that their research results have supported constructive change and/or well-being.

To do so the discovery of "evidence itself is not enough" (Greijn, 2008, p. 3). Editors of psychology journals in SSA confirm that even publication of evidence in academic journals will not automatically effect positive change (J. G. Maree, personal communication, 18 September 2013; E. Mpofu, personal communication, 16 September 2013). Essentially, to make a positive difference, researchers have a duty to "apply the evidence base" (Masten, 2011, p. 494), in contextually and culturally aligned ways, to prevent, diminish, and/or manage risks to children's health and well-being and offer compelling evidence of the usefulness (or not) of such application.

For example, post-1994 South African research reported the prevalence of and dangers inherent in illegal abortion practices for South African girls and women of all races and classes. However, it was the purposeful application of this evidence that was instrumental in changing South Africa's policy (and later, law) on termination of pregnancies and subsequently improving the health and well-being of many pregnant girls and women (Pillay, 2006). Similarly, Petersen et al. (2012) used prior research results to develop an evidence-based family intervention (the CHAMP-SA project) to

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promote mental health in preadolescents challenged by their residence in HIV-affected communities. Among other outcomes, application of their research results modified parenting practices and increased the potential for mental health in at-risk youth participants. Their application illustrates that although policy traditionally informs practice, change in praxis is not necessarily reliant on transformation of macro-level policy. In other words, meaningful application of evidence can support a change at grass-root level even if governmental policies remain unchanged.

However, for multiple reasons (as described below), applying research-based evidence is not a simple matter (Jansen, 2002, 2003; Mertens, 2009; Pillay, 2006). Nonetheless, in SSA and other contexts where children's optimal development is jeopardized, the application of evidence to policy and practice is non-negotiable (de Lange, 2012; Masten, 2014). Thus, the purpose of this chapter is firstly to sensitize researchers to the complexities of "applying the evidence base" (Masten, 2011, p. 494). This is done by providing a brief description of the challenges in using research results to influence policy and practice, particularly in SSA. The second purpose is to illustrate how these complexities can be managed by adopting *participatory research approaches* that forge researcher-community partnerships (Groundwater-Smith et al., 2015). The latter is achieved by presenting the case of the Pathways-to-Resilience Study (PTR), South Africa. Since the 1970s, studies of children's resilience have informed developmental science, with the express purpose of supporting children's resilience processes by using knowledge of positive adjustment to transform practices and policies directed at vulnerable children (Masten, 2012). The case of the PTR illustrates how researcher-community collaborations supported African children's resilience by promoting meaningful application of research findings in various practice- and policy-related ways across systemic levels.

Before commenting on the complexities of using research results to shape policy and practice, and illustrating how a participatory approach eases these complexities, it is important to acknowledge that there are other approaches to

using research to influence policy and practice—participatory approaches are not the only means. The most obvious way would be to engage in *research commissioned by policy-makers*. Such commissions, or contract research, have the express intention of supporting the development of new policy or changing existing policy (Pillay, 2006). Researchers, especially those active in SSA with its history of structurally supported social injustices, would need to be circumspect about such policy-maker-directed research. To quote Jansen (2003, p. 94):

It is also important to ask what kind of state and what kinds of policies are being buttressed by research-based knowledge. Research is implicated in regressive politics if such information is used simply to legitimate oppressive regimes or propagate discriminatory policies. Policy-oriented research cannot simply be the handmaiden of the state; it also needs to retain a critical distance and space which enable studies to emerge that show how policies might in fact be implicated in deepening racial divisions or class inequalities or spatial (urban/rural) differences.

A second possible approach is *researcher-driven analysis of current policy/practice*, but this would be contingent on researchers having a thorough grasp of the policy context and regulatory frameworks that relate to their research interest (Mertens, 2009; Young, 2008). Such an analysis would be used to determine how policy/practice offers an inadequate response to existing challenges. Researchers would then resolutely tailor their research agendas to deliver evidence that could support improved policy/practice responses (Pillay, 2006; Swart and Bowman, 2007). An example of this approach can be found in the work of Mannan et al. (2012, 2013): following the World Health Organization's drive toward "Health for All," these researchers purposefully analyzed the mental health policies of four African countries and used this to advocate for policy overhaul. Implicit in the analysis approach is the need for researchers to bring their evidence to the attention of influential stakeholders, so that it can be used to shape policy and practice. Influential stakeholders could include advocacy groups, relevant government officials/committees (if macro-level policy change is



aimed for), major role players in local organizations (if microlevel policy change is aimed for), or key practitioners (Creswell, 2012; Nzimande, 2001; Swart and Bowman, 2007). Typically, such awareness raising requires more than writing a policy brief. Rather, it necessitates strategic access to policy-makers, at various systemic levels, and involves a process of fixed steps and actions (see, e.g., the RAPID program, as explained by Young, 2008). Gaining access and/or executing the necessary steps effectively requires patience, skill, and often luck (Jansen, 2003; Young, 2008).

In summary, what is common to both approaches mentioned above is community passivity (change is policy-maker or researcher driven; their voices are paramount), and the assumption that policy change transforms practice. For researchers in SSA, these commonalities should cause concern—partly because SSA has a history of colonialism that encouraged the marginalization of indigenous voices and stifled the production of non-Western knowledge, policies, and/or practices, and partly because policy change does not necessarily lead to the transformation of practice (Jansen, 2002). Informed by the case of the PTR study, this chapter encourages SSA researchers to consider how *participatory research approaches* facilitate grass-root level policy and practice changes that are not researcher- or policy-maker led and that promise to make a veritable difference to vulnerable children's development.

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### **Influencing Policy and Practice: Some Complexities**

Potentially, three barriers complicate using research results to influence policy and practice. The first relates to the agendas of politicians and budgetary constraints (often associated with political agendas). The second is associated with the production of research results that are meaningless, for various reasons (as explained below). The third pertains to research results that do not invite uptake, again for a variety of reasons (also detailed below).

### **Political Agendas and Budgetary Constraints**

Young (2008, p. 4) described the process of using research results to influence policy and practice as “complex, multifactorial and non-linear.” Part of this circuitous complexity relates to the “primacy of politics” (Jansen, 2003, p. 91) in what sways policy and, to some extent, practice. Another part relates to parliamentary machinery and iterative processes of democratic participation and contestation (Nzimande, 2001). Perhaps for this reason, Pillay (2006, p. 452) advised, “Research must take into account the political factors that impact on policy – it is not sufficient to include only empirical considerations in a research report for use by policymakers.” In other words, conducting rigorous research and then simply introducing practitioners or policy-makers to research findings will probably not translate into practice- or policy-related endorsement of findings, however meaningful the findings might be.

In reality, there is selective up-take of research results by advocacy groups, stakeholders, practitioners, and policy-makers. In addition to political agendas, practice- or policy-related consumption of research results could be influenced by such arbitrary factors as offering evidence-based solutions that fit well with budgetary restrictions, or that solve unforeseen crises to which communities must respond (Jansen, 2003).

### **Irrelevant Research Results**

Researchers confound the use of their research when they produce research results that are irrelevant, superficial, and/or untimely. Research results are more likely to be used if they flow from rigorous research studies, and offer credible, practical solutions to current problems prioritized by communities, organizations, and/or government (Jansen, 2003; Masten, 2014; Mertens, 2009; Pillay, 2006). In the context of developmental research, contextual relevance is crucial given the understanding that children's development

is enabled or disabled by the social ecology in which they are embedded (Ungar, 2011).

Particularly in developmental research in SSA, researchers need to guard against solutions that are grounded in a Western evidence base and/or Western ideologies (Skovdal and Daniel, 2012; Theron, 2012). Furthermore, using Western perspectives to interpret data generated in African contexts could lead to misinterpreted results and subsequent evidence that is inconsequential to children, communities, practitioners, or policy-makers. For example, Tol et al. (2013) noted that Ugandan children's silence about conflict-related experiences could have been misconstrued as indicative of resilience and mental health in contexts of armed conflict, if interpreted through the lens of pre-existing (Western) frameworks. In actual fact, the children's silence did not signal a lack of distress, but allegiance to a culture of respect for others' suffering and duty not to inflict further suffering by voicing distress. Culturally insensitive interpretation of the research results could have led to meaningless policies and/or harmful practice.

To offer relevant research results, researchers need to conduct culturally competent research (Mertens, 2009). Petersen et al.'s (2012) research illustrates the usefulness of culturally aligned solutions that flow from culturally sensitive research into a topical problem. In this instance, researchers purposefully introduced a timely, group-based intervention that aligned with traditionally African ways-of-being to support the mental health of vulnerable African youth. They fostered practical, collaborative approaches to improved mental health, rather than individualized ones. Their choice reflected cognizance of the challenges inherent in effecting/maintaining behavior change among Africans who have been socialized to respect interdependence, unless such change was supported by the immediate social ecology. Consequently, the results of their study showed that behavior change was bolstered by 'collective conscientization and collective action by parents to strengthen community protective influences for youth' (Petersen et al., 2012, p. 564). Their solution was opportune,

given the continued prevalence of HIV-related challenges to South African youths' physical and mental well-being, particularly in KwaZulu Natal (Hall et al., 2012).

## User-Unfriendly Research Results

Results are user-unfriendly when they are written up as difficult theories or as lengthy reports (Creswell, 2012; Pillay, 2006). This limits stakeholders', policy-makers', and/or practitioners' comprehension and subsequent use of research results. Particularly in SSA where English is seldom the first language of stakeholders to whom results will be disseminated, uptake will be complicated if researchers report results in difficult English (Casale and Posel, 2011). In SSA, results may need to be disseminated visually and/or orally to support uptake among stakeholders with no or low literacy (Mitchell and de Lange, 2011).

Results that will be used to shape policy/practice are unfriendly when they are written in such a way that they do not reflect the views and voices of the users that they are being directed at. For example, too often results are written up to shape policies and practices related to children without including the children's voices (Chigona and Chetty, 2008; Liebenberg and Ungar, 2009; Mashiri et al., 2007). This could be because marginalized stakeholders (such as children or mental health care users) are excluded from research directed at policy development (Kleintjes et al., 2010). Worse, it could be because their inclusion was superficially done to appease democratic expectations but with no real intention to allow marginalized voices to shape research findings and subsequent policy/practice (Groundwater-Smith et al., 2015; Jansen, 2003). Whatever the reason, results that privilege certain voices jeopardize community buy-in—perhaps even more so in SSA with its history of the marginalization of the voices of disempowered people (Swart and Bowman, 2007).

Community and other stakeholder buy-in are further influenced by the fiscal implications of applying research results. SSA is home to

many economically disadvantaged communities. Children often bear the brunt of this disadvantage. For example, they could be expected to forfeit schooling and other activities to contribute to their families' well-being and functioning, often at the expense of their personal development (Porter et al., 2012). Results are, therefore, also user-unfriendly, particularly to children and their disadvantaged families, when they will be expensive to implement in practice (Jansen, 2003).

Finally, because policy-makers and practitioners are not trained to appreciate or apply valuable findings, broad recommendations that can be ambivalently interpreted, or disregarded, are unpromising (Chigona and Chetty, 2008). Researchers need to be prepared to work with practitioners and policy-makers to convince them of the value of research findings and to support their practical application of the findings (Jansen, 2003). Such support could entail workshops, short courses, modeling, or any other pragmatic encouragement of hands-on application.

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### **A Participatory Approach to the Complexities of Using Research Results to Influence Policy and Practice**

To illustrate how a participatory approach supports the uptake of research results, and facilitates avoidance of the complexities noted above, the instrumental case (see Creswell, 2012) of the Pathways to Resilience Study (PTR), South Africa is presented. To do so, a brief summary of the study's context and aims is provided. Then the participatory process that facilitated the uptake of research results by practitioners and policy-makers is described. The illustration is concluded by extrapolating conclusions about the value of a participatory approach to policy and practice.

#### **The Case of the Pathways to Resilience Study (PTR), South Africa**

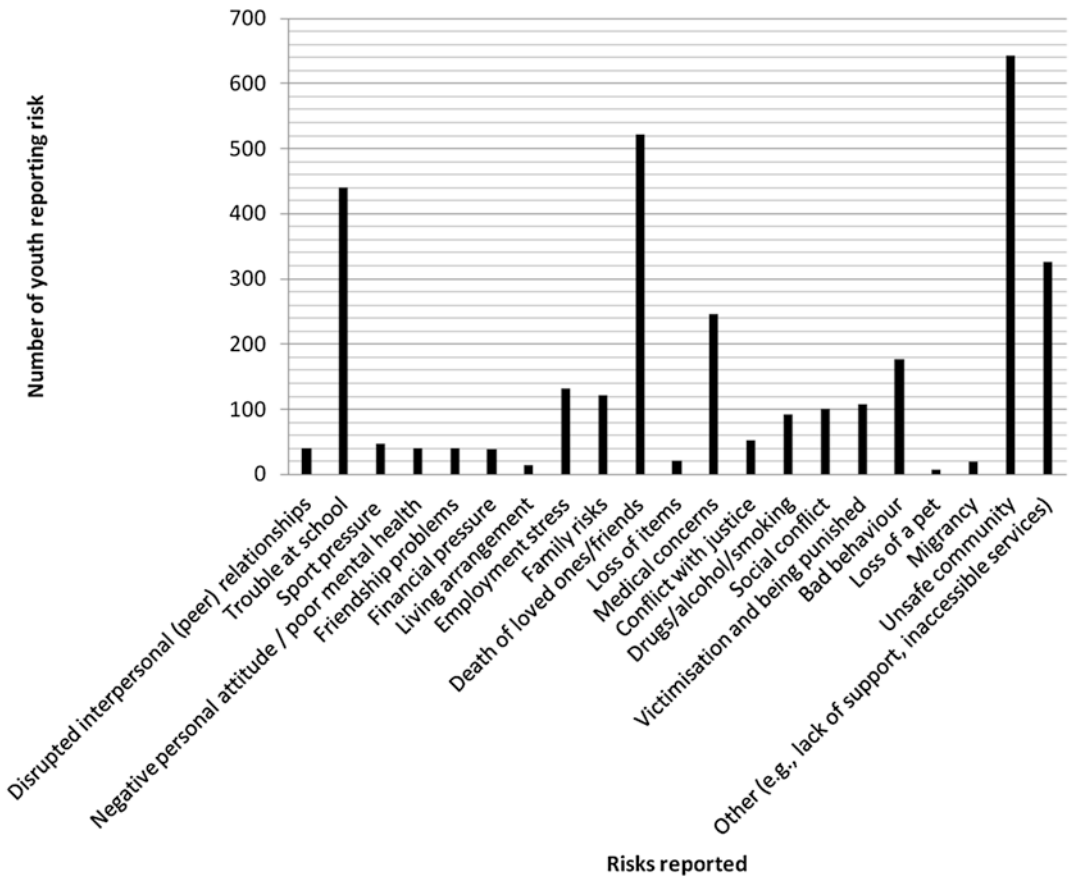
PTR, South Africa, forms part of a five-country study of resilience that commenced in 2008 and

concluded in 2014/2015 (see [www.resilienceresearch.org](http://www.resilienceresearch.org) for detail). In South Africa, PTR drew African young people from socially, economically, and educationally disadvantaged communities in the Thabo Mofutsanyana District, Free State province. This included an area that formed part of a previously designated homeland. During the Apartheid era, homelands were set aside for black African people to govern. Mostly, the agricultural land in these areas was sub-standard and there was inadequate infrastructure. This resulted in significant economic disadvantage for Africans living there (Madhavan and Crowell, 2014). Post-1994, former homelands continue to be distinguished by impoverishment (Hall et al., 2012).

The greater Free State province is also challenged by economic disadvantage: 60% of Free State province youth live below a poverty line of R575 (approximately \$50) per month. One in three lives in families without employed adults and has intimate knowledge of chronic poverty. Of these, at least 40% are African youth (Hall, 2012). Around 7% have lost both their parents (mostly from AIDS-related deaths), with higher incidence among African youth of school-going age. More than a third of Free State province youth (i.e., 39.1%) live with their mother only. Around 13% of these youths' fathers are deceased (Meintjies and Hall, 2012).

For various reasons, including those detailed above, PTR youth participants living in these areas likely had first-hand experience of multiple adversities that threatened their optimal development (Theron, 2016; Theron, Liebenberg, & Malindi, 2014; Theron et al., 2013). Aligned with the contextual disadvantages implicit in living in the Thabo Mofutsanyana District, participating youth self-reported multiple risks to their development (see Fig. 20.1). They foregrounded the risks of an unsafe community, death of loved ones and friends, and schooling challenges (including low standards of education and poor scholastic progress).

Within this high-risk context, PTR's primary purpose was to investigate the formal service and informal pathways that encourage youth resilience, using mixed methodologies. A related purpose was to use resultant knowledge of youths'



**Fig. 20.1** Contextual and personal risks challenging the well-being of youth participants

pathways to resilience to ‘help policy makers and practitioners build upon and promote best practices that are most relevant to their particular context rather than importing programs from contexts and cultures different from their own’ (Ungar et al., 2009, p. 8). Moreover, given the high risk to the optimal development of youth participants, PTR researchers had an ethical imperative to use the research finding to shape local policy and practice in ways that would support local youths’ resilience. To support policy-makers and practitioners to make good use of such locally relevant knowledge, PTR engaged in participatory methodologies. In South Africa, PTR researchers engaged in community-based participatory research (CBPR).

### The Participatory Process of Influencing Policy and Practice

CBPR encourages collaboration between researchers and community members in the planning and execution of the research and in the interpretation and dissemination of its results. It also respects community members as deeply knowledgeable about the research phenomenon (Mitchell and de Lange, 2011; Pinto et al., 2011). The integral role of community representatives in participatory research potentiates uptake of research results by influential stakeholders (de Lange, 2012; Ferreira, 2008). Furthermore, CBPR purposefully transforms research results into a variety of outputs that “can be mobilized

for social change and policy” (Quijada Cerecer et al., 2013, p. 220).

South African PTR researchers and community members collaborated at all stages of the research process, including at the planning stage. Thus, before the grant proposal was finalized, researchers met with key role players in communities that, should funding be granted, would be invited to participate in the research. Typically, these community-based stakeholders were (1) knowledgeable about the risks and resilience of local young people, (2) could support researchers to conduct culturally compliant research that would have relevance for local communities, and (3) strategically positioned to influence the uptake of research results. These meetings allowed researchers and stakeholders to explore the relevance of the proposed PTR research to communities where young people were at risk for poor developmental outcomes. They also facilitated stakeholder input regarding culturally and contextually appropriate ways of conducting the research and disseminating its results (Elias and Theron, 2012; Theron, 2013). This meant that from the outset, stakeholders and researchers were assured of the local relevance of the PTR and that this likely influenced their subsequent uptake of the research results (Mertens, 2009; Pillay, 2006).

When funding for the project was granted, university-based researchers continued to collaborate with these and other stakeholders. Essentially, in South Africa, this entailed ongoing collaboration with an Advisory Panel (AP) that comprised 14 key role players from local government and youth-related services in participating South African communities (for detail on this collaboration, see Theron, 2013; Theron et al., 2013). In addition to these adult core-researchers, 1209 young people from participating communities communicated their lived experiences of vulnerability and resilience.<sup>1</sup> Their voices strongly informed the PTR’s understanding of local youths’ pathways to resilience, thereby supporting credible theories that were aligned with the envisaged end users (i.e., African

youth) of the project’s results (Liebenberg and Ungar, 2009; Quijada Cerecer et al., 2013).<sup>2</sup> For the purposes of this chapter, the emphasis falls on how collaboration with these adults and young people promoted the uptake of research results by local practitioners and policy-makers.

As summarized in Fig. 20.2 below, the uptake of research results by local practitioners and policy-makers was supported by three active steps: (1) collaborative transformation of research results into a relevant and user-friendly product, (2) community-responsive diversification of the research product, and (3) collective advocacy of the research product.

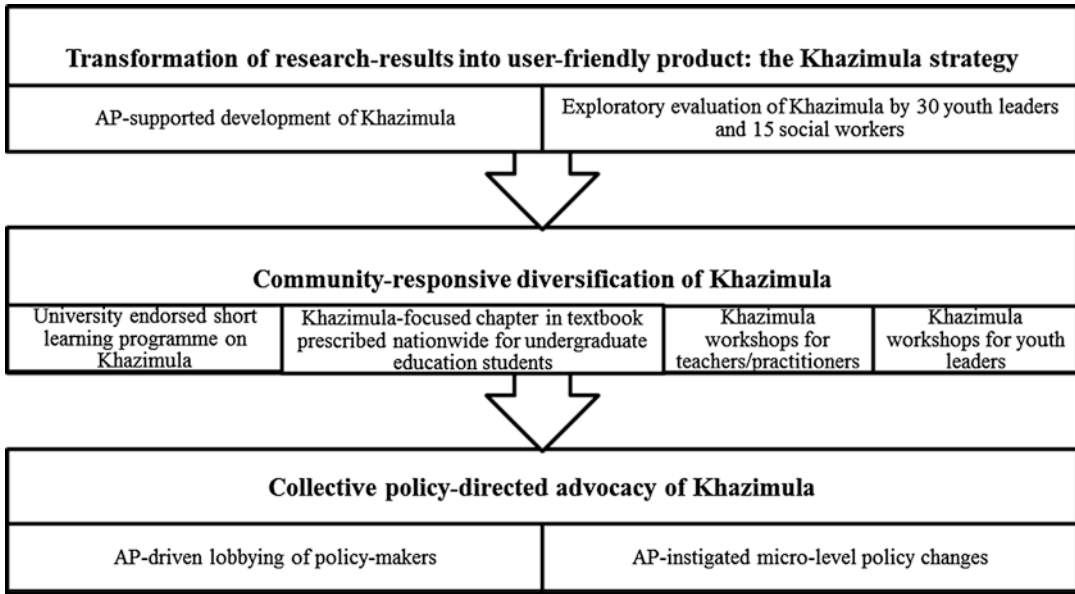
### **Collaborative Transformation of Research Results into User-Friendly Products**

To influence practices and policies aimed at supporting the resilience processes of South African youth, the PTR team translated the quantitative and qualitative research results into an uncomplicated strategy. The AP and PTR team named the strategy “Khazimula” (an African word meaning “to shine”). Essentially, Khazimula teaches that for young people to shine in the face of adversity, they need to dream (i.e., be future oriented), connect (i.e., relate constructively to living and ancestral others, to spiritual beings, to culture, and to themselves), and do (i.e., take productive action, such as enlisting support or using available resources and opportunities, which will benefit both self and community). Moreover, Khazimula teaches that supportive social ecologies are integral to such dreaming, connecting, and doing and so urges social ecologies to commit to, and support (also in proactive ways), resilience processes that encourage young people to reach functional outcomes. To nurture resilience-supportive dreaming, connecting, and

<sup>1</sup>Of these, 1137 yielded usable data.

<sup>2</sup>The findings of PTR are reported in numerous papers, journal articles, and book chapters. Because the focus of this chapter is on the use of these findings, rather than the findings per se, no detail is included. Readers who would like more information about PTR’s findings are welcome to contact the author of this chapter, read of the referenced articles, or download the final project report (available at: <http://idl-bnc.idrc.ca/dspace/handle/10625/53853>).





**Fig. 20.2** Participatory route to influencing practitioners and policy-makers

doing, Khazimula includes reflective questions and activities that can be applied across a range of settings. For example, the questions and activities can be used by young people themselves, individually, or in groups. They can also be facilitated by youth leaders/mentors, practitioners, service providers, or caregivers in interaction with individual young people or groups of youth (for detail of Khazimula, see Theron, 2014, or watch the Khazimula dvd at [www.Lindatheron.org](http://www.Lindatheron.org)). Alternatively, they can be applied by adults to reflect on their own resilience-enabling interactions with young people. Once the PTR team was certain that the Khazimula strategy approximated a relevant, user-friendly product, they invited the AP, local adolescent youth leaders, and social workers to review it critically.

The AP was concerned that the Khazimula strategy was too broad and so encouraged inclusion of detailed guidelines or a user’s manual. They were concerned that without these additions, youth leaders, teachers, and social workers would not make meaningful enough use of Khazimula in their interactions with young people who were considered at risk. Their concerns forestalled practitioner dismissal of what would probably

have been user-unfriendly results (Chigona and Chetty, 2008). The AP also encouraged the inclusion of more comprehensive contents. For example, for the use by teachers, the AP encouraged the inclusion of simple, short, English-medium worksheets that prompted dreaming, doing, and connecting. According to the AP, simple worksheets would accommodate possible language and literacy barriers, given the limited English comprehension and educational disadvantage of many African youth (see also Casale and Posel, 2011). Likewise, short worksheets would be inexpensive to reproduce. For the use with practitioners (such as social workers and school counselors), the AP encouraged the inclusion of basic theories of resilience in simple English. Khazimula was refined accordingly, before being evaluated by young people and practitioner stakeholders. Again, the AP’s insights prompted results that likely were friendlier to users, in terms of both language (Creswell, 2012; Pillay, 2006) and affordability (Jansen, 2003).

Thirty local adolescent youth leaders and 15 social workers piloted Khazimula and provided critical suggestions on how it needed to be improved to be even more user-friendly (Jefferis

et al., 2013). For example, they suggested that the instructions for activities be simplified. They also encouraged more physical activities and fewer paper-and-pencil activities. They championed activities that made use of traditionally African conventions like song, dance, and stories. They suggested that there should be no time limit to Khazimula activities. These recommendations were implemented by the PTR team. As with the AP's inputs, the youth leaders' and social workers' suggestions supported the creation of socio-culturally appropriate and comprehensible results, thereby facilitating avoidance of the barriers that typically complicate uptake of research results (Jansen, 2003; Pillay, 2006; Tol et al., 2013).

### **Community-Responsive Diversification of Khazimula**

Following the collaborative development of Khazimula, it needed to be disseminated to practitioners. To respond to AP and community invitations for such dissemination, the format of the Khazimula strategy had to be diversified (see Fig. 20.2). These adaptations are detailed below.

The AP prioritized dissemination to teachers and social workers, given that these professionals were key local support figures. The resilience literature confirms the centrality of teachers and social workers to South African youths' resilience (see, e.g., Phasha, 2010; Pillay, 2011; Theron and Malindi, 2010; Theron, 2016; Theron and Theron, 2010, 2014). Moreover, scrutiny of the South African Children's Act (38/2005) and education policy (as set out in the South African Norms and Standards for Educators—see Department of Education, 2000) endorsed the centrality of social workers and teachers to the promotion of children's well-being.

Accordingly, AP members affiliated with the Free State Department of Education arranged for PTR researchers to workshop 100 life orientation teachers in the use of Khazimula and organized for these teachers to attend a full-day workshop. This necessitated that the PTR team prepares workshop notes and develops a visual, interactive Khazimula workshop. These same AP members included the aforementioned in staff-focused interventions aimed at uplifting the performance

of under-performing schools; in other words, they themselves facilitated uptake. Simultaneously, AP members affiliated with government education departments were concerned that education students were being inadequately trained to support youths' resilience processes. They urged the principal investigator to lobby for the inclusion of the Khazimula strategy in the teacher education curriculum and/or prescribed learning material. To this end, the strategy was rewritten as a chapter and included in a newly commissioned Life Orientation textbook (see Theron, 2014), projected to be prescribed annually for at least 2000 undergraduate South African education students.

AP members who held strategic positions in local government and nongovernmental welfare organizations created opportunities for the PTR team to disseminate Khazimula to social workers and other service providers. This included training social workers, youth workers, and youth mentors to become accredited Khazimula facilitators, with the idea that these practitioners and stakeholders then continuously train local parents, caregivers, and mentors to use Khazimula to support youth resilience. To meet this community need, and to secure governmental funding for subsequent large-scale community training, the Khazimula strategy needed to be written up as a university-accredited short-learning program. Accordingly, the PTR team added relevant theoretical contents (e.g., a social-ecological understanding of resilience as explained by Ungar, 2011, 2013), formulated a curriculum, developed a complementary study guide (Theron, Jefferis, & van Rensburg, 2014), and followed the necessary steps for the Khazimula short-learning program to be accredited by the North-West University.

An AP member who chose to formally complete this short-learning program diversified it further. He registered a "Pathways to Resilience Workshop" with the South African Council of Social Service Professions for the purposes of continued professional development (CPD). This workshop reflected the contents of the Khazimula and facilitates ongoing resilience-focused CPD of service professionals from the Departments of

Health and Social Development, as well as regional service agencies.

Lastly, in the communities where PTR took place, schools engage young adults and school-going adolescents as peer leaders. These peer leaders take responsibility for the well-being of vulnerable youth. The AP urged the PTR team to workshop local peer leaders in the use of Khazimula with vulnerable peers and created opportunities for the PTR to do this. To this end, the PTR team adapted Khazimula into a youth-friendly workshop and presented it to peer leaders, either as stand-alone workshops or as part of camps designated for the training of peer leaders. The team also printed a graphic summary of the Khazimula strategy onto T-shirts that could be worn by local youth leaders to incidentally broaden awareness of the strategy (see Fig. 20.3). The AP was particularly supportive of this mode of awareness raising because local youth gained an article of clothing in this process.

To summarize, the cooperation between the AP and the PTR team, South Africa, supported the creation of diverse dissemination formats. AP members' sensitivity to the challenges of their specific professions and to their contexts swayed what diversification was needed. Simultaneously, the research team respected their insights and adapted dissemination vehicles. Together, this supported results that were user-friendly and



**Fig. 20.3** Local youth wore their Khazimula t-shirts to school and community activities and used questions about their t-shirts to promote uptake of research results. Youth participants and their parents provided written permission for photographs to be made public

relevant to a range of practitioners, as well as young people. Accordingly, it resulted in the PTR team supporting 874 young people and adults to understand, apply, and further disseminate Khazimula across South Africa. For example, an AP member affiliated with the Department of Education attended a provincial meeting aimed at government NGO strategizing toward a policy for (future) support of South African youth. She used her attendance to lobby the head of the influential NGO spearheading the strategy to include Khazimula. Subsequently, via collaboration between the PTR team and this youth-focused NGO, Khazimula was incorporated into the NGO's existing programs. The NGO then trained its staff manning 25 countrywide offices to champion resilience, using these programs. In doing so, approximately 5000 children and young people were introduced to Khazimula-aligned strategies (see Guoxiu et al., 2015).

### Collective Policy-Directed Advocacy of Khazimula

CBPR not only supported the uptake of the transformed research results into local and national youth-directed practices but also into the policy of local organizations and regional government departments. This was partly accomplished by bringing Khazimula to the attention of local and regional/national stakeholders that could influence policy. To this end, much in line with recommendations by Mitchell and de Lange (2011), the AP prioritized oral and visual advocacy of Khazimula. Given traditionally African emphases on extending hospitality to all (Murove, 2009), the AP encouraged that such advocacy be conducted around a meal hosted by the research team (see also Elias and Theron, 2012). Khazimula could then be informally promoted during the meal and formally presented to stakeholders and policy-makers after the meal. For the first of these dinners, the AP directed the invitations, acted as cohosts, and partnered with PTR researchers in informally advocating Khazimula to the invited guests. Thereafter the AP continued to lobby for Khazimula-aligned policy change. For example, AP members affiliated with a welfare organization approached the national Department of Social Development con-

cerning its policy regarding programs offered to children residing at child and youth care centers or visiting drop-in centers throughout South Africa. They urged that Khazimula be used to structure the foci of such programs. Departmental response was favorable and final approval is in process (see Guoxiu et al., 2015).

Microlevel policy change has been affected too. Such policy change is directly associated with the influence of AP members who were well positioned to influence the policy of their government department or organization. These members ensured that Khazimula informed policy, in that it became part of the prescribed *modus operandi*. For example, a welfare organization changed its intake protocol to include a Khazimula-aligned assessment of children's relatedness, future orientation, and resilience-supporting actions along with how their families supported these aspects. It also adopted Khazimula into its policy for working with street children; social workers and their aides were obligated to train as Khazimula facilitators and to use the Khazimula strategy in their support of street children. Likewise, the local education department incorporated Khazimula into its strategy for the remediation of underperforming schools. As part of the uplifting of such schools, teacher-pupil relationships were targeted, and Khazimula formed part of the policy informing improved relationships.

### **The Value of a CBPR Approach to Influencing Policy and Practice**

The description above of how the transformed evidence from the PTR, South Africa, has been used to influence practice and policy foregrounds the value of a CBPR approach. This chapter theorizes that because influential stakeholders and local youth were purposefully involved throughout the project in meaningful ways, it was perhaps easier to use research results to influence policy and practice, than if PTR researchers had gone the formal policy-change route (Mertens, 2009; Young, 2008). Moreover, in the course of this collaborative alliance with participating youth and the AP, many of the typical barriers to

the uptake of research results were eliminated. For example, rather than marginalize certain voices (Swart and Bowman, 2007) or import Western theories (Petersen et al., 2012; Skovdal and Daniel, 2012; Theron, 2012; Ungar, 2013), researcher-community cooperation ensured that Khazimula reflected the voices of local young people and adults and respected their sociocultural context. Khazimula's emphasis on sustaining hope for an improved future, connecting with others (living, ancestral, and spiritual), and taking constructive action that benefits the self and the community aligned with local communities' understanding of resilience and traditionally African ways of being (Theron et al., 2013). Likewise, the active participation of the AP and that of the youth leaders and social workers who collaborated in the transformation of the research results supports avoidance of the pitfalls of theoretical, expensive, and/or user-unfriendly research-based solutions and products (Jansen, 2003; Mertens, 2009). In summary, the collaborative processes that characterized PTR, South Africa, facilitated accessible and relevant research and galvanized endorsement of these results. Moreover, the strong working alliance with stakeholders supported traction for research results at grass-root level and allowed researchers to sidestep the "primacy of politics" (Jansen, 2003, p. 91) in the uptake of research results into policy and practice.

Although a CBPR approach was an invaluable route to the uptake of PTR research results, it made specific demands of researchers. The PTR researchers needed to do more than pay lip service to the participatory design of the project. Instead, the PTR researchers had to respect community partners as knowledgeable coresearchers, work synergistically with them, and flex in their formulation of the Khazimula research product, depending on participating communities' expressed needs (also see Theron, 2013). As in much of SSA, PTR researchers needed to be sensitive to the poverty, poor education, and associated illiteracy that characterized the communities in which they worked and include oral, hospitable (i.e., around a meal) ways of interacting with practitioners and influential stakeholders (Elias

and Theron, 2012). They also needed to take primary responsibility for more academic or formal writing tasks that flowed from respecting stakeholder and AP insights and needs (e.g., redrafting the Khazimula strategy as a university-endorsed short-learning program). Thus, researchers considering a participatory route to influencing practice and policy in SSA should anticipate the need for creativity, flexibility, and context-specific responsiveness. More importantly perhaps, researchers considering a participatory route to using research results to influence policy and practice need to set aside traditional assumptions of researcher importance and superior knowledge and respect community partners and participants as prominent and inherently knowledgeable coresearchers (Mertens, 2009; Pinto et al., 2011).

Implicit in the description of the participatory process of influencing practice and policy is the dedication of the AP (see also Theron, 2013). Their active endorsement of the PTR research project and participation in the process helped circumvent many of the barriers to the uptake of research results and promoted stakeholder buy in. Had the AP been less committed to practice- and policy-focused dissemination of PTR's results, the outcome could well have been less positive. This calls attention to the importance of the composition of an AP and the need for researchers to purposefully include strategically positioned community members, if they intend to follow a participatory route to influencing practice and policy. This could be seen as part of the decisive dissemination agenda of CBPR approaches (Quijada Cerecer et al., 2013). It also flags the importance of including such community members from the outset of the research process and of sharing ownership of the research process (including its focus) with them (Pillay, 2006).

A caveat to the conclusion that a participatory approach supported grass-root uptake of PTR research findings is that the value and longevity of practitioner endorsement has not yet been formally evaluated. Preliminary content analyses of qualitative data generated by youth leaders and social workers who piloted Khazimula provide

evidence of a sense of enhanced agency and confidence in their capacity to support local youths' resilience processes. Their lived experiences of Khazimula reflect increased resilience processes (Jefferis et al., 2013). However, these initial suggestions of value need to be confirmed by rigorous, large-scale evaluation of the meaningfulness of Khazimula to support resilience in local youth, also over time.

A final cautionary lesson implicit in the above case description is that practitioner uptake of transformed research results was more robust than that of policy-makers. Thus, even via a participatory route, using research findings to influence policy (at various systemic levels) remains a complex, slow process (Young, 2008). Nevertheless, as in Petersen et al.'s (2012) research, the case of PTR, South Africa, illustrates that grass-root change is not contingent on macro-level policy change. This begs question: in risk-laden contexts like SSA where children and communities need locally relevant, evidence-based supports, should researchers prioritize macro-level policy change or should researchers collaboratively (i.e., in cooperation with stakeholders) transform their evidence base for use by practitioners and encourage these practitioners and their communities to lobby for policy change, at micro- and, later, macro-level?

One benefit of influencing practice, and trusting that stakeholder endorsement will eventually influence policy change, is that it circumvents the policy-practice disconnect often experienced in SSA (Jansen, 2002). For example, although current education policy directs teachers to provide pastoral care to youth, the reality is that many teachers cannot implement this policy because they do not have the time, confidence, skills, or tools to do so (Ferreira and Ebersöhn, 2011; Theron, 2009). In other words, policy does not necessarily translate into concomitant practice. In contrast, in the case of PTR, the shared transformation of research findings into an easy-to-use intervention pragmatically supported practitioners to nurture the resilience processes of local young people in ways that macro-level policy-based mandates might not have.



## Conclusion

The instrumental case of PTR, South Africa, illustrates that participatory approaches support community-led practitioner and policy uptake of research findings. Unlike other approaches to evidence-based policy and practice change that prioritize the agendas of policy-makers or researchers, the researcher-community working alliance reported in this chapter foregrounded participating communities' needs, knowledge, and priorities. In SSA where policy and practice changes are complex, often politically motivated, and slow and where there is a pressing need for the constructive application of research findings (de Lange, 2012), a participatory approach is a viable way of gaining traction for research results at grass-root level while continuing to lobby macro-level policy-makers.

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