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12 From birth to early child care

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Abstract: The birth cohort study of the German National Educational Panel Study takes up the challenge of measuring education-relevant conditions and processes as well as the development of competencies in the first years of a child's life. The rationale to begin "from the crib on" can be found in results of infant and early childhood research. We review the design and main features of existing birth cohort studies in the field of education conducted in developed countries. Most studies begin when infants are between 6 and 11 months old with subsequent waves annually or every second year. The most common instruments are computer-assisted parent interviews, sometimes accompanied by additional self-completion modules, or completely self-administered questionnaires. We discuss early childhood developmental indicators and instruments that can be applied in large-scale assessments carried out in private homes. We favor measurements with predictive validity for subsequent development. The birth cohort study will start in 2012 with a representative sample of 3,000 children born in Germany in this year.

Keywords: Birth cohort study · Early childhood · Education · Panel study

Neugeborene und frühkindliche institutionelle Betreuung

Zusammenfassung: Die Geburtskohortenstudie des Nationalen Bildungspanels stellt sich der Herausforderung, Bedingungen und Prozesse der frühkindlichen Bildung unter besonderer Berücksichtigung von Fähigkeiten und Kompetenzen in den ersten Lebensjahren zu erfassen. Die Not-

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wendigkeit, bildungsrelevante Faktoren „von Geburt an" zu erheben, ergibt sich aus Ergebnissen der Säuglings- und Kindheitsforschung. Zunächst werden inhaltliche Schwerpunkte zum Thema Bildungsforschung und das Design bisheriger Geburtskohortenpanels beschrieben, die in industrialisierten Ländern durchgeführt wurden. Die meisten dieser Studien beginnen mit der ersten Erhebung, wenn die Kinder zwischen 6 und 11 Monate alt sind. Die Folgeerhebungen werden im Abstand von ein bis zwei Jahren durchgeführt. Häufig werden computergestützte Elterninterviews eingesetzt und zum Teil um handschriftlich auszufüllende Elternfragebögen ergänzt. Im Anschluss werden Instrumente zur Erfassung kindlicher Kompetenzen und Fähigkeiten diskutiert, die sowohl prädiktive Validität für die weitere kindliche Entwicklung haben als auch in großangelegten, repräsentativen Studien im häuslichen Setting einsetzbar sind. Im Nationalen Bildungspanel starten die Erhebungen der Geburtskohortenstudie im Jahr 2012 mit einer repräsentativen Stichprobe von ungefähr 3.000 Kindern, die im selben Jahr in Deutschland geboren wurden.

Schlüsselwörter: Geburtskohortenstudie · Frühe Kindheit · Bildung · Panelstudie

12.1 The competent infant

Fifty or more years ago, newborns and infants were seen as mostly sleeping, drinking, or crying bundles who could not yet think, speak, behave socially, or interact with their environment. Nowadays, infant and childhood research tells us a different story. The widely known book *"The scientist in the crib"* by Gopnik et al. (1999) summarizes this shift in infant and childhood research as follows: "For the last thirty years scientists like us have been looking in cribs—and in playpens and nurseries and preschools. There have been hundreds of rigorous scientific studies that tell us how babies and young children think and learn" (Gopnik et al. 1999, p. viii).

Infants are no longer seen as showing merely reflexes. Instead, the so-called "competent infant" (Stone et al. 1973) is able to perceive the surrounding environment according to her or his own needs, to structure even very early experiences in the first months of life, to memorize and to compare known to new experiences, and to integrate this into further perceptions and actions. The infant is endowed with not only general early learning abilities and social-emotional skills like imitating, reacting to special parental behaviors, and turn-taking in early interaction (Papoušek and Bornstein 1992), but also domain-specific competencies like preverbal language processing (Hennon et al. 2000; Weinert 2006, in press) and intuitive attentiveness to object characteristics like number or categorical similarities (Pauen 2003). Up to their 3rd birthday, toddlers extend these early abilities while interacting with their caregivers and exploring the environment (see, for an overview, Fthenakis et al. 2007). The 12th German Report on Children and Youth (Bundesministerium für Familie et al. 2005) defines education as an active and co-constructional process, and emphasizes the family as the first learning environment and one of the most important variables in explaining educational inequalities. Results of the US-American Early Childhood Longitudinal Study—Birth Cohort (ECLS-B) have shown that cognitive and social skills already vary in infants and toddlers according to family background: "As early as nine months of age, statistically significant developmental disparities are identified for children based on […] demographic characteristics […]. Furthermore, disparities become more prominent at 24 months of age" (Halle et al. 2009, p. 17). These findings are compa-

rable to results of the Millennium Cohort Study (MCS) revealing that social influences on developmental disparities in 3-year-olds became more prominent than in 9-months-olds (Hansen and Joshi 2007).

Not only structural aspects of family background but also quality of maternal caregiving in the first 3 years of life are a strong predictor of children's later achievements (Belsky et al. 2007; NICHD Early Child Care Research Network 2002). Additionally, quality of nonfamilial learning environment has an effect on children's educational outcome, especially if family background (e.g., migration background) is taken into account (cf., Roßbach 2005).

These examples underline the need to study educational processes as early as possible in the familial and nonfamilial setting. Therefore, a panel study on newborns will be established in the National Educational Panel Study (NEPS). The NEPS framework divides the educational biography into different stages (see Chap. 1, this volume). Stage 1 covers the first 3 years. In this contribution, we focus on this first stage. The subsequent stages are described from Chap. 13 onward in this volume.

In the next section, we provide a compilation of the design features and instruments in existing birth cohort studies that have been conducted mainly in countries other than Germany. Then, we discuss important findings from early childhood research regarding the predictive validity of developmental indicators. This discussion leads to the presentation of some instruments that we intend to use in the NEPS birth cohort study with a special focus on early competencies and home learning environment. The methodological requirements for the selection of our measures are large-scale practicability and reliability in familial settings, that is, private homes. We give an overview of our sample design and conclude with an outlook.

12.2 Cross-national overview of birth cohort studies focusing on education

The Centre of Longitudinal Studies, based at the Institute of Education, University of London, provides a list of the most important large scale panel studies.[1] In addition, Roßbach and Weinert (2008) summarize longitudinal studies covering preschool education. The following cross-national overview on birth cohorts is based on both of these sources while adding two smaller longitudinal studies on children with special needs, the Finish Jyväskyla Longitudinal Study of Dyslexia[2] and the German Mannheim Study of Children at Risk.[3] Table 1 gives an overview of birth cohort studies sorted according to starting years. For our purpose, we focus on those panel studies with a first wave conducted in the first year after the birth of the target person, that is, the child.[4] As the focus of this chapter is on infants and toddlers, the following overview of birth cohort studies takes into account only the early waves of data collection.

One of the first birth cohort studies, the National Child Development Study (NCDS), started in the United Kingdom in 1958 and is still continuing. Whereas at the beginning of the NCDS, the focus was on health issues directly after birth, the following waves with older children and adults also tap educational issues.

The subsequent birth cohort study in the United Kingdom, the British Cohort Study (BCS 70), accounts increasingly for aspects of infants' and toddlers' development and

Table 1: Overview of birth cohort studies with a focus on education

Study title	Country/region/ starting year	Initial sample size
NCDS National Child Development Study	UK 1958	17,500
BCS 70 British Cohort Study	UK 1970	17,198
Mannheim Study of Children at Risk	Germany 1986	384
NICHD Study of Early Child Care	USA 1991	1,364
JLD Jyväskylä Longitudinal Study of Dyslexia	Finland 1993	200
DALSC Danish Longitudinal Survey of Children	Denmark 1995	7,200
QLSCD Québec Longitudinal Study of Child Development	Canada 1998	2,817
ECLS-B Early Childhood Longitudinal Study	USA 2001	10,700
MCS Millennium Cohort Study	UK 2001	18,818
LASC Longitudinal Study of Australian Children	Australia 2004	5,107
GUS Growing Up in Scotland	Scotland 2005	5,000
GUI Growing Up in Ireland	Ireland 2008	11,000
ELFE French Longitudinal Study of Children	France 2011	20,000

early education. The BCS 70 recruited mothers of newborns born during one week in April 1970. Areas of interest are pre-, peri-, and postnatal health of infants and their mothers as well as day care and family background.

The Study of Early Child Care is conducted by the National Institute of Child Health and Human Development (NICHD). The nonrepresentative sample excluded families who were not fluent in English, had preterm children or children with birth complications, intended to move, or in which the parents themselves were minors. The NICHD study focuses mainly on the effects of early child care and sociodemographic background on children's language and cognitive development. Multiple methods like questionnaires, interviews, observations (in the family home and in child care), and testing (in a laboratory) were used to assess children's development and learning environment at 1, 6, 15, 24, and 36 months[5]. Some of the best known rating scales and tests used in the NICHD study are the Bayley Scales of Infant Development (Bayley 1993), the Child Behavior Checklist (Achenbach 1992), the Home Observation for Measurement of the Environment (Caldwell and Bradley 1984), the MacArthur Communicative Development Inventories (Fenson et al. 1991), the NEO Five Factor Inventory (Costa and McCrae 1989), the

Parenting Stress Index (Abidin 1983), and the Peabody Picture Vocabulary Test—Revised (Dunn and Dunn 1981).

The Danish Longitudinal Survey of Children (DALSC) started in 1995 with a sample of 6,011 children born in 1995 by mothers with Danish citizenship and two smaller samples consisting of children with migration background and of children recruited in care environments such as residential institutions or foster families. Main research questions of the DALSC are the influences of socioeconomic situation, ethnicity, home learning environment, and education on children's and adolescent's development and participation in society. The first two waves considered children at the ages of 6 months and 3 years. Mothers as the primary respondents were interviewed and the remaining questionnaires used in the DALSC were for self-completion on paper or computerized.

The Québec Longitudinal Study of Child Development (QLSCD) is situated in the francophone Canadian Province of Québec. Families were visited when infants were 5, 17, 29, and 41 months old. Both parents completed computer-assisted personal interviews and questionnaires about their child's temperament, social and motor development, home learning environment, daily routines, parent-child attachment, social capital, and leisure activities. Observers additionally administered the Home Observation for Measurement of the Environment (Caldwell and Bradley 1984). Infants' motor and social skills were tested with subscales of the Bayley Scales of Infant Development (Bayley 1993), and their sensorimotor development was assessed with a specially developed task. At the age of 41 months, the Peabody Picture Vocabulary Test—Revised (Dunn and Dunn 1981) was administered as well.

The birth cohort of the Early Childhood Longitudinal Study (ECLS-B) started of a representative sample of 9-month-old infants who were reassessed at the age of 24 months. The ECLS-B provides detailed information on children's development and learning experiences in the family and in day care. Children's cognitive development was assessed using a short-form research edition of the Bayley Scales of Infant Development (Bayley 1993). Trained observers coded videotaped parent-child interactions using the Nursing Child Assessment Teaching Scale (Summer and Spietz 1995). At the age of 24 months, the Infant/Toddler Environment Rating Scale (Harms et al. 2003) and the Family Day Care Rating Scale (Harms and Clifford 1989) were used.

Children in the Millennium Cohort Study (MCS) were born between 2000 and 2002, and the first wave took place when most of the infants were 9 months old. Both parents were asked about their infant's general development, temperament, language, and motor abilities in a computer-assisted personal interview. Items were chosen from rating scales that are traditionally used to screen early development such as the MacArthur Communicative Development Inventories (Fenson et al. 1991) and the Carey Temperament Scales (Carey and McDevitt 2007) for the infants and the Strength and Difficulties Questionnaire (Goodman 1999) for the 3-year-olds. At the age of 3, a test was also administered directly to assess basic mathematical and natural science knowledge about colors, letters, numbers, and shapes. Apart from that, the parent interviews covered topics such as child care, family structure, social capital, and health. The MCS also integrated self-completion modules concerning private questions about social relationships, attitudes, and values. Subgroups like disadvantaged families or families with an ethnic minority background were oversampled.

In Australia the birth cohort study of the Longitudinal Study of Australian Children (LASC) started when most infants were in their first year of life. Parents were interviewed at home and filled out self-completion questionnaires including a so-called time use diary displaying the hours that their child spent on activities like eating, sleeping, or playing with toys on a typical day. The main research questions in the LASC were about the home learning environment, amount and quality of day care, social capital of families, and health. Children's language competencies and their social-emotional development were also assessed indirectly via two rating scales, the Communication and Symbolic Behavior Scales (Wetherby and Prizant 1993) and the Brief Infant-Toddler Social Emotional Assessment (Briggs-Gowan and Carter 2002).

The birth cohort of the Growing up in Scotland Study (GUS) annually follows infants born in 2004 and 2005 who were 11 months old when their parents were interviewed for the first time. Computer-assisted personal interviews with integrated self-completion modules are being administered every year, and especially cover topics such as child's competencies, health, nonfamilial learning environment, and social capital.

Growing Up in Ireland (GUI) interviewed families with 9-month-old infants between September 2008 and April 2009. The next wave will take place when children are 3 years old. Parents filled out questionnaires about their infant's development, daily routines, child care arrangements, and their own lifestyle and parental experiences. In cases in which infants were cared for by other persons for more than 8 hours per week, a questionnaire was also sent to these caregivers. A subgroup of 120 families was additionally interviewed in a conversation format to record their views and experiences of family life, interests, and aspirations in their own words. The results of this qualitative study will be linked to the main study.

The French Longitudinal Study of Children (ELFE) will start in 2011 and collect data from about 20,000 families at maternity hospitals right after birth, at family homes 2 weeks after birth, and when the child is about 3 years old. Mothers will be interviewed face-to-face and fathers with a computer-assisted telephone interview. Key questions in the ELFE will address health, social inequalities, and other aspects such as the social environment that influence physical, psychological, social, and professional development.

Apart from these birth cohort studies, which recruited representative samples (except the NICHD study), there are also birth cohort studies tracking special populations, like the already mentioned Finish Jyväskyla Longitudinal Study of Dyslexia and the German Mannheim Study of Children at Risk. Both are performing in-depth assessments of children's cognitive and language abilities, temperament, and home learning environment at least every 6 months from birth onward through experimental tasks, observations, parent questionnaires, and directly administered tests.

To summarize, the need to study developmental and educational processes already in infancy has been perceived especially in the United Kingdom and the United States. These countries have already conducted two or more longitudinal studies including infants and toddlers. The most common instruments are parent interviews, either computer-assisted, sometimes accompanied by additional self-completion modules, or completely self-administered questionnaires. Parents are always asked about their sociodemographic background, own health, and the health of their child. Most studies include items related to families' daily routines, the home environment, child care arrangements, and social

capital. The most common instrument for rating the home learning environment is the Home Observation of the Environment (Caldwell and Bradley 1984), which is based on a parent interview and observations by the interviewer. Some studies also code videotaped parent-child interactions by using more objective and detailed coding schemes. Cognitive or motor abilities are commonly assessed directly with the Bayley Scales of Infant Development (Bayley 1993). With respect to the larger representative panels, only the ECLS-B and the QLSDC directly assess infants' cognitive or sensorimotor abilities in the first year of life. Most large-scale longitudinal studies do not directly test children's cognitive, language, and motor abilities before the age of 3, but prefer to use parent interviews as a source of data on the development of infants' and toddlers' competencies. In the next chapter, we shall discuss quality criteria of early childhood measures and present the instruments for measuring early competencies and the home learning environment that we intend to use in the NEPS birth cohort study.

12.3 Early childhood developmental indicators in the NEPS

In the NEPS, educational conditions and processes are measured over the life course from the perspective of five so-called pillars (see Chap. 1, this volume): Competence Development across the Life Course (pillar 1), Education Processes in Life-Course-Specific Learning Environments (pillar 2), Social Inequality and Educational Decisions in the Life Course (pillar 3), Educational Acquisition with Migration Background in the Life Course (pillar 4), and Returns to Education in the Life Course (pillar 5).

Most of the theoretical constructs in pillars 2 to 5 can be surveyed by interviewing parents. These include structural aspects of the learning environments and parents' or educators' and childminders' attitudes and orientations (pillar 2); the socioeconomic status of the family, the decision for or against the use of different care settings, and mother's return to labor market (pillar 3); parents' migration background, languages used in their own childhood, and those used currently (pillar 4); and parents' income situation, information on pregnancy and birth complications, as well as child's health status from birth onward (pillar 5).

The main challenges facing stage 1 are to develop, select, and administer instruments to measure different aspects of infants' and toddlers' competencies. A further goal is to assess the quality of learning environments beyond parents' self-reports. The prerequisite for generating good quality indicators is instruments that are objective, reliable, and valid. An adequate theoretical background and predictive validity are of particular importance to measure stability and change over time and to assure the alignment of data over the lifespan. Other more methodological requirements for instruments in a panel like the NEPS are large-scale practicability in terms of administration time, coding restrictions, and logistic demands. Moreover, the burden of every assessment should be kept low to avoid high rates of panel attrition.

The following sections describe how we are identifying, selecting, and developing items and instruments to measure early competencies and learning environments.

12.3.1 Indicators of competence development in infants and toddlers

This chapter began with the "competent infant" in order to emphasize the relevance of early development for educational research. Educational competencies can be seen as functional, context-sensitive, domain-specific, and capable of being influenced by education (Weinert 2007). Measuring competencies in the first year of life requires sophisticated methods. Competencies measured in school-age and adulthood cannot simply be transferred to early childhood, because competencies develop dynamically over the lifespan (cf., Weinert 2007). However, it is important to detect the essential prerequisites for the development of reading competence, auditory language comprehension, math competence, natural science competence, metacognition and self-regulation, the ability to handle information technologies, as well as social and general cognitive abilities and skills. As a result, the birth cohort in the NEPS has to conceptualize and operationalize

- basic cognitive capacities,
- preverbal communication and early language,
- early numeracy,
- and building of categories.

The internationally most common instrument for assessing young children's basic cognitive abilities is the mental scale of the Bayley Scales of Infant Development (Bayley 1993). The ECLS-B administered a short-form research edition of this direct test when children were 9 months old and at the age of 2 years; the NICHD study, when children were 15 months old and also at the age of 2 years. The most recent version is the cognitive scale of the Bayley Scales of Infant and Toddler Development—Third Edition (Bayley 2006). This will be described in the following while accentuating important modifications in comparison to the prior version. The cognitive scale assesses sensorimotor development, exploration, manipulation, habituation, and other aspects of cognitive processing. Items in the second edition of the Bayley Scales of Infant Development (Bayley 1993) with demands on language or motor skills have been removed from the cognitive scale and added to the language or motor scale in the third edition. A standardized set of objects and toys is provided for the procedure such as a rattle, blocks, balls, squeeze toys, books, cups, spoons, a doll, and—for toddlers—also puzzle boards. The examiner performs a specific task with the object or toy and observes whether the child shows an expected reaction or not. In addition, a spontaneous action or reaction by the child can be scored. Table 2 gives an example of an item for a 7-month-old child.

Table 2: Example of an item from the Bayley Scales of Infant and Toddler Development (Bayley 2006, p. 54)

Persistent reach
Place the object on the table in front of the child, and just beyond his or her reach. Observe the child's efforts to obtain it.
1 point: Child persistently reaches for the object, even if he or she fails to obtain it. 0 points: Child does not reach for the object. Child only initially reaches for the object.

Up to now, empirical evidence on the quality criteria of the recently published third edition is still rare. Although Domsch et al. (2009)—using the second edition—showed significant correlations between individual differences at 6 and 24 months of age and later childhood intelligence in a German sample, empirical findings are contradictory (see also, e.g., Hack et al. 2005). Reviews from Bjorklund (2000), Fagan and Singer (1983), and Harris (1983) show that the predictive validity of sensorimotor tests of development is rather poor compared to the predictive validity of the so-called habituation paradigm, which is described below. The third edition of the Bayley Scales of Infant and Toddler Development (Bayley 2006) is expected to be more predictive (Lennon et al. 2008), but—as mentioned above—this has not been empirically proven to date. Additionally, the third edition exists only in an American version, and the transferability of items regarding translation, application procedure, and play toys cannot just be taken for granted. Thus, we intend to adopt a second measure for early cognitive capacities: the habituation paradigm.

Two longitudinal studies, the already mentioned Mannheim Study for Children at Risk (see Table 1) and the Avon Longitudinal Study of Parents and Children (ALSPAC)—a panel focusing on health issues started in the United Kingdom in 1991 (Golding 1990) —have applied the habituation paradigm (see, for details, Bornstein et al. 2006; Laucht et al. 2000).

Habituation is defined as the reduction of attention to a continuously presented stimulus (e.g., pictures) that is not based simply on fatigue of the sensory receptors. The speed of habituation is measured mostly by the number of trials presented in which the child fixes the stimulus visually before fixation time drops to less than 50% of the initial fixation time at the first presentations of the stimulus. However, the proportional reduction of attention during the phase of familiarization and the reaction to a new stimulus after familiarization, the so-called dishabituation (or preference of novelty), have also been used as predictive measures in different studies. Briefly, visual habituation is viewed as a manifestation of encoding speed, whereas dishabituation is taken to be the ability to differentiate the habituation stimulus from a new stimulus. These mental functions are interpreted as forms of information processing, that is, the speed, exactness, and completeness of the encoding along with the memorization, recognition, and comparison to a new and different stimulus (Bornstein and Sigman 1986; Fagan et al. 2007; Fagan and McGrath 1981; Kavšek 2004; McCall and Carriger 1993). As shown in several reviews and meta-analyses, these abilities are closely tied to the results of intelligence tests later in childhood (Bornstein and Sigman 1986; Kavšek 2004). Bornstein and Sigman (1986) found correlations of up to $r = 0.47$ between habituation measures in the first 7 months of life and children's intelligence from 2 to 8 years. Fagan et al. (2007) showed that infants' habituation correlates up to $r = 0.34$ with measurements of intelligence at 21 years and up to $r = 0.32$ with the achieved academic degree. All these studies support the notion that there is continuity between infants' information processing abilities and later measurements of intelligence.

Moreover, if stimuli are chosen that represent a certain amount of objects or members of a specific category, it may even be possible to gain insight into possibly domain-specific early number processing or categorization processes. Some studies have shown that early habituation correlates not only with later intelligence but also with domain-specific competencies like later language development (Colombo et al. 2009).

One advantage of the habituation paradigm is its cultural fairness if it is presented with nonverbal and neutral stimulus material. This feature is very important for testing basic cognitive capacities in children with diverse family backgrounds. The challenge of the birth cohort in the NEPS is to transfer this experimental paradigm to the home setting, because all children are visited and observed at home (see Sect. 12.4 for the procedure). At the moment, preliminary studies are trying to develop a habituation paradigm that can be applied in a large-scale study conducted in a home setting.

Apart from directly testing and observing early cognitive skills, it is also possible to ask parents about their impression of their child's behavior. There is some evidence from an American study that direct and indirect measures of early cognition correlate with each other (Gollenberg and Lynch 2009).

Besides general cognitive abilities, language is a key competence for educational outcome. In the preverbal phase, important precursor skills for language development are turn-taking skills and the reception and production of typical prosodic shapes (Hennon et al. 2000; Mampe et al. 2009). The complexity of an infant's cries, cuing, and babbling is related to language development in the 2nd year of life (Wermke et al. 2007). From 9 months onward, infants build up joint attention and receptive vocabulary. The amount of joint attention episodes in the communication between infant and parents correlates with later language development (Bornstein et al. 1999). Possible methods for assessing these preverbal competencies are the observation of turn-taking and joint attention in (semistructured) parent-child interaction or parents' information on their babies' crying, cuing, and babbling—ideally supported by acoustic analyses. Later on, during the two-word phase, vocabulary and early grammar are important predictors for later language competencies (Fenson et al. 1994) and can be assessed by parent questionnaires and developmental tests. The size of vocabulary measured in the second year of life is the best predictor for grammar development in the third year of life (Fenson et al. 1994). In bilingual children, the size of vocabulary around the second birthday correlates more strongly with subsequent language development than measures of general development or the amount of contact to a special language (Conboy and Thal 2006; Marchman et al. 2004). Of special interest are children who fail to build up a vocabulary of 50 spoken words up to their second birthday. These so-called late talkers are at risk for specific language impairment (Grimm 1999; Weinert 2005, 2006) and have significantly lower skills in academic language than control peers up to adulthood (Rescorla 2009). The most widely used questionnaire to assess vocabulary in toddlers is the MacArthur-Bates Communicative Inventory (Fenson et al. 2007), which is also being used in the MCS and NICHD study. Versions of this questionnaire are now available in other languages including German, Turkish, and Russian.

Other areas that are important indicators of young children's development are gross- and fine-motor skills (Michaelis 2003). Easily observable motor skills can be measured with parent questionnaires.

12.3.2 Indicators of quality of early learning environments

A widely accepted instrument for the home learning environment of young children is the Home Observation for Measurement of the Environment (Caldwell and Bradley 1984).

It has been used in the NICHD study, the QLSCD, and the Mannheim Study for Children at Risk, and it can also be applied in Turkish families (Otyakmaz 2007). Early social skills can be observed in the dyadic and later on triadic interaction of the infant with her or his environment. It is important not only to analyze parent's behavior (see below) but also to reveal the children's part in the interactive process. For example, the Nursing Child Assessment Teaching Scale (Summer and Spietz 1995) offers the opportunity to score child and parent separately according to the child's responsiveness and the parent's responsiveness and teaching behavior. The interaction has to be videotaped and interpreted afterwards. Whereas the ECLS-B used the Nursing Child Assessment Teaching Scale (Summer and Spietz 1995), the NICHD study developed its own scoring procedures for videotaped interaction to operationalize the quality of children's learning environment in the first 3 years of life (NICHD Early Child Care Research Network 1999; see also Lohaus et al. 2004). Here, maternal sensitivity or responsiveness is an important predictor for later social development and has been shown to have a positive association to both language development and overall cognitive ability (Bornstein and Tamis-LeMonda 1989; Page et al. 2010). Responsiveness is defined as mothers' prompt, contingent, and appropriate (not simply contiguous) behaviors (Bornstein and Tamis-LeMonda 1989). Two forms of responsiveness can be measured: either toward nondistress activities like smiling, or toward infants' distress like crying. Analyses can be carried out macroanalytically, for example, by scoring whether a special behavior occurs; or microanalytically, for example, by scoring the amount of a special behavior in a set time interval.

The model applied in the NEPS for analyzing the process quality of the learning environment is structure, support, challenge, and orientation, also called the SSCO model (see Chap. 6, this volume). The intuitive didactic processes (Papoušek and Bornstein 1992) that allow mothers to react promptly, contingently, and appropriately to their infants and later on to scaffold their toddlers' abilities can be subsumed under structure and support. The challenge aspect occurs whenever parents provide activating stimulation, play tasks, toys, or activities to their children. The attitudes and values concerning childrearing, caring, and educating are the orientation that influences the familial and also nonfamilial environment. At the moment, a macroanalytic procedure for coding 5–10 minutes of videotaped parent-child interaction is being developed.

Regarding nonfamilial day care, the available instruments for measuring quality of early child care are the Krippen-Skala (KRIPS-R, Tietze et al. 2005a), which is the German version of the Infant/Toddler Environment Rating Scale (ITERS-R, Harms et al. 2003), and the Tagespflege-Skala (TAS, Tietze et al. 2005b), which is the German version of the Family Day Care Rating Scale (FCDRS, Harms and Clifford 1989). A questionnaire on early nonfamilial day care (child care provisions and childminders) will be added to the research design, because more day care places will be offered for children under the age of 3 in Germany in the following years.

Another important variable that influences child's well-being and learning especially in the early years is attachment (Grossmann and Grossmann 2003; Korntheuer et al. 2007). As temperament contributes directly to social-emotional development and interacts with parenting and other environmental variables (Rothbart and Gartstein 2008), it should be integrated as a moderator variable when measuring learning environments (see Chap. 10, this volume).

Altogether, the quality of familial and nonfamilial learning environments can only be measured if the interdependency of the quality of structural aspects (e.g., the familial or institutional background), the quality of processes (e.g., intuitive or, later on, explicit didactics and interactions), and the orientations behind the structures and processes are taken into account when collecting and analyzing the data (cf. Roßbach 2005).

12.4 Sample design and procedure of the birth cohort

A nationally representative sample of children born in 2012 in Germany will be drawn for the birth cohort. See Chap. 4 in this volume for more information on the sampling strategy.

In the first funding period up to 2013, there will be two waves of data collection. At the first wave in 2012/2013, infants will be around 7 months old. The second wave will take place in 2013 when they are 14 months old. Field phases of the main study will last 6 months for two reasons: because the individual sampling requires that every child is visited at home, and because the exact age of infants is very important at this age due to the way that developmental changes can occur within months during infancy.

The measurement points at 7, 14, and 24 months differ from the annual measurements in most other cohorts of the NEPS. It is not advisable to collect data at phases during infancy when developmental variance is at its height. During these phases, some infants will already reach important milestones while other infants will be reaching these milestones just a few weeks later. One very important milestone is, for example, the vocabulary explosion around the age of 18 months. Consequently, data collection around 18 months should be avoided—which, in fact, has been realized in most panel studies described above. Second, the proposed scheme is closer to most other international birth cohort studies like BCS-70, ECLS-B, MCS, and the NICHD study, and this makes the collected data or analyses more comparable.

During the visit to the family, an approximately 30-min long computer-assisted personal interview will be administered with one parent (normally the mother) and approximately another 30 min will be needed to observe the child´s competencies and the home learning environment.

12.5 Prospect

Studying education as a lifelong process makes it necessary to start at the beginning, that is, from birth onward. The challenge is to identify early indicators at this age that are relevant for educational processes. The measurement of early developmental indicators requires indirect methods such as parent interviews and parent questionnaires, and—for an in-depth assessment of infants' and toddlers' competencies and learning environments—also direct methods such as observational situations, experimental tasks, and tests (for toddlers and older children). The prerequisite for this is an interdisciplinary perspective on child development and education that integrates psychological, educational, and sociological issues. As Roßbach and Blossfeld (2008) have noted, the desiderata of

research in early education especially concern the impact of early learning environments on child development and the educational career and vice versa—including the problem of the social disparities that are already evident in infancy and toddlerhood. Because of the paucity of research on educational processes in this age group, extensive preliminary studies are under way so that the birth cohort will start in 2012. When children in the birth cohort study are 3 to 4 years old, they will become part of the second Kindergarten cohort study.

Endnotes

1 For details see http://www.cls.ioe.ac.uk/.

2 For details see http://www.jyu.fi/humander/dyslexia.shtml.

3 For details see http://www.zi-mannheim.de/259.html.

4 Not mentioned in Table 1 is the German Socio-Economic Panel Study (SOEP), which has expanded its survey program and is now gathering additional education-relevant information with questionnaires on newborns and 2- to 3-year olds. For more information see Chap. 3 in this volume.

5 A complete list of all study instruments and their rationale can be found at the website of the NICHD, see http://secc.rti.org/home.cfm.

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