

A Review Essay on the Measurement of Child Well-Being

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Abstract Research on indicators related to the state of child well-being is a growing field that has experienced several changes over time. The growing supply of data on children, as well as the need to facilitate conclusions and to track trends, has led researchers to develop a number of child well-being indexes. This paper critically reviews the most recent and relevant child well-being indexes, i.e., the Index of Child and Youth Well-Being in the United States, the Child Well-being Index for the European Union, the Microdata Child Well-being Index, and the Deprivation Index. The study focuses primarily on the contributions and innovations the indexes have brought to the field, making a critical assessment of the methods used in the construction of the indexes and identifying their main limitations.

Keywords Child well-being · Measurement · Child indicators · Composite indexes

1 Introduction

1.1 On the Need to Study and Measure Child Well-Being

It is widely acknowledged that experiences of poverty in childhood, which constrain children's well-being in the short-term, can also lead to constrains in their later lives (Secretary of State for Social Security 1999; Hobcraft 2002; Kiernan 2002; Piachaud and

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Sutherland 2002; Sparkes and Glennester 2002; Ridge 2004; European Commission 2008). Studies have also shown that children have always been more affected by poverty than any other group (Cornia and Danzinger 1997; European Commission 2008) and that they are at a higher risk of poverty than the average population member (Tsakloglou and Papadopoulos 2002).

In 2005, 19% of the EU27 child population was at risk of poverty, while the risk-of-poverty rate for the total population was 16% (European Commission 2008). In some less developed EU countries, for instance, Portugal, this number for the same year was even higher, 24% of the children were at risk of poverty (European Commission 2008). Additionally, in spite of some visible improvements in child well-being (in 2006 the at-risk-of-poverty rate for children diminished to 21%, against 18% for the total Portuguese population), children remained a particularly vulnerable group in the country (Portugal 2008). It is thus clear that child well-being deserves attention, at both the national and international levels, for at least two important reasons: the relevance of the problem in itself—poverty affects children in the present but also affects their future lives—and also, the dimension of the problem—the numbers speak for themselves, child poverty is a widespread and persistent problem.

However, assessing child well-being cannot be reduced to the measurement of poverty, especially when poverty measures focus on income alone. As researchers have come to acknowledge (namely, Ben-Arieh 2000, 2006, 2008; Land et al. 2001; Aber et al. 2002; Hoelscher 2004; Bradshaw et al. 2006, 2007; Moore et al. 2007, 2008; UNICEF 2007; Bradshaw and Richardson 2009), the well-being of children depends on several dimensions and, consequently, measurement should take into account a vast array of indicators.

It is now broadly accepted that social indicators play a determinant role in the formulation of social policies (Ben-Arieh 2000), but there is still a lack of indicators that can actually be used to assess how children are faring (Ben-Arieh 2000). This is the case mainly because the family, instead of the child, is usually taken as the basic unit of analysis and also, children are seldom directly surveyed, since the respondents are typically their parents. Recent studies (Land et al. 2001, 2007; Bradshaw et al. 2006, 2007; Moore et al. 2007, 2008; Bastos et al. 2004, 2008; Bastos and Machado 2009; Bradshaw and Richardson 2009) have attempted to overcome this gap, some of which will be reviewed below. However, much has yet to be done in the field. Indeed, child monitoring has been less than perfect, because children have not been treated as a completely independent group (Ben-Arieh 2000), with particular characteristics and needs, in other words, as a group that deserves a direct approach, different indicators and, consequently, different policies.

In short, there are at least three main reasons why child well-being requires special attention:

1. The problem of child well-being is not restricted to the present lives of children; it has repercussions on their future;
2. Children are still one of the groups most afflicted by poverty;
3. There is still a basic lack of 'direct' information on children's lives.

1.2 On Recent Trends in the Measurement of Child Well-Being

The research on indicators related with the state of child well-being is a growing field that has experienced several changes over time. From among all the major shifts, three recent trends deserve to be highlighted (see Ben-Arieh, 2000, 2006, 2008): (1) an increasing child-centred focus; (2) this child-centred approach goes beyond mere survival and

multidimensionality emerges as an essential perspective; (3) an increasing reliance on single composite indexes that can summarize children's situations, instead of considering several disparate indicators.

The first of these three trends was deeply inspired by both the framework established by the Convention on the Rights of the Child (CRC) (1989)¹ and developments in the field of social psychology, particularly the ecological model of human development (Bronfenbrenner and Morris 1998). These frameworks have drawn attention to the need to focus on children when studying children. That is, the child should be the unit of analysis instead of the family or household where he/she is integrated. This is a goal that the main research works in this field have progressively come to pursue (e.g., Land et al. 2001, 2007; Hoelscher 2004; Bradshaw et al. 2006, 2007; Moore et al. 2007, 2008; Bastos et al. 2008; Bastos and Machado 2009; Bradshaw and Richardson 2009).

Furthermore, when assessing the condition of children, the CRC and the ecological model of human development have also highlighted the need to examine the several dimensions that can affect their lives, that is, the issue of multidimensionality in child well-being, the second of the major trends mentioned above. Indeed, researchers have come to realize that child well-being cannot be regarded as one-dimensional, meaning that mere indicators of family income poverty are not enough to measure the extent of child welfare. This explains why most of the recent studies on the matter (e.g., Ben-Arieh 2000, 2006, 2008; Land et al. 2001, 2007; Aber et al. 2002; Hoelscher 2004; Bradshaw et al. 2006, 2007; Bastos et al. 2004, 2008; Bastos and Machado 2009; Bradshaw and Richardson 2009; Moore et al. 2007, 2008; UNICEF 2007; Bradshaw and Richardson 2009) now consider several indicators reflecting the different aspects of children's lives when analyzing how they are faring.

One of the latest developments regarding the dimensions of well-being is the introduction of subjective well-being. Indeed, several recent studies on children (e.g., Aber et al. 2002; Bradshaw et al. 2007; UNICEF 2007) include this additional aspect of well-being, claiming it is as crucial as any other. However, there is still a lack of clear consensus as to which dimensions (and their boundaries) should be considered. As we shall see later on, when comparatively analyzing the works of Land et al. (2001, 2007), Moore et al. (2007, 2008), Bradshaw et al. (2007, 2009) and Bastos et al. (2004, 2008, 2009), the definition and delimitation of these dimensions varies considerably across the studies.

Treating the problem of child well-being as multidimensional and the consequent growth of data on children led to the third, and most recent, trend mentioned previously: the aggregation of indicators into a single composite index. Although aggregating indicators can lead to some opacity as to which are the most critical areas of child well-being (UNICEF 2007), it remains a useful exercise for several reasons. First, it makes measuring progress easier (Ben-Arieh 2008), and, second, it facilitates comparisons between trends across different demographic groups, localities and regions (Ben-Arieh 2008). The studies by Land et al. (2001, 2007), Bradshaw et al. (2007, 2009) or Moore et al. (2007, 2008) were developed along these lines and are today renowned references.

¹ Henceforth, the abbreviation "CRC" will be used when referring to the Convention on the Rights of the Child.

Nevertheless, improvements are still required with regard to the aggregation methodology applied to the indicators, such as the importance each indicator should bear when aggregating them into a single composite index. Most of the existing work in this field considers that there is no valid reason to attribute different weights to each indicator and agreement on a different weighting scheme has yet to be achieved (Hagerty and Land 2007). Hagerty and Land (2007) have demonstrated that, indeed, in the absence of estimates on the importance a population places on certain life aspects, the equal weighting system becomes most appropriate when aggregating information into a single composite index. However, the authors also concluded that, whenever that information is available, it is preferable to use weights derived from surveys built for the purpose of estimating the importance placed by individuals on each indicator (Hagerty and Land 2007).

In what respects the construction of summary indexes still, the ecological model of human development bears one more important implication. Bronfenbrenner and Morris' work on human development suggests that there are "synergistic interdependencies" (Bronfenbrenner and Morris 1998: 999) between the several relevant aspects of children's lives and, for this reason, the effects of these components cannot simply be conceived as additive. This means that interactions between dimensions should be taken into account when constructing a summary index that is intended to measure child well-being. Bradshaw et al. (2007) seem to recognize the existence of such interrelationships, but due to complexity in comparisons between countries, they argue, they opted to leave considerations of this kind out of the construction of their summary index.

Alongside these developments, and also partially inspired by the CRC (where the children's right to be heard is recognized), a discussion on children as agents in their own lives and as agents in the assessment of their own well-being has emerged and spread. Researchers have attempted to appease this issue in several ways. Some authors (e.g., Ridge 2004; Sutton et al. 2007) have focused on understanding children's perspectives on poverty, deprivation and social exclusion. Others (e.g., Hoelscher 2004; Van der Hoek 2005; Redmond 2008, 2009) have focused on how children deal and cope with hardship in their lives, highlighting how they exercise their agency when faced with economic adversity. Other authors still (e.g., Ridge 2004; Van der Hoek 2005; Sutton et al. 2007; Redmond 2009) also draw attention to the need to focus on children as agents of exclusion themselves. The relevance of involving children in the definition and measurement of their own well-being is another aspect that has recently been highlighted (Sutton et al. 2007; Redmond 2008, 2009). In this regard, however, considerable research has yet to be done (Redmond 2009), including guidelines as to how children can be better involved in the measurement of their own well-being. Ben-Arieh (2005) is one of the few authors who dealt with this matter by mentioning the need to make children part of the research design, since studies have clearly shown that children do actually know what is important to them, and should, therefore, be involved in the study and measurement of their own well-being.

It is therefore possible to conclude that, for a proper assessment, several aspects regarding the measurement of child well-being need to be considered:

1. The child should be the unit of analysis;
2. Children's perspectives on their own well-being should be taken into account;
3. Multidimensionality is a requirement;

4. It is desirable to have summary indexes that can adequately represent the overall well-being of children;
5. When constructing these kinds of indexes it is preferable to assign 'real' weights to indicators;
6. Interactions between the different aspects of well-being should also be considered when engaging in such a measurement exercise.

The main purpose of this paper is to review the existing work on the measurement of child well-being through summary indexes (Sect. 2) aiming also to highlight its main shortcomings, along the lines presented above. The conclusions drawn from the literature review are then briefly summarized and additional comments are also made in Sect. 3.

2 Where We Stand on the Measurement of Child Well-Being Through Summary Indexes

In this section we review the most relevant and leading research on the measurement of child well-being through summary indexes. Four studies in particular deserve to be mentioned: the index of child and youth well-being in the United States, by Land et al. (2001, 2007); the index of child well-being in the EU, built by Bradshaw and colleagues (Bradshaw et al. 2007; Bradshaw and Richardson 2009); the microdata child well-being index, by Moore et al. (2007, 2008); and, finally, the child deprivation index by Bastos et al. (2004, 2008) and Bastos and Machado (2009). The analysis of these studies is organized according to the contributions they brought to the field. As such, research by Land et al. (2001; 2007) is mentioned first because it constitutes one of the earliest and most prominent efforts in building a child well-being index for the United States, based on aggregated longitudinal data (collected from several surveys), which enables tracking the evolution and trends of child well-being in the country. The studies by Bradshaw et al. (2007, 2009) come second, with their contribution to the construction of the first aggregated data based child well-being index for the European Union, which has been key to comparisons among European countries. Work by Moore et al. (2007, 2008) is reviewed next, focusing on their prime contribution involving the use of a single microdata survey, which enables more insights than just describing the proportion of children with a particular outcome. Finally, we focus on Bastos et al.'s deprivation index (2004, 2008; Bastos and Machado 2009), which is based on a microdata survey collected from children themselves, having the authors employed an aggregation method which differs from uniform distribution (the method adopted by the other indexes mentioned).

However, before proceeding, a quick review of earlier studies in the field and their contributions to the study and measurement of child well-being is in order.

2.1 Earlier Works on the Measurement of Child Well-Being

The concern with the condition of children is not a new one; several reports and studies on the subject have been published around the world since at the least the 1960s (Ben-Arieh and Goerge 2001). UNICEF alone has published the State of the World's Children report since 1979, and also The Progress of Nations since 1993 (Ben-Arieh 2000; Ben-Arieh and Goerge 2001). However, the 1990s witnessed the most significant rise in interest in child well-being and a remarkable growth in reports and studies on the matter (Ben-Arieh 2000;

Ben-Arieh and Goerge 2001). The global ratification of the CRC in 1989 most definitely played an important role in this rising interest in the monitoring of child welfare (Ben-Arieh 2008).

UNICEF's reports on child well-being have undoubtedly played a major role in this area (Ben-Arieh 2000; Ben-Arieh and Goerge 2001; Ben-Arieh 2008). Although they are multi-topic reports on the entire child population, until recently they mostly dealt with survival issues and, although child oriented, they tended not to use children as the basic unit of analysis (Ben-Arieh and Goerge 2001).

By the early 1990s other international initiatives, reports and studies were developed by international organizations, such as the WHO or the OECD, by national governments and academic groups and, also, by NGOs (Ben-Arieh and Goerge 2001). Many of these were multi-topic, covering several areas of child well-being, but others tended to focus on specific topics (e.g., children's health or education) or specific child population targets (e.g., children at risk or homeless children) (Ben-Arieh and Goerge 2001).

These reports and a large number of the works developed until the end of the 1990s, as well as in the early 21st century (e.g., Brown 1997; Brooks-Gunn and Duncan 1997; Aber et al. 2002; Hoelscher 2004; see also Ben-Arieh and Goerge 2001, for other references), mainly consisted of the compilation of indicators for the several dimensions of child well-being, using primarily the family instead of the child as their basic unit of analysis. Some research has also focused on recommendations concerning the choice of child well-being indicators (e.g., Moore 1997, 1999), and other studies on summarizing the state of the art regarding the measurement of child well-being (Ben-Arieh 2000; Ben-Arieh and Goerge 2001).² However, the growing supply of data on children has led to difficulties in drawing conclusions about the state of children and how it has progressed over time, mainly due to problems in interpreting large batteries of indicators (Ben-Arieh 2008). This has led to more recent efforts by researchers to develop composite summary indexes (Ben-Arieh 2008). The next section reviews some of these works.

2.2 Recent Works on Child Well-Being Indexes

2.2.1 *The Index of Child and Youth Well-Being in the United States*

Land et al.'s work (2001) constitutes an attempt to answer and summarize questions on child indicators and how children are faring in the United States. The authors did so by engaging in what they call a "measurement exercise", that is, the construction of the "Index of Child and Youth Well-Being".

The study starts by reviewing work on the quality of life and major approaches to the concept, to then conclude that seven domains of life are relevant when analyzing adults,

² Other research works could be mentioned at this point, but our aim here is not to go into all that has been done in the field, but rather to provide an overview of the main developments in the measurement of child well-being, leading to this paper's main focus, the construction of composite child well-being indexes. For more on earlier works in this domain, references can be found in Ben-Arieh (2000) and Ben-Arieh and Goerge (2001). For other early works exclusively dedicated to children, see also Cornia and Danziger (Eds.) (1997a, b), Brooks-Gunn et al. (Eds.) (volumes I and II—1997a, b), Micklewright and Stewart (2000), Vleminckx and Smeeding (Eds.) (2001), Bradshaw (Ed.) (2002) or Ridge (2004).

and those same domains, with some adaptations, were applicable to children and youth. The identified domains are:

- material well-being: covers poverty, employment and income;
- health: includes mortality rates and personal health;
- social relationships: assesses single-parent families and changes in home life;
- safety/behavioural concerns: covers engagement in risky activities, such as smoking, drinking and drug abuse;
- productivity/educational attainment: assesses school-related scores;
- place in community: includes school enrolment and civic engagement;
- emotional/spiritual well-being: covers religious activities and suicide rates.

After determining which domains were most relevant, the authors compiled 28 basic indicators of child and youth well-being, based on available national data, and then, after analyzing each indicator in each dimension, constructed the summary index of child and youth well-being, giving all components equal weighting.

Recently, the index was expanded to include 16 new indicators (Land et al. 2007), distributed along the dimensions identified earlier. The approach to the index remained nevertheless the same.

This is a relevant and instructive study on the construction of a child well-being index and also deserves mention because of the use of longitudinal data in the analysis, enabling the tracking of trends in child well-being in the US. On the other hand, one of the main disadvantages to the study is, as in many others, the use of aggregated data from existing datasets, which may hinder some conclusions. Namely, aggregated data can only be used to describe the proportion of children with a particular outcome, as opposed to using microdata, which can determine whether an individual child has one or more particular outcomes, hence, giving more meaning to the child-centred perspective (Moore et al. 2007, 2008). Also, the data considered in the construction of this index has different origins; it consists of an array of indicators compiled from different surveys (Land et al. 2001, 2007), which means that the sample is not stable throughout the set of indicators. Additionally, although many of the surveys on which the authors based their work take children as the unit of analysis, and although in some children are actually the respondents, children's own views about their well-being are not properly considered. As the authors themselves mentioned (Land et al. 2001), only two of the 28 indicators were based on subjective well-being responses, and these were furthermore based on responses from the children's parents and not from children themselves. Moreover, equal weights were assumed for each of the indicators used in the index's construction and no interactions between dimensions were considered, nor indeed was their existence even acknowledged.

2.2.2 *The Index of Child Well-Being in the EU*

The index of child well-being is the result of work by Bradshaw et al. (2007) and represents an attempt to summarize and monitor child well-being at the European level, based on the available data for the EU25.

The analysis is conducted on a rights-based and multidimensional understanding of child well-being, where the CRC and the ecological human development model occupy a special place. Taking these theoretical frameworks as their background, the authors analyzed child well-being in eight clusters, which include relevant topics to children from their

own point of view and also topics pertaining to the adult's responsibility for the well-being of children, covering 23 domains and a total of 51 indicators. The clusters and domains are:

- material situation: provides information on child income poverty, deprivation and parental worklessness;
- housing: covers overcrowding, local environment and space, and housing problems;
- health: addresses children's health at birth, immunization, and health behaviour;
- subjective well-being: inquires about self-defined health, personal well-being, and well-being at school;
- education: covers educational attainment, educational participation, and youth labour market outcomes from education;
- children's relationships: provides information about family structure, relationships with parents, and relationships with peers;
- civic participation: addresses participation in civic activities and political interest;
- risk and safety: inquires about child mortality, risky behaviour, and experiences of violence.

In the aggregation stage, the indicators were combined to form domains, domains were combined to form clusters, and, finally, clusters were combined to form the overall index. The authors stated to have found no theoretical or empirical justification for weighting, and hence, aggregation was carried out assuming equal weights for all variables (Bradshaw et al. 2007).

More recently, as a result of the availability of new data, the index was updated and expanded to the EU27 countries, plus Norway and Iceland (Bradshaw and Richardson 2009). The more up-to-date data does not include information on citizenship, so the authors dropped this domain, but the methodology used in the construction of the index remained the same. The main differences from the previous index consisted in changes and improvements in the indicators used in accordance with criticisms and reflections on the previous list (Bradshaw and Richardson 2009), namely, differences in the choice of indicators, where the authors sought to use those representing what children think and feel about their lives (Bradshaw and Richardson 2009). This is the case of the indicators chosen for subjective well-being and the children's relationship dimensions.

This work constitutes an important step forward in the child indicators movement, since, instead of just collecting indicators, the authors attempted to come up with a single composite number that summarizes the situation of children. However, at least two shortcomings in Bradshaw and his colleagues' work need mentioning, one related with data availability and the other with the methodology the authors followed.

As mentioned previously, the child well-being index in the EU is based on previously published surveys and, thus, aggregated data is used to analyze child well-being. Also, since indicators are collected from different surveys, namely Health Behaviour in School-Aged Children (HBSC) and the OECD Programme for International Student Assessment (PISA), the sample of children considered is not always the same. Additionally, the data used is often not available for the same years and for the same child age group (HBSC focuses on children aged 11, 13 and 15, whereas the PISA is based on 15 and 16 year-olds), and in some cases child-centred indicators are combined with indicators at the household level. This is the case, for example, of the measurement of deprivation, where the authors combine the percentage of households with children reporting a lack of consumer durables with indicators of educational deprivation from PISA, which uses children as its unit of analysis (Bradshaw and Richardson 2009). Finally, since the surveys used serve specific purposes (namely, the HBSC assesses children's health behaviours, and the

PISA children's knowledge and skills acquired through education), some elements of child well-being are misrepresented or not represented at all (Bradshaw et al. 2007). For example, in the material situation dimension, the authors argue it would be desirable to have data on the relative child poverty rate, absolute child poverty rate, poverty gaps for children, an indicator of persistent poverty for children, and a subjective poverty measure, but only two of these measure are available, the relative child poverty rate and the relative average poverty gap (Bradshaw et al. 2007).

Moreover, in spite of the authors' most recent effort to include indicators that take into account children's views, given that this type of data is not available in the surveys, the truth is that the task was only accomplished residually. As mentioned earlier, very few of the indicators used truly translate children's thoughts on their own lives. Furthermore, in the aggregation stage, Bradshaw and his colleagues assumed that each indicator and each dimension have the exact same weight, meaning that each indicator and each dimension contributes in the exact same way to child well-being, which is most probably not the case. Another shortcoming of the methods employed by the authors is that the dimensions are taken as completely independent from each other. Although recognizing the existence of such interrelationships, the authors opted to leave out considerations of this order in the construction of the summary index, due to the ensuing complexity in comparisons between countries (Bradshaw et al. 2007).

2.2.3 A Microdata Child Well-Being Index

Bearing in mind the criticisms about the aggregated data generally used in studies on child well-being indicators and indexes, Moore et al. (2007) developed their work using representative microdata of U. S. children, and then proceeded to compare their results with those of the most relevant studies on the matter in the US based on aggregated data. The authors analyzed other studies on child well-being and proposed their own indicators and index based on the National Survey of America's Families (NSAF).

A key feature of this work is the distinction that Moore and colleagues established between domains of well-being and contextual variables, where the first are related to the question of how children are faring and the second pertain to aspects of children's environment that influence their well-being (Moore et al. 2007). Variables were then selected from the NSAF according to the most commonly used domains of well-being. The same procedure was adopted for the selection of contextual variables (Moore et al. 2007). Three domains of well-being were identified:

- child and health safety, lodging indicators on health status and sports practices;
- child educational achievement and cognitive development, which includes indicators on school engagement;
- social and emotional child development, where several indicators on psychological well-being and behaviour are used;
- and two types of contextual variables:
- family processes, which includes indicators on religious services attendance, community engagement, child-parent relationship;
- family demographic, social and economic status, where indicators such as family type and income are explored.

A total of 17 indicators were used to summarize the child well-being dimension and 12 to characterize the contextual dimension. At the micro-level, an individual well-being

index was then calculated and the contextual variables were added to form an overall condition of children index. To obtain measures for the United States' child population as a whole, the micro-level index scores were averaged.

More recently, improvements in the definition of domains were introduced, which led Moore et al. (2008) to consider four key individual child well-being domains and three contextual well-being domains. The domains were defined as follows (Moore et al. 2008):

- individual child well-being:
 - physical health: refers to the biological status of individuals and includes overall health and functioning, weight, and involvement in a healthy lifestyle;
 - psychological health: includes how individuals think about themselves and their future, how they handle and cope with situations and being free of problems;
 - social health: refers to several elements related to how well an individual is able to get along in the social ecology, including basic skills, engagement in constructive activities, ability to relate emotionally to people and make friends;
 - educational/intellectual: includes skills related to a child's ability to learn, remember, reason adequately for their age, being able to apply cognitive skills to be productive and engaged in school;
- contextual well-being:
 - family: includes the structure of the family, resources in the home, and relationships between the individuals;
 - community: neighbourhoods and/or communities are the immediate context in which individuals and families interact and engage with others and with institutions of society, where neighbourhoods are both spatial and social units;
 - socio-demographic: social and economic features of families which affect child well-being.

The research was carried out based now on the National Survey of Children's Health (NSCH), from which 69 indicators were taken and included in the computation of the indexes for each domain and for the well-being indexes. Two composites indexes were calculated, a child well-being index, created by summing the four individual well-being domains and a contextual well-being index created by summing the three context domains. Opposed to Moore et al.'s previous work (Moore et al. 2007), the two indexes were analyzed separately in order to distinguish trends in child well-being from trends in context (Moore et al. 2008).

In both the NSAF and the NSCH indexes, items are equally weighted within sub-domains and sub-domains are also equally weighted when aggregated into the overall index.

As pointed out above, this research has two distinctive and important features, the use of microdata and the breakdown of child well-being into two dimensions, individual well-being and contextual well-being; the first alone puts it quite ahead of previous studies, generally based on aggregated data. Nevertheless, some shortcomings can be pointed out. The major limitations of this study are related with the data surveys used. The two surveys, NSAF and NSCH, were developed for specific purposes, the first for the study of welfare reform and devolution, and the second for the purpose of monitoring the health status of children and thus, in both cases, the list of indicators is somewhat incomplete and also some relevant dimensions are actually missing (Moore et al. 2007, 2008). For example, in

the NSCH there are very few measures related to school context and hence, although schools are considered an important contextual domain, it is neglected in this study (Moore et al. 2008). Also, since parents are the respondents in both surveys (NSAF and NSCH), the children's own views about their well-being are disregarded. Additionally, as was the case of the indexes reviewed earlier, an equal weighting system is applied in the aggregation stage of the index construction and no interactions between dimensions are acknowledged or considered.

2.2.4 A Multidimensional Measurement of Poverty

Acknowledging that most studies about children focus on their families, Bastos et al. (2004, 2008) and Bastos and Machado (2009) chose to measure child poverty based not only on family income but also on what they call "child deprivation". In this line, a child suffers from income poverty if he/she is a member of a family with scarce income, and is deprived if he/she does not have a consumption pattern that follows the generally accepted norm (Bastos et al. 2004). To measure child deprivation, five categories of variables were defined (Bastos et al. 2004, 2008):

- family living conditions: number of family members, education level of parents, subjective perception of the family's economic resources;
- housing: physical conditions of the house, infrastructures and neighbourhood;
- health: nutrition, medical care and child's perception of his/her own health conditions;
- education: school success, family support and child's perception of school;
- social integration: extra-curricular activities, playtime, holidays, mobility, favourite games and child's perception of the urban space.

A counting deprivation index was then computed where items were considered to have equal weighting, and results were analyzed together with income poverty.

More recently, Bastos and Machado (2009) developed a notion of deprivation defined as a state of well-being deficit in the most fundamental domains to the child's functioning. In this study, the domains identified were reduced to four: education, health, housing and social integration. Individual deprivation for each indicator was measured in terms of degree according to a membership function (Bastos and Machado 2009). Here the authors applied a different aggregation method concerning the weights given to each indicator. The weights were defined as a log of an inverse function of the average deprivation level, placing more importance on indicators in which deprivation is not widespread—namely, in the education dimension, child's positive perception of school, in the health dimension, regular bathing, in the housing dimension, adequate housing, and in the social integration dimension, practice of extracurricular activities, come up as the most relevant indicators and, therefore, with higher weights in their respective dimensions—and, therefore, emphasizing items for which non-possession translates, the authors argue, into a strong feeling of deprivation (Bastos and Machado 2009). A composite index of deprivation for the whole population was then calculated as a weighted sum of the membership average value for each indicator, allowing for the evaluation of the deprivation intensity.

The studies just described (Bastos et al. 2004, 2008; Bastos and Machado 2009) were carried out with sample surveys applied to children randomly selected from students attending the third and fourth years of primary education in public schools in the area of Lisbon (Portugal). The children themselves answered the questionnaire and some indicators translating the children's own views about their well-being were included. Examples

Table 1 Comparing Indexes: dimensions, contributions and limitations/general characteristics

Dimensions, Indicators, Contributions and Limitations/General characteristics	The Child and Youth Well-Being Index in the US (2001) – Land et al.	Expanded Child and Youth Well-Being Index in the US (2007) – Land et al.	Index of Child Well-Being in the EU (2007) – Bradshaw et al.	Index of Child Well-being in Europe (2009) – Bradshaw and Richardson	A Microdata Child Well-Being Index (NSAF) (2007) – Moore et al.	A Microdata Child Well-Being Index (NSCH) (2008) – Moore et al.	A deprivation Index (2008) – Bastos et al.	A Composite Deprivation Index (2009) – Bastos and Machado
<i>Material situation/ Socio-economic context</i>	X	X	X	X	X	X	X	
<i>Housing and environmental/ Neighbourhood Context</i>			X	X		X	X	X
<i>Health/ Physical Health</i>	X	X	X	X	X	X	X	X
<i>Education/ Cognitive achievement</i>	X	X	X	X	X	X	X	X
<i>Social relationships/ Social health</i>	X	X	X	X	X	X	X	X
<i>Subjective well-being/ Psychological well-being</i>	X	X	X	X	X	X		
<i>Risk and safety/ Behavioural concerns</i>	X	X	X	X				
<i>Civic participation/ Place in community</i>	X	X	X					
<i>Other domains: Family processes/ Family context</i>					X	X		
Total number of indicators	28	44	51	43	29	69	12	20
Contributions	Introduction of a summary index for the United States using longitudinal data		Introduction of a summary index for the European Union which enables comparisons between countries		Introduction of a summary index for the United States using microdata		Introduction of a summary index for a specific area of Portugal taking into consideration children's perspectives	
Limitations/General characteristics	Type of data used				Aggregated		Microdata	
	Children's perspectives				Generally overlooked			Not overlooked
	Weighting scheme				Uniform			Non-uniform
	Interactions between dimensions				No interactions between dimensions			

are the child's positive perception of school or positive perception of the neighbourhood (Bastos et al. 2004, 2008; Bastos and Machado 2009). In this sense, and taking the earlier criticisms into account (i.e., lack of children's views and uniform weighting scheme), the work developed by Bastos and her colleagues is of considerable importance in the child literature at the international level and particularly in Portugal, as it remains a rather neglected subject in this country (Bastos et al. 2008).

Although one of the strengths of Bastos and Machado's (2009) most recent work consists in the aggregation method, where a non-uniform weighting system is used, the method employed is still an imperfect approximation to real weights. As previously described, the weights were defined according to possession/non-possession of the items considered as indicators for each dimension. So if most of the children were not deprived in a certain indicator, that indicator was attributed the highest weight within its dimension (this was the case for child's positive perception of school, regular bathing, adequate housing and practice of extra-curricular activities). However, this methodology does not produce weights that represent how relevant those items actually are to children and to their well-being, hence failing to meet Hagerty and Land's (2007) recommendations concerning weighing systems. Moreover, as is the case with the other indexes mentioned previously, interactions between dimensions are not recognized.

Additionally, given the limited cohort and geographical scope of the study (it focuses on children attending two years of the primary public education, the third and fourth grades, and of a specific (high developed) area of Portugal, Lisbon), it would be interesting to assess whether the conclusions would remain the same when applying similar methods and the index across the country and to a larger sample of students, including students enrolled in more advanced schooling years (e.g., 5th and 6th grades), from public and private schools located in urban and rural areas. Studies have demonstrated (see, for example, Fan and Chen 1999; Alderman et al. 2001; Reeves and Bylund 2005; Lubienski and Lubienski

2006) that differences do exist between students attending rural versus urban schools and private versus public schools, not only in educational achievement but also in what concerns the socio-demographic characteristics of the students, and hence this diversity should be considered and compared when analyzing child well-being.

3 Summary and Additional Comments

Section 2 allowed us to conclude that the analyzed child well-being indexes bear some limitations regardless their important contributions to the research field. Comments on both these aspects were already made and are summarized in Table 1.³ Now we move to some other final considerations.

A comparative analysis of the indexes reveals that the number of dimensions considered varies greatly, from four dimensions (Bastos and Machado 2009) to a total of eight dimensions (Bradshaw et al. 2007).

Additionally, in spite of our efforts to identify common domains, as summarized in Table 1, the indicators considered in each dimension for each of the indexes are not always the same. Also, it often happens that, for some authors, one specific indicator is considered to belong to one dimension, and for other authors, a similar indicator is placed in a completely different dimension. For example, this is the case of school enrolment indicators, placed in the education domain by most authors but considered by Land et al. (2001, 2007) as indicators characterizing the civic participation dimension. Also with health care indicators, placed in the health dimension by Bastos et al. (2004, 2008, 2009), but regarded by Moore et al. (2007, 2008) as belonging to the family processes domain, even though there is an independent health domain in their index as well. The total number of indicators used in each of the indexes also varies greatly, ranging from 12 to 69 indicators.

Hence, it seems clear that there is no definite rule for defining dimensions and their boundaries. This might be explained by the fact that authors make use of different theoretical backgrounds. Being so, we argue that it would be desirable to find a common and consensual framework to help more clearly defining dimensions and indicators, allowing also for the construction of summary indexes applicable across regions and countries, making comparisons possible and more accurate.

In summary, we can conclude that, in spite of evident progress, research on the measurement of child well-being is still evolving, particularly with regard to composite measures, and regardless the valuable contributions of the works here reviewed, improvements to the existing frameworks are required. Although constituting a review essay, by identifying the main shortcomings of the most recent studies on child well-being indexes, the present work offers some pointers concerning the directions future research on the field should take.

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Appendix

See Table 2.

³ See also Table 2 in the Appendix.

Table 2 Methods and interpretation, contributions and limitations of the Indexes

<p>Methods, contributions and limitations</p> <p>The Child and Youth Well-being index in the US (2001)—Land et al.</p> <p>Expanded Child Well-being index in the US (2007)—Land et al.</p> <p>Index of child well-being in the EU (2007)—Bradshaw et al.</p> <p>Index of child well-being in Europe (2009)—Bradshaw and Richardson</p> <p>A Microdata child well-being index (NSAF) (2007)—Moore et al.</p> <p>A Microdata child well-being index (NSCH) (2008)—Moore et al.</p> <p>A Deprivation index (2008)—Bastos et al.</p> <p>A composite deprivation index (2009)—Bastos and Machado</p>	<p>Seven domains are considered</p> <p>Each of the time series of the key indicators is indexed by a base year (1975 or 1985), where the base year is assigned a value of 100 and subsequent values of the indicator are taken as percentage changes between the base year and each subsequent year for each item</p> <p>To obtain an index score for each domain, indicator scores are summed and divided by the number of items in the index domain</p> <p>To obtain the composite index, the mean of the index values across domains is calculated</p>	<p>Eight domains are considered</p> <p>Indicators are combined to form domains, domains combined to form clusters, and clusters combined to form the overall index</p> <p>In order to obtain rank order and degree of dispersion, calculate z scores for each indicator and average the z scores to obtain an average score for a domain; the averaged z score for the domains were averaged to create a cluster average and the averages of the cluster z scores were averaged to obtain the overall index score</p>	<p>Seven domains are considered</p> <p>Each of the time series of the key indicators is indexed by a base year (1975 or 1985), where the base year is assigned a value of 100 and subsequent values of the indicator are taken as percentage changes between the base year and each subsequent year for each item</p> <p>To obtain an index score for each domain, indicator scores are summed and divided by the number of items in the index domain</p> <p>To obtain the composite index, the mean of the index values across domains is calculated</p>	<p>Three well-being domains and two contextual domains are considered</p> <p>Thresholds are set for problematic levels on each individual item</p> <p>Each child has a value of 1 or 0 for each component, 1 meaning negative scores and 0 meaning positive scores</p> <p>A overall child well-being index score is obtained by summing the 3 well-being scores</p> <p>To obtain the overall condition of children index, the two contextual domains are added to the child well-being index</p> <p>The micro-level scores are averaged to obtain summary measures for the U.S. child population</p>	<p>Four well-being domains and three contextual domains are considered.</p> <p>Cut-off points are defined for each item</p> <p>Each child receives for each component a score of 0 or 1, where 0 means no well-being and 1 means well-being</p> <p>The child well-being index is created by summing the 4 individual well-being domain scores.</p> <p>The contextual well-being index is created by summing the 3 context domain scores</p>	<p>Five domains are considered.</p> <p>Thresholds for each indicator are set for each child.</p> <p>Indicators are then organized into dimensions</p>	<p>Four domains are considered</p> <p>Deprivation for each indicator is quantified in terms of degree</p> <p>The summary measure of deprivation for the whole population is a weighted sum of the membership medium value for each indicator</p> <p>The index can also be defined for each dimension of well-being by summing the correspondent indicators</p>
<p><i>Methods and interpretation</i></p>							

Table 2 continued

<p>Methods, contributions and limitations</p>	<p>The Child and Youth Well-being index in the US (2001)—Land et al.</p>	<p>Expanded Child and Youth Well-being index in the US (2007)—Land et al.</p>	<p>Index of child well-being in the EU (2007)—Bradshaw et al.</p>	<p>Index of child well-being in Europe (2009)—Bradshaw and Richardson</p>	<p>A Microdata child well-being index (NSAF) (2007)—Moore et al.</p>	<p>A Microdata child well-being index (NSCH) (2008)—Moore et al.</p>	<p>A Deprivation index (2008)—Bastos et al.</p>	<p>A composite deprivation index (2009)—Bastos and Machado</p>
<p><i>Weighting scheme</i></p>								
<p>Equal weights are assumed throughout the calculation of the indexes</p>			<p>Equal weights are assumed throughout the calculation of the indexes</p>			<p>Equal weights are assumed throughout the calculation of the index</p>		
<p><i>Interpretation</i></p>								
<p>A value greater (lesser) than 100 means the social condition measured has improved (deteriorated)</p>			<p>The average of the domains represents overall child well-being and countries are ranked accordingly</p>			<p>Higher scores indicate higher average number of problems</p>		
<p>The index is a counting indicator, which can vary between 0 and 12. The bigger the index the more intense is the level of child deprivation</p>								
<p>The index varies between 0 and 1 and evaluates deprivation intensity</p>								

Table 2 continued

Methods, contributions and limitations	The Child and Youth Well-being index in the US (2001)—Land et al. (2007)—Land et al. (2007)—Land et al. (2007)	Expanded Child and Youth Well-being index in the US (2007)—Land et al. (2007)	Index of child well-being in the EU (2007)—Bradshaw et al. (2009)—Bradshaw and Richardson (2009)	A Microdata child well-being index (NSAF) (2007)—Moore et al. (2008)	A Microdata child well-being index (NSCH) (2008)—Moore et al. (2008)	A Deprivation index (2008)—Bastos et al. (2009)—Bastos and Machado	A composite deprivation index (2009)—Bastos and Machado
<i>Contributions</i>	Constitutes one of the first efforts to summarize child well-being in a single composite index for the United States, using longitudinal data and tracking child well-being over time	Constitutes one of the first efforts to summarize child well-being in a single composite index for the European Union, with country ranking according to the results obtained	Constitutes one of the first efforts to summarize child well-being in a single composite index for the United States using microdata, giving new meaning to a child-centred perspective of well-being	Constitutes one of the first efforts to summarize child well-being in a single composite index for a specific area of Portugal, using microdata collected directly from children and for the specific purpose of measuring their global well-being, hence taking in consideration children's perspectives on their well-being	Constitutes one of the first efforts to summarize child well-being in a single composite index for a specific area of Portugal, using microdata collected directly from children and for the specific purpose of measuring their global well-being, hence taking in consideration children's perspectives on their well-being	Constitutes one of the first efforts to summarize child well-being in a single composite index for a specific area of Portugal, using microdata collected directly from children and for the specific purpose of measuring their global well-being, hence taking in consideration children's perspectives on their well-being	Introduces a new weighting scheme, different from equal weighting, placing more importance on indicators in which deprivation is not widespread

Table 2 continued

<p>Methods, contributions and limitations</p> <p>The Child and Youth Well-being index in the US (2001)—Land et al. (2007)—Land et al.</p> <p>Expanded Child and Youth Well-being index in the US (2007)—Land et al.</p> <p>Index of child well-being in the EU (2007)—Bradshaw et al.</p> <p>Index of child well-being in Europe (2009)—Bradshaw and Richardson</p> <p>A Microdata child well-being index (NSAF) (2007)—Moore et al.</p> <p>A Microdata child well-being index (NSCH) (2008)—Moore et al.</p> <p>A Deprivation index (2008)—Bastos et al.</p> <p>A composite deprivation index (2009)—Bastos and Machado</p>	<p><i>Survey limitations</i></p> <p>The index is based on aggregated data and on different surveys, not built for the purpose of measuring overall child well-being</p> <p><i>Limited account of children's perspectives</i></p> <p>Children's perspectives on their well-being are not properly taken into account due to lack of indicators</p> <p><i>Weighting scheme</i></p> <p>An uniform weighting scheme is used to aggregate indicators</p>	<p>The index is based on surveys not built for the purpose of measuring overall child well-being</p> <p>Children's perspectives on their well-being are not properly taken into account due to the fact that children were not directly surveyed</p> <p>An uniform weighting scheme is used to aggregate indicators</p> <p>An uniform weighting scheme is used to aggregate indicators</p> <p>A non-uniform weighting scheme is used but it can be considered an imperfect approach to the real weights of indicators since it does not translate the true relevance items have for children's well-being</p>
<p><i>Limitations</i></p>	<p>The survey covers a limited population of Portuguese children, not representative of the country's child population</p>	<p>No interactions between dimensions are taken into account</p>
<p><i>Interactions between dimensions</i></p>	<p>No interactions between dimensions are taken into account</p>	<p>No interactions between dimensions are taken into account</p>

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