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**A WEIGHTED MULTIDIMENSIONAL INDEX OF CHILD  
WELL-BEING WHICH INCORPORATES CHILDREN'S  
INDIVIDUAL PERCEPTIONS**

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**A weighted multidimensional index of child well-being which incorporates children's  
individual perceptions**

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**Abstract**

It has been a decade since a landmark piece of work on child well-being measurement based on a summary index was developed in the United States, the Index of Child and Youth Well-Being. Several research studies, both in the U.S. and Europe, followed on from this work. However, improvements in the methodologies used by researchers are still required, namely with regard to incorporating children's own perspectives of their well-being, as well as involving them in the measurement process. In the present paper, a composite index is proposed in order to try overcoming three of the main methodological limitations of current studies: the short account for children's perceptions on their own well-being, the use of aggregated data, and the use of uniform and other weighting schemes that do not translate the real weights of individual indicators.

*JEL-Code:* I31; I32

*Keywords:* child well-being, measurement, child indicators, methods.

## 1. Introduction

Concern with child well-being and its measurement is not new (Ben-Arieh and Goerge, 2001). This field of research has, however, experienced several changes and important developments over time, where the measurement of child well-being through summary indexes has become one of the most recent trends (Ben-Arieh, 2008). Although some limitations remain – namely measuring children’s perspectives of their own well-being is still not duly considered –, data on children has been growing rapidly (Ben-Arieh, 2008; Fernandes et al., forthcoming). This increase in the data available has led to some difficulties in drawing conclusions about how children are faring, especially when several dimensions of their well-being are considered, and that is basically why researchers have been called upon to build single summary indexes, in order to simplify the interpretation of data which is now abundant (Ben-Arieh, 2008; Moore et al., 2007, 2008).

It has been a decade since a landmark piece of work on child well-being measurement based on a summary index was developed in the United States, the Index of Child and Youth Well-Being by Land and colleagues (Land et al., 2001). Several research studies both in the U.S. and Europe followed on from this work, namely those of Land et al. (2007), Bradshaw et al. (2007, 2009), Moore et al. (2007, 2008) and Bastos et al. (2004, 2008, 2009).<sup>1</sup>

However, improvements to the methodologies used by these authors are still required, be it because of the use of aggregated data, as is the case of Land et al. (2001, 2007) and Bradshaw et al. (2007, 2009), or because children’s perspectives are generally overlooked, which is, for example, the case of Moore et al. (2007, 2008), who use microdata, but collected from parents and not from children. Another shortcoming, with the exception of very few papers, such as that by Bastos and Machado (2009), has to do with the fact that equal weights are assigned to each indicator used in the construction of the index.<sup>2</sup>

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<sup>1</sup> A thorough analysis of the several methodologies is provided in Fernandes et al. (2011).

<sup>2</sup> It should be noted that none of the abovementioned studies consider interactions between the dimensions of well-being that, according to Bronfenbrenner and Morris (1998), are likely to exist. Bronfenbrenner and Morris’s (1998) ecological model of human development considers that the main effects on children’s outcomes are likely to be the result of interactions between factors. Although comprising a limitation to the existing indexes in this area, developing an interaction model between dimensions of well-being is beyond the (necessarily restricted) scope of the present research work. Nevertheless, some comments on this matter are made in the concluding section.

This paper primarily aims to draw the methodological basis for a new summary child well-being index which takes into account, and tries going beyond, the major limitations of previous studies, and where children's views on their own well-being assume a central role.

Two types of questionnaires are needed to collect data for this type of index. One questionnaire focuses on the measure of objective items, which are considered to characterize child well-being, where the parents of the targeted children are the respondents. The second questionnaire is administered to children themselves who are asked about the relative importance they give to each of the items considered relevant for their well-being. The weights for aggregating the components of children's well-being into the summary index come from the data collected in this second questionnaire.

This paper is, thus, intended to contribute to the theory and methods used in the construction of summary child well-being indexes and to demonstrate the relevance of taking into account children's perspectives on their own well-being in the measurement process. Bearing this goal in mind, the paper is structured as follow: first, the theoretical foundations underlying the choice of which dimensions of children's well-being to include are described (Section 2); next, the use of a weighting scheme different from a uniform one is justified and the way to achieve it is explored (Section 3); finally, Section 4 puts forward a summary of our proposal and some concluding remarks.

## **2. Theoretical basis for selecting the dimensions to be included in the child well-being index**

### **2.1. The current consensus: a multidimensional approach**

Following the general consensus in current work on child well-being indexes (e.g., Land et al., 2001, 2007; Moore et al, 2007, 2008; Bradshaw et al., 2007; Bastos et al., 2008; Bastos and Machado, 2009; Bradshaw and Richardson, 2009; for a survey, see Fernandes et al., forthcoming), a multidimensional approach is also here. This being said it is necessary to specify which dimensions are to be considered in order to assess child well-being and on what basis the choice of those dimensions is grounded.

We consider here two types of foundations for the choice of these dimensions:

1. A normative foundation, corresponding to the universal social ideal, enshrined in the United Nations' Convention on the Rights of the Child (1989);

2. A positive foundation, corresponding to a model of child psychological development, proposed by Bronfenbrenner and Morris (1998).

### **2.1.1. A normative foundation: the United Nation's Convention on the Rights of the Child**

The United Nations' Convention on the Rights of the Child (CRC, 1989) is a normative framework establishing children's rights with relatively widespread social consensus in current days. The rights advocated by this convention can be considered as those that many contemporary societies believe are required to ensure the well-being of children. Thus, this convention provides a normative grounding which is unlike to raise much criticism when looking to assess child well-being.

The CRC basically addresses human rights placing the child at the centre of its concerns, and follows an holistic approach, which means that ensuring the realization of children's rights requires taking into consideration all the relevant areas of their lives (United Nations, 1989; Pais, 1999).

The CRC advocates four general principles (United Nations, 1989; Pais, 1999). The first (Article 2) states non-discrimination, irrespective of race, colour, gender, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. This implies that data on child well-being should be disaggregated by gender, age, ethnic, economic and geographic group (Pais, 1999).

The second principle (Article 3) determines that the child's best interest should be a major concern, contributing to the perception of the child as a citizen in his or her own right (Pais, 1999). This implies that the child should be the unit of analysis when analyzing his/her well-being.

The third principle (Article 6) states children's inherent right to life and determines the obligation to ensure, to the maximum extent possible, the child's survival and development. This reflects the holistic approach of the CRC (Pais, 1999), since it points to the complexity of children's lives and, hence, to the need for multidimensionality.

Finally, the fourth principle (Article 12) determines respect for the views of the child. Children have the right to express themselves freely and their views should be taken into consideration in

matters that affect them (Pais, 1999; Bradshaw et al., 2006, 2007; Ben-Arieh, 2008). As mentioned earlier, the main purpose of this paper is to take this principle into consideration.

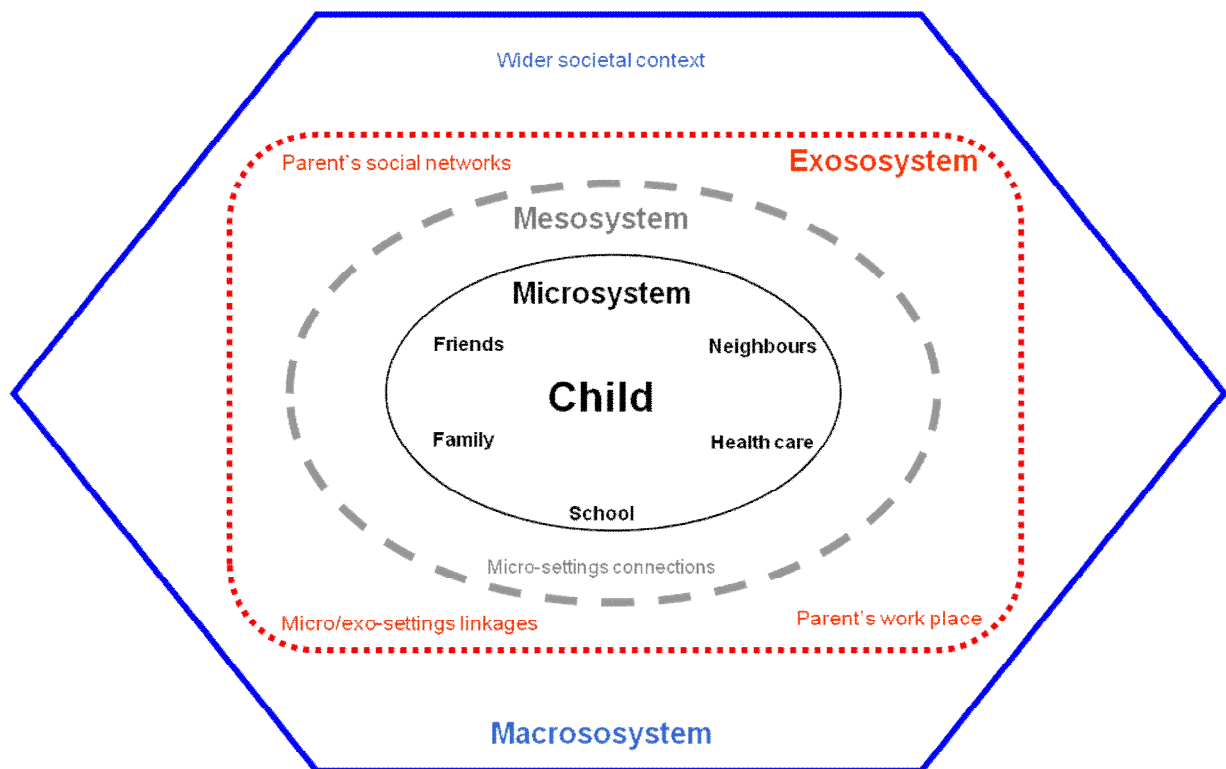
The CRC also elaborates on thematic areas such as children's civil rights and freedoms, family environment and alternative care, basic health and welfare, education, leisure and culture activities (Pais, 1999).

Hence, the CRC is anchored in an understanding of children's well-being as the realization of children's rights. It takes children as the unit of analysis and calls for more data on their well-being, while also highlighting a breadth of topics and issues that need to be covered when assessing children's well-being. Finally, it stresses the dual status children should have in society: they are dependent on their families, and other entities such as schools and communities, but they are also members of society in their own right (Ben-Arieh, 2000, 2008; Hoelscher, 2004; Bradshaw et al. 2006, 2007).

### **2.1.2. A positive foundation: the ecological model of human development**

It is today recognized that children's psychological development and the context in which it takes place influences their well-being. The ecological model of human development (Bronfenbrenner, 1977, 1979, 1994; Bronfenbrenner and Morris, 1998) is a useful framework to understand this influence.

The ecological model environment "is conceived as a set of nested structures, each inside the other like a set of Russian dolls" (Bronfenbrenner, 1994: 39) – see Figure 1. Children's psychological development occurs within four concentric circles of environmental influence with which they interact (Bronfenbrenner, 1994; Bronfenbrenner and Morris, 1998; Bradshaw et al., 2006, 2007; Ben-Arieh, 2008). The immediate environment of interaction, the microsystem, is the level of most direct influence on children. It includes settings such as family, friends, neighbours, school, health care, etc. The mesosystem includes the connections between the microsystems, such as between family and school. The exosystem comprises linkages between settings where at least one does not directly include the child but exerts indirect influence on him/her. Examples are parent's work place or parent's social networks. Finally, the macrosystem comprises the most distant factors, the wider societal context, the "societal blueprint for a particular culture or subculture" (Bronfenbrenner, 1994: 40).



**Figure 1:** Systems of the ecological model of human development

These systems are dynamic and interdependent, exerting influence on each other and undergoing change over time (Lippman, 2004; Bradshaw et al., 2006, 2007; Ben-Arieh, 2008).

This model can provide the basis to define which dimensions should be considered as relevant in shaping children's well-being. For this reason, several recent studies on this topic (e.g., Bradshaw et al., 2006, 2007; Moore and Vandivere, 2007; Ben-Arieh, 2008) have made reference to this model and it also serves as the starting point in our study.

## 2.2. Choosing the dimensions of child well-being

Following Bronfenbrenner and Morris' (1998) considerations, the microsystem is the level with the strongest impact on children, since it is where children spend their time and interact the most among themselves and with other people (Bradshaw et al., 2006). This being said, to have the full picture of the settings which most greatly and directly influence child well-being, it is helpful to take a closer look at what characterizes the microsystem level.

According to Bronfenbrenner and Morris (1998), human development happens through processes of interaction between a human being and the persons, objects, and symbols in their immediate

external environment. These interactions in the immediate environment are designated as proximal processes. The power and direction of the proximal processes vary systematically as a function of the characteristics of the developing person, of the environment, of the nature of the developmental outcomes, and occur over time (Bronfenbrenner and Morris, 1998). These are the main components of the model at the microsystem level. In what follows, special attention will be given to the first three: proximal processes, person's characteristics, and environment.

The main individuals with whom young children interact are, in general, their parents (or the people that are in charge of them). As children get older, other people such as caregivers, relatives, siblings, peers, teachers, close friends and so on, come into play, to exert influence on their development as well (Bronfenbrenner and Morris, 1998). Interaction with objects and symbols - such as playing with toys, working on hobbies, or reading - also plays an important role in developmental outcomes (Bronfenbrenner and Morris, 1998). According to Bronfenbrenner and Morris (1998), several studies have shown<sup>3</sup> that these proximal processes appear as the most important force influencing development outcomes, but, at the same time, their impact on child development varies according to what the authors call "person" (person's characteristics) and "context" (environmental context) factors. So the impacts on child psychological development of personal characteristics and context, through proximal processes, should not be conceived simply as additive.

Proximal processes and their relationship with personal characteristics and context happen at the microsystem level which includes several settings. According to Bronfenbrenner and Morris (1998), the family setting is the most relevant, followed by a whole range of others, namely: friend/peer groups, neighbourhoods, health care, and school (see also Bradshaw et al., 2007; Ben-Arieh, 2008). Children influence and are influenced most directly by these settings. We will consider here that these settings are the basis from which to select the relevant dimensions of child well-being.

Based on the settings mentioned above, we argue that family, neighbourhood, school and health possibly encompass the largest part of children's lives, since, for example, it would not be inaccurate to assume that children's interactions with friends happen most often at school or in their neighbourhood. Within each of these settings we can find proximal processes and/or context

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<sup>3</sup> Full references are given in Bronfenbrenner and Morris (1998).



variables that exert influence on children's lives. Both can be seen as comprising different dimensions of child well-being for each of the settings considered. Additionally, since children's personal characteristics have influence on their own well-being, factors such as their physical and psychological traits have to be taken into account. It should be noted, though, that some of these features per se - particularly the physical ones - may not directly imply constraints to the child's development and well-being; what they represent is disparity in the biological resources available for a child to engage in activities (Bronfenbrenner and Morris, 1998). Put another way, they represent risk factors (Bronfenbrenner and Morris, 1998). This goes for any of the physical psychological/behavioural factors, that is, they all represent risk factors to well-being. Additionally, we have to be aware that personal characteristics play a dual role in children's lives, in the sense that if, on the one hand, they influence child development, on the other, they can also be regarded as dependent variables (Bronfenbrenner and Morris, 1998). This means that personal characteristics can represent risk factors and actually determine well-being at the same time, which is why they should be considered in the assessment of child well-being.

Based on the abovementioned aspects of Bronfenbrenner and Morris's model (1998), we can define three types of variables that exert influence on children's development and well-being (cf. Table 1):

- "context variables";
- "interaction variables", including "interaction with people" and "interaction with objects";
- "personal characteristics variables" (or "psychobiological" factors).

The main settings in which children interact can incorporate one or more types of variables, that is, interaction and/or context variables. With regard to children's psychobiological characteristics, they will be treated as an independent group of variables. Using the types of variables mentioned and organizing them within the main settings, we can structure the child's environment as follows:

- family setting:
  - interaction variables: family relations, especially, child-parent relations, parents engagement in children's health, in children's school; also interaction with objects,

such as reading, working on hobbies, access to computers, free time spent with media can be considered here;

- context variables: different contextual topics can be covered, such as family and children's income, deprivation, and housing;
- school setting:
  - interaction variables: examples are student-teacher relations, student-peer relations, friends at school, educational achievement, educational engagement;
- neighbourhood setting:
  - interaction variables: such as family and child relations with neighbours, friends within the neighbourhood, engagement in activities within the neighbourhood;
  - context variables: neighbourhoods' socioeconomic characteristics, such as physical conditions, available services, including public transport, and infrastructures such as playgrounds can have impact on children's well-being;
- health setting:
  - interaction variables: visits to the doctor, nutrition, and also, among young teenagers, cigarette smoking, alcohol drinking, drug use, teenage pregnancy, among others, have impact on children's and young people's lives;
- personal characteristics (psychobiological): factors such as permanent illness, physical handicaps, distractibility, aggressiveness, apathy, unresponsiveness, curiosity, or tendency to engage in activities are determinant of children's well-being.

**Table 1: Main settings and types of variables included**

		Main Settings				
		<i>Family</i>	<i>Neighbourhood</i>	<i>School</i>	<i>Health</i>	<i>Personal Characteristics</i>
Types of variables	<i>Context</i>	X	X			
	<i>Interaction</i>	X	X	X	X	
	<i>Psychobiological Factors</i>					X

From this categorization, which allows us to sort variables by their main features, and taking into account insights from a literature survey on child well-being indicators (Fernandes et al., forthcoming), we arrive at eight broad dimensions of child well-being, where three of them include context variables only, four include only interaction (with people or objects) factors and one considers personal characteristics factors only:

- Contextual dimensions:
  - Material well-being: related to family and child’s material resources, such as income and deprivation;
  - Housing context: related to housing physical conditions;
  - Neighbourhood environment: related to neighbourhood socioeconomic features;
- Interaction dimensions:
  - Health: includes children’s general health behaviours;
  - School/education: includes factors related to educational engagement/ participation;
  - Leisure and recreation: covers other children’s activities such as hobbies and extra-curricular activities;
  - Social relations: focuses mainly on children’s relations with other people, such as family, friends and peers from school and/or neighbourhood.
- Psychobiological Factors:
  - Child’s personal characteristics: this dimension is ultimately related to children’s physical and psychological traits.

Three remarks should be made about this dimensional breakdown. Firstly, these dimensions result directly from the previous categorization into settings and main types of variables (cf. Table 1). This new breakdown is, however, useful for the purpose of structuring the summary index that we are about to propose, since it enables distinguishing effects on children’s well-being resulting from different types of factors, that is, impacts resulting from context factors, from interaction factors and from children’s own personal characteristics. It should be noted that some dimensions cut across different settings since they include variables of the same type, namely the leisure and recreation, and the social relations dimensions (Table 2).

**Table 2: Settings, types of variables and dimensions**

		<b>Settings</b>					
		<i>Family</i>	<i>Neighbourhood</i>	<i>School</i>	<i>Health</i>	<i>Personal Characteristics</i>	
<b>Types of variables</b>	<i>Context</i>	Material Well-being	-	-	-	-	
		Housing Context	-	-	-	-	
		-	Neighbourhood Environment	-	-	-	
	<i>Interaction</i>	Leisure and Recreation			-	-	-
		Social Relations				-	-
		-	-	-	School/ Education	-	-
		-	-	-	-	Health (behaviours)	-
	<i>Psychobiological Factors</i>	-	-	-	-	Physical and Psychological Traits	

Secondly, the dimensions are all obviously interrelated. So it is actually quite difficult to establish a clear distinction and boundary between them and their individual impact on children’s well-being. As Bronfenbrenner and Morris (1998) acknowledge, the main effects on children’s outcomes are likely to be the result of interactions between factors - proximal processes, context and person - and, also, between settings. Nevertheless, dimensional breakdown is still a helpful exercise since it allows for a comprehensive representation of children’s well-being and may point out which dimensions represent challenges to social policy and deserve more attention (Bradshaw et al., 2007).

Thirdly, there are some family and child features that, although not directly related to well-being, represent additional potential risk factors, for example, family structure, age, ethnicity, and gender (Land et al., 2001, 2007; Aber et al., 2002; Meadows et al., 2005), which are worth analyzing to complement the assessment of children's circumstances, but cannot be included in one single dimension of child well-being.

### **3. A child well-being index: a new methodological approach**

#### **3.1. Implementing the distinct dimensions of child well-being**

In order to implement the distinct dimensions of child well-being (cf. Table 2) and focus on the measurement of objective items which are generally considered to characterize child well-being, we developed a questionnaire<sup>4</sup> where the parents of the targeted children are the respondents. This questionnaire is, thus, intended to assess information on 41 indicators (cf. Table 3) that cover the eight dimensions previously identified.

The indicators were chosen taking into account existing literature on child well-being indicators (e.g., Land et al., 2001, 2007; Aber et al., 2002; Hoelscher, 2004; Bradshaw et al., 2006, 2007; Moore et al., 2007, 2008; UNICEF, 2007; Bastos et al., 2004, 2008; Bastos and Machado, 2009; Bradshaw and Richardson, 2009), and following also Bronfenbrenner and Morris' (1998) model of human development. Table 3 presents the complete list of indicators, sorted by dimensions, but before proceeding, some considerations on the choice of the indicators are in order.

Concerning the material well-being dimension, it is now more than established that the family's income level strongly influences children's well-being. A vast majority of studies on indicators of child well-being include at least one indicator of this kind (e.g., Land et al., 2001, 2007; Aber et al., 2002; Hoelscher, 2004; Bradshaw et al., 2007; Moore et al., 2007, 2008; Bradshaw and Richardson, 2009), reason by which it has also been included on our list. With regard to the deprivation level indicators on Table 3 (having meat/fish or equivalent vegetarian meals, having new shoes/clothes, celebrating special occasions, and having holidays away from home), they provide complementary and more direct information on children's material situation (Bradshaw et al., 2007). Following the work of Gordon et al. (2000), and the recommendations of Hoelscher (2004), we included indicators related to children's needs, namely, having meat/fish or equivalent

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<sup>4</sup> Questionnaire is available upon request to the corresponding author.

vegetarian meals and having new shoes/clothes, as well as “soft indicators” (Hoelscher, 2004), which encompass celebrating special occasions and having holidays away from home.

**Table 3: Elementary indicators**

<b>Dimensions</b>	<b>Indicators</b>
<i>Material well-being</i>	<ul style="list-style-type: none"> <li>▪ Household income;</li> <li>▪ Number of times:               <ul style="list-style-type: none"> <li>▪ a week the household provides the child with meat/fish (or vegetarian equivalent) meals;</li> <li>▪ every year the household:                   <ul style="list-style-type: none"> <li>▪ Buys new shoes/clothes for the child;</li> <li>▪ Celebrates special occasions (e.g., birthday party);</li> <li>▪ Has a vacation away from home.</li> </ul> </li> </ul> </li> </ul>
<i>Housing context</i>	<ul style="list-style-type: none"> <li>▪ Total number of rooms in the house;</li> <li>▪ Child has his/her own bedroom;</li> <li>▪ Child has his/her own bed;</li> <li>▪ House has:               <ul style="list-style-type: none"> <li>▪ rotten windows, doors and/or floors;</li> <li>▪ damp ceilings and/or walls;</li> <li>▪ a flushing toilet;</li> <li>▪ a shower/bathtub.</li> </ul> </li> </ul>
<i>Neighbourhood environment</i>	<ul style="list-style-type: none"> <li>▪ Access to public transports;</li> <li>▪ Access to stores/markets/supermarkets;</li> <li>▪ Public spaces where the child can play (e.g., streets, parks, playgrounds, etc.);</li> <li>▪ Streets are safe for children to walk around alone;</li> <li>▪ Number of times the child plays in the street without adult supervision.</li> </ul>
<i>Health (behaviours)</i>	<ul style="list-style-type: none"> <li>▪ Child eats fruit and/or vegetables at least once a day;</li> <li>▪ Child has three meals a day;</li> <li>▪ Number of times in a day child brushes teeth;</li> <li>▪ Number of times in a year child has doctor appointments (excluding when sick).</li> </ul>
<i>School/education</i>	<ul style="list-style-type: none"> <li>▪ Child has repeated a grade;</li> <li>▪ Child has been suspended/expelled from school;</li> <li>▪ Child’s relationship with teacher(s);</li> <li>▪ Child has help with homework.</li> </ul>
<i>Leisure and recreation</i>	<ul style="list-style-type: none"> <li>▪ Child has extra-curricular activities (e.g., sports, music, etc.);</li> <li>▪ Child has leisure activities at home (e.g., reading, watching TV, playing computer games, etc.);</li> <li>▪ Child has leisure activities outside the house (e.g., going to the movies, to the theatre, to the circus, etc.).</li> </ul>
<i>Social relations</i>	<ul style="list-style-type: none"> <li>▪ Child plays/spends time with parents/caregivers;</li> <li>▪ Child plays/spends time with brother(s)/sister(s)/other children living in the household;</li> <li>▪ Child talks about him/herself to parents/caregivers;</li> <li>▪ Child talks about him/herself to brother(s)/sister(s)/other children living in the household;</li> <li>▪ Number of close friends the child has;</li> <li>▪ Average number of days the child spends playing with friends;</li> <li>▪ Child’s relationship with other children, besides friends.</li> </ul>
<i>Physical and psychological traits</i>	<ul style="list-style-type: none"> <li>▪ Child has physical and /or mental limitations/handicaps;</li> <li>▪ Child is physically underdeveloped;</li> <li>▪ Child has chronicle/long-term disease (e.g., asthma, diabetes, etc.);</li> <li>▪ Child has concentration problems;</li> <li>▪ Child has aggressive behaviours;</li> <li>▪ Child reveals lack of interest in his/her surroundings.</li> </ul>

The housing context dimension is intended to capture children’s living conditions. Research has shown that housing conditions affect children’s well-being (see e.g., Aber et al., 2002; Hoelscher,

2004; Bradshaw et al., 2007), so indicators related to physical housing problems, such as rotten windows, having a flushing toilet and a shower/bathtub (Bradshaw et al., 2007; Bradshaw and Richardson, 2009), as well as indicators related to overcrowding and specifically to the child having or not his/her own private space in the house (Hoelscher, 2004; Bastos et al., 2004, 2008; Bradshaw et al., 2007; Bastos and Machado, 2009; Bradshaw and Richardson, 2009), emerge as relevant.

The neighbourhood dimension can constrain children's well-being for several reasons, such as whether they have public spaces in which to play and/or whether the neighbourhood is safe or not (see e.g., Hoelscher, 2004; Bradshaw et al., 2007; Moore et al., 2008); or the neighbourhood lacks important public services and amenities, such as public transportation and markets/supermarkets which are relevant to meet children's daily needs (Aber et al., 2002).

Health is obviously of the utmost importance as a dimension of child well-being and its inclusion in a child well-being index is unquestionably found in a vast majority of studies on the matter (e.g., Land et al., 2001, 2007; Bastos et al., 2004, 2008; Bradshaw et al., 2007; Moore et al., 2007, 2008; Bastos and Machado, 2009; Bradshaw and Richardson, 2009). For reasons explained earlier, we opted to only consider health-related behaviours in this dimension, whereas physical and psychological traits are treated as a separate dimension. Nutrition and having healthy food (Aber et al., 2002; Hoelscher, 2004; Bradshaw et al., 2007; Bradshaw and Richardson, 2009), visits to the doctor (Aber, 2002; Hoelscher, 2004) and brushing teeth habits (Bradshaw et al., 2007; Bradshaw and Richardson, 2009) are all considered relevant health behaviours that impact on children's well-being.

Children spend a large part of their time at school (Aber et al., 2002; Hoelscher, 2004). Their enrolment in education represents an important indicator of participation in society, which has impact on children's well-being not only in the present but also in their future lives (Aber et al., 2002; Hoelscher, 2004; Bradshaw et al., 2007). Thus, educational achievement, here measured through "repeating a grade", becomes an important indicator (Moore et al., 2008). Children's behaviours towards school have impact on their educational achievement (Aber et al., 2002; Hoelscher, 2004), hence it is important to observe factors such as school suspension/expulsion (Moore et al., 2007). Teacher-student relationships and having support from parents, caregivers

or others also impact on school attainment (Aber et al., 2002; Hoelscher, 2004; Bastos et al., 2004, 2008; Bastos and Machado, 2009).

Leisure and recreation activities are important for children's development (Bronfenbrenner and Morris, 1998) and participating in such activities is essential to children's well-being (Hoelscher, 2004). These include all kinds of activities developed at home, like watching TV, reading, or playing games, having private lessons, such as sports and music, and also activities developed outside the house, such as going to the movies, theatre or circus (Hoelscher, 2004; Bastos et al., 2004, 2008; Bastos and Machado, 2009).

The quality and quantity of social relations are central to children's well-being (Hoelscher, 2004), including relations with children's significant others, namely their parents, siblings and friends (Aber et al., 2002; Hoelscher, 2004; Bastos et al., 2004, 2008; Bradshaw et al., 2007; Moore et al., 2007, 2008; Bastos and Machado, 2009; Bradshaw and Richardson, 2009).

Children's personal resources, specifically physical and psychological traits, have a direct impact on their development, and therefore on their well-being, and can also influence how children interact with other important dimensions of their lives (Bronfenbrenner and Morris, 1998). Thus, overall physical and psychological healths are key components of children's well-being (Moore et al., 2007, 2008). Specifically, physical and/or mental handicaps, underdevelopment and chronic/long-term diseases, as well as behavioural problems like aggressiveness, lack of concentration and lack of interest in the surrounding environment, can be considered relevant indicators for this dimension (Bronfenbrenner and Morris, 1998; Moore et al., 2008).

Other information, such as composition of the household, nationality and ethnic origins of the household members, parents' or caregivers' employment situation and education level, is addressed on the questionnaire. All these represent potential risk factors (see e.g., Land et al., 2001, 2007; Aber et al., 2002; Meadows et al., 2005), meaning that each of these elements in themselves do not directly influence children's well-being but can place them at a higher risk of restraints to their well-being, and are thus worthy of analysis. It should be noted that parents/caregivers' level of education and employment situation are often considered indicators of child well-being (e.g., Land et al., 2001, 2007; Aber et al., 2002; Bradshaw et al., 2007; Bradshaw and Richardson, 2009). These can indeed be determinant to the household's income poverty and, therefore, to deprivation levels (Aber et al., 2002; Bradshaw et al., 2007; UNICEF,



2007), but we consider them as not exerting direct influence on children's well-being. Hence, they are included in the category of risk factors and should be analyzed separately from the composite child well-being index.<sup>5</sup>

Following the main trend in the literature on poverty and deprivation measurement (e.g., Gordon et al., 2000; Rodrigues and Andrade, 2010), in the material well-being dimension, along with the questions on the number of times the household provides the child with meat/fish (or vegetarian equivalent) meals, new shoes/clothes, celebrations on special occasions and vacations away from home, a question is added to obtain information on whether the household would provide more of these items if they had a higher income. The rationale behind this question is to try to assess if the household can afford, or not, those items and to try to isolate situations where the household can actually afford the items but simply chooses not to buy them.

An additional question about the parents'/caregivers' perceptions of their child's overall happiness is also included. This question is added in order to compare these perceptions with the results of the overall child well-being index. A similar question will also be considered in the children's questionnaire. This will additionally allow us to compare parents' and children's perceptions of their well-being and draw some conclusions about the adequacy of considering parents as respondents when trying to assess subjective factors pertaining to children's lives.

### **3.2. Aggregating the dimensions of child well-being**

With regard to the aggregation of the child well-being dimensions into a single composite indicator, a major issue needs to be addressed at the outset: the relative importance each dimension should have on overall well-being (and the importance each indicator should have within each dimension), that is, the weighting scheme.

#### **3.2.1. Review of the current weighting scheme proposals**

##### *Composite well-being indexes for the total population*

The construction of composite summary indexes implies choosing a method to aggregate the elementary indicators, a matter that generates little agreement among social scientists (Hagerty and Land, 2007). For this reason, social indicators are often aggregated considering that each

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<sup>5</sup> Moore et al. (2007, 2008) also refer to these components as 'risk factors' and analyze them together with contextual variables instead of within the group of individual well-being variables.

particular indicator has the same importance as the next one, that is, equal weights are assumed, both for the indicators within dimensions and for dimensions in relation to the overall indicator (Hagerty and Land, 2007).

Hagerty and Land (2007) have demonstrated that in the absence of estimates of the importance a population places on certain life aspects, the equal weighting system becomes the most appropriate when aggregating information into a single composite index, since it allows for greater agreement among individuals about the importance that each indicator should have. However, the authors have also established that a much higher level of agreement arises when using true weights, derived from surveys done for the purpose of estimating the importance placed by individuals on each indicator. By comparing the attitudes of a group of people with regard to the results of two composite well-being indexes, one using equal weights and the other using weights derived from the group members' opinions, Hagerty and Land (2007: 486) concluded “[a]greement is maximized by using the average weights from a survey of individuals' importance”.

In an attempt to measure and compare social exclusion of immigrants and Germans in Germany and, Haisken-DeNew and Sinning (2007) followed a similar approach. In line with the life satisfaction literature, the authors propose a set of weights based on an analysis of the extent to which the dimensions of a social inclusion index contribute to the individual's general life satisfaction (Haisken-DeNew and Sinning, 2007). The conclusions they reached are quite revealing. Using a weighting scheme based on the individuals' (immigrants versus Germans) subjective evaluations about the contribution of each inclusion dimension to overall life satisfaction allows for a different picture on how immigrants are fairing in Germany. With this type of weights, “on the whole immigrants are as equally ‘deprived’ (or not) as Germans” (Haisken-DeNew and Sinning, 2007: 18).

Another recent study on material deprivation, conducted by Rodrigues and Andrade (2010), analyzes the impact of considering different weighting systems when assessing material deprivation through a composite indicator. The authors compare the results of material deprivation when using an equal weighting system with the results obtained using a weighting system derived from a survey that reflects the social perception of the importance of the items considered in the material deprivation indicator. The weights of this second approach were

derived from the Eurobarometer survey of 2007 on “Poverty and Social Exclusion”. The authors concluded that when applying these different weights to the material deprivation indicator the number of deprived households was reduced significantly (Rodrigues and Andrade, 2010).

Albeit in the latter case weights are ‘aggregated’ and not individually considered, the evidence from the abovementioned studies suggests that taking into account the subjective perceptions of individuals (Haisken-DeNew and Sinning, 2007) or groups of individuals (Hagerty and Land, 2007; Rodrigues and Andrade, 2010) of the relative importance of the dimensions (and indicators in each of those dimensions) in their own well-being may lead to substantially different results, compared to the case where an equal weighting system is used to construct a composite index. Thus, people’s subjective perceptions about their own lives, together with objective indicators – which have proven to be useful but are often considered narrow-focused (Diener, 1994; Diener and Seligman, 2004; Land et al., 2007) -, should be part of the construction of indexes measuring people’s well-being.

#### *Composite indexes of child well-being*

Literature on composite measures of child well-being has tended to adopt the uniform weighting scheme. This is the case, for example, of the works of Land et al. (2001, 2007), Bastos et al. (2004, 2008), Bradshaw et al. (2007), Moore et al. (2007, 2008) and Bradshaw and Richardson (2009) (Fernandes et al., forthcoming). An exception is the research developed by Bastos and Machado (2009). Here the authors opted to place more importance on the indicators in which deprivation was not widespread and, consequently, non-possession of certain items, the authors argue, will translate into a strong feeling of deprivation (Bastos and Machado, 2009). However, although different from uniform weights, the weighting scheme adopted by Bastos and Machado far from represents the real weights of the items considered in the construction of their composite deprivation index, since they do not take into account children’s perceptions of those items’ relative importance (Fernandes et al., forthcoming).

Hence, considering the recommendations and results from the literature on composite indexes and weighting schemes on the one hand, and what has and has not been done by the main research works on composite measures of child well-being on the other, we put forward a new proposal for weighting indicators when constructing composite indexes of child well-being: weights should be derived from inquiries to the children themselves. This opens space for the

participation of children in what can be considered a determinant stage in the measurement of their well-being process: the importance they place on each 'objective' elementary indicator.

### **3.2.2. Proposing a new weighting scheme based on micro (individual children's) perceptions**

Subjective well-being has come to be considered a crucial aspect that needs to be taken into account when analyzing child well-being (Aber et al., 2002; Bradshaw et al., 2007; UNICEF, 2007; Fernandes et al., forthcoming). Several studies on child well-being indicators do take subjective well-being into consideration in one way or another: by including a dimension of subjective well-being in the indicator of overall well-being (see, for example, Bradshaw et al., 2006, 2007; UNICEF, 2007); or by considering empirical research on subjective well-being when identifying the relevant domains of well-being (see Land et al., 2001, 2007). But what is subjective well-being exactly?

Some authors consider subjective well-being to be “the degree to which an individual judges the overall quality of her or his life as a whole in a favourable way” (Diener, 1994: 106). Others define subjective well-being as “both a cognitive evaluation and some degree of positive or negative feelings, i.e., affect” (Andrews and Whitey, 1976: 18).<sup>6</sup> The implicit theory in these and similar definitions is that individuals are capable of evaluating life events and circumstances in terms of cognitive considerations and/or in terms of affect (Diener, 1994). This definition of subjective well-being is very close to that of another concept: the concept of attitude.

According to Ajzen (2001), an “attitude represents a summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, and likable-dislikeable” (Ajzen, 2001: 28). Hence, attitudes can be conceived as predispositions to respond to certain objects with certain classes of responses (Fishbein and Ajzen, 1974; Greenwald, 1989; Cross, 2005) or characterized as evaluations of an attitude object “on a pro to con continuum” (Ostrom, 1969: 16). Consequently, it is possible to conclude that measuring subjective well-being is basically measuring attitudes (Andrews and McKennel, 1980).

In Section 2 we defined the dimensions of well-being based on the ecological human development model (Bronfenbrenner and Morris, 1998). We did not base our choice of dimensions on empirical research on subjective well-being, nor did we distinguish a dimension of

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<sup>6</sup> For some more definitions see, for example, Diener (1994).

subjective well-being. But, if perceived or subjective well-being is relevant to the overall well-being of individuals, how can we introduce this kind of considerations into our framework? The answer to this question is implicit in our weighting scheme proposal for the summary child well-being index. With regard to this aspect, a quick word on child agency is in order.

Child agency is an important issue that researchers have paid greater attention to (Ben-Arieh, 2005; Sutton et al., 2007; Redmond, 2008, 2009). There is a growing number of studies (e.g., Ben-Arieh, 2000, 2006, 2008; Land et al., 2001, 2007; Aber et al., 2002; Hoelscher, 2004; Bradshaw et al., 2006, 2007; Moore et al., 2007, 2008; UNICEF, 2007; Bastos et al., 2004, 2008; Bastos and Machado, 2009; Bradshaw and Richardson, 2009) where the child is the unit of analysis, not considered simply as a passive research object, but rather as an agent whose perceptions and attitudes have to be expressed and taken into account, when his/her well-being is at stake.

A particular way of involving children in the study of their own well-being is to try to capture their views in the measurement of their life circumstances. Using data resulting from surveys where children are asked about several, mostly objective, aspects of their lives has been the solution presented by several studies (e.g., Land et al., 2001, 2007; Bradshaw et al., 2007; Bradshaw and Richardson, 2009).

Another course of action, and the one proposed here, involves asking children about subjective aspects of their lives, which has to some extent been done by some of the previously mentioned studies (e.g., Bradshaw et al., 2006, 2007; Bradshaw and Richardson, 2009; Bastos et al., 2004, 2008; Bastos and Machado, 2009). In our case, however, this information is treated differently: it is used to generate weights for the composite well-being index.

Specifically, within each dimension, children are asked to organize the several items included in the parents' questionnaire (cf. Table 3) according to their importance, that is, to order the items from the most to least important. Ordering dimensions according to their importance must also be requested. This means that besides a parents' questionnaire, a children's questionnaire also had to be built.<sup>7</sup> Following this procedure solves two issues usually raised in the child well-being literature: children are more adequately involved in the measurement of their well-being and, moreover, the weights of the indicators and dimensions considered in building a child well-being

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<sup>7</sup> Questionnaire is available upon request to the corresponding author.

index correspond to their ‘true’ relative importance, since they result from children’s perceptions of several aspects of their lives.

Thus, we argue, the weights of the index’s indicators and dimensions have to be obtained from questionnaires that focus on children’s perceptions of the relative importance of those items for their well-being. These perceptions are no different from attitudes, so the questionnaires are essentially measuring children’s attitudes towards these different aspects of their lives. According to previous conclusions about the existing relationship between the concept of attitudes and that of subjective well-being, this means that subjective well-being is in fact being introduced in our framework. Indeed, our proposed child well-being index can be conceived as a ‘subjective’ measure of well-being, which combines objective items with children’s subjective perceptions about them.

### **3.3 The new composite well-being index: implementing the dimensions and weighting scheme**

Following the rationale and procedures put forward in previous sections, we can now define the well-being indicators for each dimension (material well-being, housing context, neighbourhood environment, health (behaviours), school/education, leisure and recreation, social relations and finally, psychobiological traits). However, before doing so, an additional methodological procedure needs to be included.

In the children’s questionnaire that we propose here, besides being asked to organize items within dimensions according to their importance, children are also required to classify each item according to a degree of importance scale that goes from “Not important” to “Extremely important”.<sup>8</sup> This procedure allows us to distinguish the different degrees of impact having or not having a certain item may have on children’s well-being, and this according to their own perceptions on the importance of the items. Thus, instead of having to define thresholds of well-being for each item, we have degrees of well-being for each of these items. Most research works have adopted a different methodology. In particular, in research works using microdata, such as in Bastos et al. (2004, 2008) and Moore et al. (2007, 2008), thresholds are defined by the researchers themselves and indicators are taken to be binary, assuming the values 0 or 1.

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<sup>8</sup> Questionnaire is available upon request to the corresponding author.

Bastos and Machado (2009) employ a different methodology. Recognizing that deprivation cannot be conceived as a binary variable (Bastos and Machado, 2009), the authors opt for a fuzzy conceptualization of deprivation, considering it as a graded variable. Accordingly, Bastos and Machado (2009) define a membership function that varies between 0 and 1, where 0 means no deprivation, 1 means total deprivation and values between 0 and 1 mean partial deprivation. This approach, the authors argue, avoids establishing a single dichotomous classification (Bastos and Machado, 2009). Our approach also has this advantage. Additionally, in our formulation, the degree of well-being is not externally imposed on the individual child; it results instead from the children's own perceptions. This can be considered another advantage to our methodology, since it allows children to further participate in the measurement of their own well-being.

Summing up, in our proposal, the indicators for each child and each dimension are defined as follows.

*Material well-being indicator (MWI)*

$$MWI = w_{MW1}(x_{MW1}g_{MW1}) + w_{MW6}[w_{MW2}(x_{MW2}g_{MW2}) + w_{MW3}(x_{MW3}g_{MW3}) + w_{MW4}(x_{MW4}g_{MW4}) + w_{MW5}(x_{MW5}g_{MW5})]$$

Where  $x_{MWi}$  refers to the elementary indicators  $i = 1, \dots, 5$  of dimension  $MW$  (material well-being) for the individual child;  $w_{MWi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 5$ ;  $g_{MWi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 5$ .

In this particular case, the sum of  $(w_{MW2}x_{MW2} + w_{MW3}x_{MW3} + w_{MW4}x_{MW4} + w_{MW5}x_{MW5})$  is attributed a particular weight  $w_{MW6}$  by the individual child, since it constitutes a sub-indicator translating the level of deprivation.

*Housing context indicator (HCI)*

$$HCI = w_{HC1}(x_{HC1}g_{HC1}) + w_{HC2}(x_{HC2}g_{HC2}) + w_{HC3}(x_{HC3}g_{HC3}) + w_{HC4}(x_{HC4}g_{HC4}) + w_{HC5}(x_{HC5}g_{HC5}) + w_{HC6}(x_{HC6}g_{HC6}) + w_{HC7}(x_{HC7}g_{HC7})$$

Where  $x_{HCi}$  refers to indicators  $i = 1, \dots, 7$  of dimension  $HC$  (housing context) for the individual child;  $w_{HCi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 7$  of

dimension  $HC$ ;  $g_{HCi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 7$ .

*Neighbourhood environment indicator (NI)*

$$NI = w_{N1}(x_{N1}g_{N1}) + w_{N2}(x_{N2}g_{N2}) + w_{N3}(x_{N3}g_{N3}) + w_{N4}(x_{N4}g_{N4}) + w_{N5}(x_{N5}g_{N5})$$

Where  $x_{NCi}$  refers to indicators  $i = 1, \dots, 5$  of dimension  $NC$  (neighbourhood context) for the individual child;  $w_{NCi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 5$  of dimension  $NC$ ;  $g_{Ni}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 5$ .

*Health (behaviours) indicator (HI)*

$$HI = w_{H1}(x_{H1}g_{H1}) + w_{H2}(x_{H2}g_{H2}) + w_{H3}(x_{H3}g_{H3}) + w_{H4}(x_{H4}g_{H4})$$

Where  $x_{Hi}$  refers to indicators  $i = 1, \dots, 4$  of dimension  $H$  (health) for the individual child;  $w_{Hi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 4$  of dimension  $H$ ;  $g_{Hi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 4$ .

*School indicator (SI)*

$$SI = w_{S1}(x_{S1}g_{S1}) + w_{S2}(x_{S2}g_{S2}) + w_{S3}(x_{S3}g_{S3}) + w_{S4}(x_{S4}g_{S4})$$

Where  $x_{Si}$  refers to indicators  $i = 1, \dots, 4$  of dimension  $S$  (school) for the individual child;  $w_{Si}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 4$  of dimension  $S$ ;  $g_{Si}$  refers to the importance given by the individual child to indicator  $i = 1, \dots, 4$ .

*Leisure and recreation indicator (LRI)*

$$LRI = w_{LR1}(x_{LR1}g_{LR1}) + w_{LR2}(x_{LR2}g_{LR2}) + w_{LR3}(x_{LR3}g_{LR3})$$

Where  $x_{LRi}$  refers to indicators  $i = 1, \dots, 3$  of dimension  $LR$  (leisure and recreation) for the individual child;  $w_{LRi}$  refers to the weight attributed by the individual child to indicators



$i = 1, \dots, 3$  of dimension  $LR$ ;  $g_{LRi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 3$ .

*Social relations indicator (SRI)*

$$SRI = w_{SR1}(x_{SR1}g_{SR1}) + w_{SR2}(x_{SR2}g_{SR2}) + w_{SR3}(x_{SR3}g_{SR3}) + w_{SR4}(x_{SR4}g_{SR4}) + w_{SR5}(x_{SR5}g_{SR5}) + w_{SR6}(x_{SR6}g_{SR6}) + w_{SR7}(x_{SR7}g_{SR7})$$

Where  $x_{SRi}$  refers to indicators  $i = 1, \dots, 8$  of dimension  $SR$  (social relations) for the individual child;  $w_{SRi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 8$  of dimension  $SR$ ;  $g_{SRi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 8$ .

*Psychobiological characteristics indicator (PCI)*

$$PCI = w_{PC1}x_{PC1} + w_{PC2}x_{PC2} + w_{PC3}x_{PC3} + w_{PC4}x_{PC4} + w_{PC5}x_{PC5} + w_{PC6}x_{PC6}$$

Where  $x_{PCi}$  refers to indicators  $i = 1, \dots, 6$  of dimension  $PC$  (psychobiological characteristics);  $w_{PCi}$  refers to the weight attributed by the individual child to indicators  $i = 1, \dots, 6$  of dimension  $PC$ ;  $g_{PCi}$  refers to the degree of importance given by the individual child to indicator  $i = 1, \dots, 6$ .

Thus, the *overall child well-being indicator (OCWI)* for each child comes as follows:

$$OCWI = W_{MW}MWI + W_{HC}HCI + W_{NC}NI + W_HHI + W_SSI + W_{LR}LRI + W_{SR}SRI + W_{PC}PCI$$

Where  $W_i$  refers to the weight attributed by the individual child to each of the dimensions  $i = MW, \dots, PC$  in overall well-being.

Consequently, we are proposing here an individual (micro) overall well-being indicator, built as detailed above, that is intended to assess the well-being of each individual child. To obtain an overall/aggregate well-being index, that is, an index for the total child population or for a given sub-set (e.g., region), a bottom (micro)-up (macro) strategy is employed by averaging individual observations.

#### **4. Concluding remarks**

The present paper constitutes an attempt to make a methodological contribution to overcome three important limitations of past studies on the measurement of child well-being through summary indexes. It offers a concrete solution on how to involve children in the measurement of their own well-being, which, in turn, yields the real weights for the selected indicators and dimensions of well-being, giving relevancy to the use of microdata instead of aggregated data.

We grounded our proposal on two distinct foundations (cf. Section 2): a normative one, framed by the Convention on the Rights of the Child (CRC, 1989), and a positive one, based on Bronfenbrenner and Morris' (1998) ecological model of human development.

The choice of well-being dimensions derives from the latter. Focusing on the microsystem level, dimensions were divided into interaction dimensions (health behaviour, school, leisure and recreation, and social relations), context dimensions (material well-being, housing and neighbourhood), and a personal characteristics dimension. Detailed definitions were provided of the indicators included in each dimension (Section 3), as well as the manner in which they were implemented. Structuring these elementary objective indicators involves the gathering of primary information from children's parents, by means of direct questionnaires.

To settle on a formulation for the proposed child well-being index, the major literature trends were reviewed regarding weighting schemes and individual indicator aggregation methods for composite indexes of well-being. This led us to conclude that the most suitable weighting scheme would have to consider 'real weights' for each of the individual indicators, that is, weights derived from the relative importance given to each of the indicators by each individual child. We thus proposed an additional questionnaire to be administered to children themselves. To the best of our knowledge, this methodology has not yet been tested for composite indicators of child well-being.

Another point was made with regard to the definition of well-being thresholds for each indicator. In most cases, the researchers themselves have defined the cut-off points for indicators. Diverging from this methodological option, we have instead chosen to involve children and ask them to evaluate each indicator on a five-point Likert scale (from "Not important" to "Extremely important"). Combining this information with that obtained from the parents' questionnaires enables us to define degrees of well-being for each indicator.

The formulation of our proposed composite index thus results from all of the above considerations. Accordingly, indicators can be weighted and summed for each dimension of well-being and dimensions weighted and summed to obtain the overall well-being index for each individual child.

Bronfenbrenner and Morris' (1998) model of human development identifies the existence of what the authors call "synergistic interdependencies" among certain aspects of children's lives. More precisely, they state that personal characteristics and context, although having a direct impact on development outcomes, also exert an indirect impact through the influence they have on interactions between the individual and other people or objects. This implies that dimensions of well-being are interrelated and, thus, when building a composite index to assess the well-being of children, a simple additive formula can reveal some limitations. This is in fact an acknowledged limitation to our proposed composite indicator. However, as mentioned earlier, the aim of this methodological proposal was to account for three of the other main methodological limitations in current studies: the short account for children's perceptions on their own well-being, the use of aggregated data, and the use of uniform or other weighting schemes that do not translate the real weights of individual indicators.

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