

Chapter 2

Theoretical Foundations

In this chapter, the most basic and common measurement methods used for child well-being indicators will be discussed first. The latter part of the chapter presents models of formative and reflective measurements, which are used to build well-being indices.

2.1 The Most Fundamental and Common Indicators and Their Respective Measurements of Child Well-Being

Since child well-being is a multi-dimensional concept, the approaches of both quantitative measurements and conceptualization differ, depending on the nature of the study and the research objectives. It is essential to understand the mechanism and underlying factors forming a child's well-being and their causes, and the interrelationships between the different components contributing to that well-being. In their book, Hanafin and Brooks, (2005) stated that the different frameworks reflect differences in the underlying perception of children. Generally, there is no clear consensus about the frameworks to be used and mostly child well-being emphasizes children's rights, needs, development, outcomes, effects and resilience. Since the indicators differ with their respective objects of research, in this study the most common and fundamental indicators of child well-being and their measuring methods strengths contributing to an individual's well-being in the physical, social, emotional and cognitive domains. Since the indicators and domains of a child's wellbeing differ

between age groups and countries, the indicators and measurements will be discussed based on the objectives of this study. When there are three core elements of the UNESCO child well-being indicator framework, and its respective measurements, some indicators that do not fit with the age group and objectives of this study will be left out.

2.1.1 Elements of Physical Well-Being

The context in which children live affects their physical well-being. (Rogers and Leavitt, in press) stated that the family's and societal system's values, as well as the community's security and accessibility to basic services, the institutional practices, availability and accessibility of a public health system, environmental quality and economic considerations, can all affect the physical well-being of children. The definition of physical well-being includes the receipt of good nutrition, access to preventive health care, physical activity, safety and security, substance abuse prevention and reproductive health (Rogers and Leavitt, in press).

(a) Nutrition

Nutrition is defined as being the consumption of an adequate amount of essential vitamins and nutrients necessary for healthy physical, cognitive, and socio-emotional growth and development. Nutrition can be measured by assessing dietary intake, by taking anthropometric measurements, through determining nutrient levels in blood samples, and through surveys and paper assessments (Leavitt and Tonniges, in press)

Measuring dietary intake requires an appropriate standard. Since nutritional problems involve conditions of lack of nutrition, as well as over-nutrition, dietary adequacies are assessed using several types of standards. In the United States,

the National Research Council publishes Recommended Dietary Allowance (RDA) figures, at approximately five-year intervals, and estimates the levels of nutrient intake “adequate to meet the known nutritional needs of practically all healthy persons”. However these standards differ with an individual’s height and weight, age and activity levels and so the assessment of a healthy diet may therefore vary widely. Although these standards are useful when used in industrialized countries, they typically exceed the standards needed for populations in developing nations.

A number of anthropometric indicators have been used to measure the nutritional status of individuals, these being weight-for-age (W/A), height-for-age (H/A), weight-for-height (W/H), mid-upper-arm circumferences (MUAC), mid-upper-arm-circumferences-for-age (MUAC/A), and mid-upper-arm-circumferences-for-height (MUAC/H). In all cases, the value of the indicator is compared with a threshold value (for example, WHO growth references/National Centre for Health Services (NCHS) references), and the indicator is derived from measured components. Anthropometric measurements are physical dimensions of a subject that are used alone, in combination, or corrected for age.

The malnutrition of a child can be measured by anthropometry in two ways: a declaration of growth which over the long term results in low height-for age or stunting and body wasting; a short-term response to inadequate intakes, and by weight relative to height (Go’mez, Tamos, and Cravioto, 1952). MUAC or MUAC/H is measured with the QUAC (Quaker Arm Circumferences) stick, which is a multi-component indicator that does not require use of a table or reference to a growth chart; the MUAC thresholds defining malnutrition are marked on a ‘height’ stick. MUAC, which is measured to the nearest centimeter (or millimeter), is measured by

using a steel tape with the left arm hanging relaxed midway between the top of the acromion and the olecranon, a process in which the tape touches the skin but does not compress the tissue. MUAC, W/H and MUAC/H are age-independent indicators of malnutrition.

Nutritional status can also be obtained using clinical signs of malnutrition and biochemical indicators (Go'mez, Tamos, and Cravioto, 1952). Biochemical indicators measure specific aspects of a subject's metabolism, such as a test to determine serum albumin levels. Clinical assessments measure the presence of clinical signs suggestive of malnutrition, such as visible wasting and bipedal edema.

(b) Preventive Health Care

Preventative health care provides the means through which parents and healthcare providers collaborate to ensure that young children receive a healthy start in life, as well as promoting preventive healthcare throughout their lifespan (Tonniges and Leavitt, in press). New-born screening, sleep and infant positioning, immunizations, as well as hearing and vision screening, are all important elements of preventive health (American Academy of Pediatrics (AAP) Committee on Practice and Ambulatory Medicine 2000).

Measuring this element has been guided by expert opinion. The American Academy of Pediatrics (AAP) developed the "Periodicity Schedule" which provided physicians with expert knowledge, guidelines and timelines for administering the best care to children in 2000 (AAP Committee on Practice and Ambulatory Medicine 2000).

(c) Physical Activity

Physical activity is operationally defined as a positive state of physical health encompassing normal growth and development and physical activity or functioning levels (Conner, in press).

The existing measures of physical activity include determining basal energy expenditure (Wong, Buttee, Ellis, Hergenroeder, Hill, and Struff, 1999), measuring total daily expenditure (Spurr and Reina, 1987; Wong, Buttee, Ellis, Hergenroeder, Hill, and Struff, 1999), measuring the amount of energy expended during activity, assessing the number of physical activity events or the duration of physical activity per week, and evaluating the percentage of time spent engaged in physical activity events per time period.

(d) Physical Safety and Security

Physical safety is defined as having a present or immediate freedom from danger and harm, including feeling secure in one's environment and being free from anxiety and apprehension of harm (Sleet and Mercy, in press). Physical safety and security also includes perceiving and avoiding unnecessary and dangerous risk-taking behavior.

The elements of physical safety and security are measured through evaluating the number or percentage of children engaged in safe or unsafe behavior, and the number of potential outcomes suggested by that behavior.

(e) Reproductive Health

Reproductive health is defined as a state of physical, mental and social well-being in all matters relating to the reproductive system and at all stages of life (World Health Organization (WHO), 1994). Adolescents also need information that

will allow them to make healthy decisions regarding their sexuality (Dewey and Conner, in press).

Reproductive health is measured by a person's access to safe, effective, affordable and acceptable methods of family planning, the right to appropriate health-care services, a satisfying and safe sex life, and the freedom to make informed choices around if and when to reproduce (World Health Organization WHO, 1994).

(f) Substance Abuse Prevention

Substance abuse prevention is the prevention of the use of illicit drugs by adolescents, such as marijuana, cocaine and heroin, as well as the use of alcohol and tobacco, in order to maintain a normal and positive development trajectory (Simons-Morton and Haynie, in press).

The use of drugs is measured by self-reports, which tends to be accurate. By evaluating self-reports, the types of drugs used, the age of initiation, and the frequency, amount and population prevalence can be determined. Drug usage can also be measured by bio-chemical verification, which tends to be reasonably accurate (Dolcini, Adler, and Ginsberg, 1996).

2.1.2 Elements of Social and Emotional Child Well-Being

Emotional regulation, well developed coping mechanisms, the development of autonomy and trust, the development of self-esteem, identity and self-concept, the development of empathy and sympathy and lastly, the formation of positive relationships with family and peers, all help to define the social and emotional well-being of a child (Halle and Zaff, in press).

(a) Emotional Development

Definitions of emotion differ between authors and across researchers' statements. Schachtler and Singer (1962) defined emotions as states of automatic arousal, while Bull (1951) defined emotion as attitudes. Fridja (1986) and Lang (1995) both defined emotions as mechanisms that control the shifts in a person's stated goals, or their motivations to act. Zajonc (1980) defined emotions as affective reactions preceding and/or lacking perceptual and cognitive encoding, and Lazarus (1991) defined them as cognitive appraisals of social events. Frijda (1999) suggested that all researchers agreed on the fact that the nature of emotions constitutes three essential components: physiological responses, subjective experiences and observable behavior.

The measurement of emotions has been mostly carried out on adults, by looking at the reduction of negative emotions such as depression. More recently, researchers have focused on positive emotions. Emotions are measured through paper/pencil surveys and assessments, as well as naturalistic observational methods (Halle and Zaff, in press).

(b) Coping

The elements of coping include the levels of cognitive and behavioral flexibility experienced in the face of environmental demands, demands that cause stress to the internal and external resources of the individual (Lazarus and Folkman, 1984).

The coping skills of children can be measured through interviews, checklists and questionnaires that inquire about the number of strategies an individual possesses for coping with a perceived stressful situation (Bridges, in press).

Coping can also be measured through the Kidcope (Spirito, Stark, and Williams, 1988), which is a checklist designed to obtain ten cognitive and behavioral coping strategies: distraction, social withdrawal, wishful thinking, resignation, self-criticism, blaming others, problem-solving, emotional regulation, cognitive restructuring and social support, and also the Self-Report Coping Scale (Causey and Dubow, 1992), which assesses the extent to which children use various coping strategies in regard to a specific stressor.

(c) Autonomy

Autonomy is defined as the ability to self-govern one's daily activities and thoughts, to self-motivate one's behavior, conduct an independent exploration of one's environment, and to self-regulate one's emotions (Bridges, in press).

The element of autonomy is measured through School-Student Self Reports (Connell and Wellborn, 1991) which assess by asking the children, using four-point scales, statements about possible strategies for doing well in school and for avoiding poor performance in school, and also observational methods that examine persistence and focused exploration.

(d) Parent-Child Relationships

A parent-child relationship is defined by the way in which parents able to regulate their parenting behavior in interaction with their child based on the child's development needs.

The quality of parent-child relationships can be measured through self-report assessments, questionnaires and direct observational methods (Cox and Harter, in press).

(e) Sibling Relationships

Furman and Buhrmester (1985) stated that sibling relationships constitute four dimensions: warmth and closeness, conflict, rivalry and relative status/power.

Sibling relationships can be measured through paper/pencil assessment, including the Sibling Relationship Questionnaire (SRQ) developed by Furman and Buhrmester.

(f) Peer Relationships

Peer relationships are defined as providing essential socialization experiences that are necessary for the acquisition of several fundamental skills for healthy personality development, and for psycho-social adjustment (Bukowski, in press).

Peer relationships can be measured through rating scales of acceptance, rejection, social preferences, popularity and friendship using questionnaires.

(g) Positive Development of Self

The self is defined as being comprised of three components: self-concept, self-esteem and identity. Franzoi, (1996) defined self-concept as the sum of an individual's beliefs about their own attributes, such as their personality traits, cognitive schemas, and their social roles and relationships. Identity is a commitment to one's self concept and self-esteem, and is how the individual perceives his or her self's concept and identity (Zaff and Hair, in press).

The Self-perception Profile for Children (SPPC), the Self-Description Questionnaire II (SDQII) self-reports, the Rorshach and the Thematic Apperception Test (TAT) are all used to measure self-concept and self-esteem (Wylie, 1989).

(h) Pro-Social Behavior, Empathy and Sympathy

Eisenberg N. (in press) stated that pro-social behavior includes a wide range of actions, the results of which are intended to benefit others. The identification with and understanding of another person's situation, feelings and motives is defined as empathy, whereas the ability to share with another person, emotions about a particular situation or occurrence, is defined as sympathy.

Pro-social behavior is measured through self-reports and observational methodology.

2.1.3 Cognitive Elements of Child Well-Being

Bornstein and Smith (in press) stated that perceiving, remembering, conceiving, judging, and reasoning in order to obtain and use knowledge, are all cognitive skills which are very important, not only for individuals to communicate their thoughts, feelings and wishes in order to get their needs, but also for adapting to the environment, as well as for the formation and maintenance of social relationships.

(a) Information Processing and Memory

Information processing is an approach of human cognition that consists of cognitive structures and organized sets of cognitive processes, processes which allow people to complete specific tasks, while memory is defined as a structure that includes ongoing cognitive processes and the ability to store and recall the information required for those processes (Kail, in press).

Cognitive ability is generally measured through the Woodcock-Johnson Test. The Woodcock-Johnson III test (WJ III: Woodcock, McGrew, and Mather, 2001a) includes 31 cognitive tests for measuring general intellectual ability, broad and narrow cognitive abilities and aspects of executive functioning. Memory is

measured using an operation span task, in which participants have to verify mathematical operations and memorize words (Turner and Engle, 1989).

(b) Thinking and Intelligence

Thinking consists of both basic and higher-level mental processes which include expressing oneself in language, and perceiving objects and events in the external environment (Siegler, in press). Gardner (1999) and Sternberg (1999) defined intelligence as an understanding of oneself and others, as creativity, musical ability and other non-prototypic forms of intelligence.

Intelligence can be typically measured through the use of standardized tests, such as the Wechsler Intelligence Test for Children which measures several aspects of intelligence, such as vocabulary, arithmetic ability, comprehension and memory, and the Stanford-Binet IQ Test which determines the level of intellectual and cognitive functioning in preschoolers, children, adolescents and adults, and assists in the diagnosis of a learning disability, developmental delay, mental retardation and giftedness.

(c) Problem Solving

Problem solving is defined as the use of a sequence of steps that attempt to identify and create alternate solutions for both cognitive social problems, including the ability to plan, resourcefully seek help from other, and to think critically, creatively and reflectively (Smith, in press).

The measurements of problem solving skills in existence, include the Preschool Interpersonal Problem Solving test (PIPS) which indicates the ability to

think of alternative solutions to real-life age appropriate problems, the What Happens Next Game developed by Shure and Spivack (1974), which is used to assess children's consequential thinking ability, and the Means-End Problem-Solving Test, which measures the approach that a person takes step-by step and through sequenced means, to reach his or her standard interpersonal goal.

(d) Moral Development

Morality is defined as those characteristics of an individual's life that are reflective of the individual's sense of obligation and other-centered values (Hart Burock, London, and Miraglia, (in press). Moral development is constituted of moral judgment, moral emotions and moral action.

There are five developmental stages of moral judgment which are used to measure moral development (Kohlberg, 1984). They are heteronomous morality, which derives from power and authority, instrumental morality which means looking out for one's self, interpersonal morality which means doing what is needed to make one liked, and normative mortality which is based on strict adherence to laws and on performing one's duty, and human rights and social welfare morality, which is based on protecting each individual's human rights.

(e) Educational Achievement

Educational achievement can be defined by identifying three areas: a readiness to learn, achievement test scores and report card grades (Plank and Macver, in press). Karweit (1999) defined readiness as the state in which the capacities and competencies of the child match the expectations and requirements of the adults, based upon what they achieved at school in their lives.

The existing measurements of educational achievement are observing achievement tests and report cards grades.

(f) Creativity and Talent

Creativity is formed by imagination, expressiveness and originality in thought and action (Winner, in press).

Creativity is measured through paper/pencil assessments, such as the Stanford-Binet IQ test, as well as other assessments tools such as the administration of insight problems, and task commitment and creativity tests.

2.2 Theoretical Considerations when Constructing Indicators and Measurement Models

In this section, construction indicators and their measurement models will be discussed. It is vital to know the nature and direction of the relationship between indicators and their domains, in order to construct a specific model. Structural equation modeling distinguishes two measurement models: reflexive and formative (Edwards and Bagozzi, 2000). There are three theoretical considerations to be made in order to decide whether reflexive models or formative model should be used. These are: (1) the nature of the construct, (2) the direction of causality between the indicators and the latent construct, and (3) the characteristics of the indicators used to measure the construct.

2.2.1 Reflective Indicators (Effect Model)

(a) The Nature of the Construct

The reflective model is also called the principal factor model, and is the most commonly used. In this model, the nature of the construct is independent of the measures used, and the latent construct exists in an absolute sense (Borsboom, Mellenbergh, and Heerden, 2004; Rossiter, 2002).

(b) Direction of Causality

The direction of causality is one of the key theoretical considerations. In reflective models, the causality flows from the construct to the indicators. It means that changes in a construct are assumed to cause changes in the indicators. This is called a reflective model by Fornell (1982) and an effect model by Bollen and Lennox (1991).

(c) Characteristics of the Indicators

In the reflective model, the latent variables influence the indicators, which mean that a change in the latent variable must precede a variation in the indicator. Since all the measures are assumed to be equally valid indicators of the underlying construct, any two measurement that are equally reliable are interchangeable. According to this assumption, Churchill (1979), and Bernestein and Nunnally (1994), stated that it is adequate to measure the domain or construct by sampling a few relevant indicators underlying the construct. One of the key factors is that the content validity of the construct cannot be affected by inclusion or exclusion of one or more indicators from the domain.

Since the indicators of reflective models are formed by the underlying construct and have a positive inter-correlation, the various primary analyses used for checking the indicators inter-correlations are necessary. Whenever constructs are

measured through questionnaire items, then administering the samples of the respondents, checking for the presence of outliers, checking the dimensionality of the construct by using factor models or principle component analysis, checking the correlation between indicators and constructs in order to decide the expected directionality and strength by using bi-variate correlations, carrying out factor or regression analysis, checking reliability with through the measure of factor loading and communality, and ensuring Cronbach alpha and internal consistency, are all necessary for the primary analysis (Trochim, 2006).

The important empirical consideration is the measurement error in the reflective model. Summing the scale score of indicators to form a construct, will result in inconsistent structural estimates, because it will ignore the effects of measurement error. Diamantopoulos (2006) stated that in the reflective model, all the error terms (δ_i in Figure 2.1) are associated with the observed scores of indicators (x_i in Figure 2.1). Common factor analysis can be used to extract out these measurement errors (Bollen and Ting, 2000). Factor analysis is a method conducted to investigate whether a number of variables of interest X_1, X_2, \dots, X_n are linearly related to a smaller number of unobservable factors F_1, F_2, \dots, F_k .

2.2.2 Formative Indicators (Causal Model)

(a) The Nature of the Construct

In a formative or composite latent variable model, changes in the indicators can cause changes in the underlying construct. The construct is dependent upon the indicators. The latent construct is determined as a combination of its indicators (Borsboom and Heerden, 2003; Borsboom and Heerden, 2004). For example, the human development index (HDI) is a composite measure based on three

dimensions of human development: health, education and income (UNDP 2006). Any changes in health, education or income can cause changes in a country's HDI score.

(b) Direction of Causality

In the formative model, the causality flows from items to the construct, and the variation in the construct does not cause a variation in the indicators. Only a variation in the item measures can cause a variation in the construct (Bollen and Lennox, 1991).

(c) Characteristics of Indicators

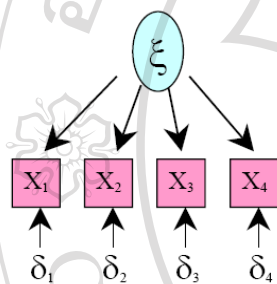
In the formative model, since the indicators have defined the construct, the construct is sensitive to the number and types of indicators selected to present the construct. Indicators do not need to be interchangeable and do not need to have a similar content or indicators that share a common theme. Conceptually, adding or dropping an indicator may change the conceptual domain of the construct (Rossiter, 2002; Javis, Mackenzie, and Podsakoff, 2003).

Since the indicators in the formative models form the construct, and indicators are not required to have the same antecedents and consequences, indicator reliability cannot be assessed empirically (Churchill, 1979; Diamantopoulos and Siguaw, 2006). There are no simple, easy and universally accepted criteria for assessing the reliability of formative indicators.

By using the sum-scale score in order to represent the construct of formative models, this may lead to biased estimates except in the event that all of the coefficients relating the measures to the construct are equal to one, and the construct level measurement error is zero (Javis, Mackenzie, and Podsakoff, 2003). The composite latent variable model includes an error term (ζ) (see Figure 2.2), which is

represented at the structural level rather than the individual item level. In the causal indicator model, by designing the model out of the study before the data is collected, the researcher can overcome the measurement error. There are two possible ways to eliminate the error term (that refers $\zeta=0$ in Figure 2.2) through design: (1) to capture all possible causes on the construct, and (2) to specify the construct in such a way as to ensure the full set of indicators is captured (Diamantopoulos, 2006).

Figure 2.1 Effect Model (Reflective Indicators)



Source: Coltman, Devinney, Midgley, and Venaik

$$X_1 = \beta_1 \xi + \delta_1$$

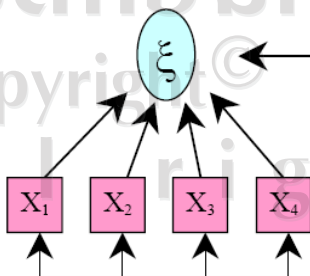
$$X_2 = \beta_2 \xi + \delta_2$$

$$X_3 = \beta_3 \xi + \delta_3$$

$$X_4 = \beta_4 \xi + \delta_4$$

(1)

Figure 2.2 Causal Model (Formative Indicators)



Source: Coltman, Devinney, Midgley, and Venaik

$$\xi = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \zeta$$

(2)