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CHILD GROWTH: CONCEPT ANALYSIS

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ABSTRACT: The aim of this study was to analyze the concept of child growth by identifying the attributes and consequences that make up the phenomenon. The concept analysis was supported by 41 studies and based on the evolutionary analysis model and integrative literature review. Five databases, Scopus, CINAHL, LILACS, PubMed, and the Cochrane Library were searched to select articles. The search found that growth has presented different connotations, including social and physiological aspects, which are part of the physical domain of child development. Attributes, antecedents, and consequences identified provide an overview of the phenomenon analyzed, because these point out several aspects previously related to other studies on child growth. The theoretical understanding about child growth can offer nurses in-depth knowledge about factors involved in this process, facilitating intervention-based decision-making.

DESCRIPTORS: Growth and development. Infant. Preschool child. Nursing. Concept formation.

CRESCIMENTO INFANTIL: ANÁLISE DO CONCEITO

RESUMO: Objetivou-se analisar o conceito do crescimento infantil por meio da identificação dos elementos atributos e consequentes que compõem o fenômeno. Para análise do conceito, subsidiada por 41 estudos, utilizou-se o modelo de análise evolucionária e a revisão integrativa da literatura. Para a seleção das produções, buscou-se as bases de dados Scopus, CINAHL e LILACS, o portal PubMed e a biblioteca Cochrane. Identificou-se que o crescimento tem apresentado diferentes conotações, incluindo aspectos sociais e fisiológicos, fazendo parte do domínio físico do desenvolvimento infantil. Os atributos e consequentes identificados trazem uma ampla visão sobre o fenômeno analisado, tendo em vista que apontam diversos aspectos já relacionados com outros estudos acerca do crescimento infantil. A compreensão teórica acerca do crescimento infantil pode oferecer aos enfermeiros conhecimento aprofundado sobre fatores que envolvem este processo, facilitando sua tomada de decisão por meio de medidas de intervenção.

DESCRIPTORIOS: Crescimento e desenvolvimento. Lactente. Pré-escolar. Enfermagem. Formação de conceito.

CRECIMIENTO DE LOS NIÑOS: ANÁLISIS DE CONCEPTO

RESUMEN: El objetivo fue analizar el concepto de crecimiento infantil mediante identificación de elementos atributos y consecuencias que componen el fenómeno. Para análisis de concepto que fue basado en 41 estudios, se utilizaron el modelo de análisis evolutivo y la revisión integradora de la literatura. Para selección de las producciones, se buscaron las bases de datos Scopus, Cinahl y Lilacs, el portal de PubMed e la biblioteca Cochrane. El crecimiento se ha presentado diferentes connotaciones, incluyendo aspectos sociales y fisiológicos como parte del dominio físico del desarrollo del niño. Atributos y consecuencias identificadas traen amplia percepción acerca del fenómeno analizado, teniendo en cuenta que vinculan diversos aspectos relacionados con otros estudios sobre crecimiento infantil. La comprensión teórica del desarrollo infantil puede proporcionar a enfermeros conocimiento en profundidad sobre los factores que implican este proceso, facilitando decisiones a través de medidas de intervención.

DESCRIPTORIOS: Crecimiento y desarrollo. Lactante. Preescolar. Enfermería. Formación de concepto.

INTRODUCTION

Academics support the idea that growth refers to a concrete and measurable process that comprises formation, increase in mass, and renewal of tissues. Childhood is the stage where global increase of the body starts.¹

In a broader view, growth involves increase of the body mass followed by the process of morphological remodeling and functional maturation that defines the child's physiological characteristics and differentiates them from adults.² Still in this context, growth is considered to be one of the best health indicators for children due to its close dependence on environmental/extrinsic factors, including eating habits, diseases, and general and personal care, in addition to proper housing and basic sanitation conditions that reflect the child's past and current health status.³

Growth is also perceived as part of the child's development, and both constitute one single phenomenon. However, child growth and development processes involve different phenomena in their physiological concept; these phenomena follow in parallel paths but are associated in their meanings.⁴

Because of such a diversity of concepts related to the phenomenon of growth in the context of nursing care, nurses have reported difficulties in assessing child growth. This difficulty is found in basic health care, where nurses are consistently assessing child growth. In this context, brief contacts with primary health care workers show situations that are investigated only regarding anthropometric parameters and eating habit characteristics, disregarding the assessment of an infant's motor activity.

In addition, there is a wide range of controversies regarding the use of this phenomenon jointly with child development. An example is the use of nursing diagnoses according to the NANDA-I taxonomy⁵ that pools several phenomena under one single diagnosis, hindering nurses from selecting proper and specific interventions.

Thus, the phenomenon of growth is complex and lacks consensus about its concepts and what it effectively intends to measure, in this way justifying the need to analyze the growth concept by focusing specifically on children. In this sense, concept analysis is widely used to clarify core characteristics of the concept of interest, or concepts that are overused or extremely vague and prevail in nursing practice.⁶

In an effort to clarify this language among health professionals, notably nurses working directly with periodic evaluation of children's health, this study analyzed the child growth concept through the identification of concepts found in the literature, and the attributes and consequences that make up the phenomenon.

METHOD

The analysis of the material concept is grounded on the evolutionary method,⁷ and the method of integrative review of the literature was used to identify bibliographic material that grounded the analysis of the child growth phenomenon concept.⁸ The study comprised the following stages of the evolutionary method:⁷

1) Identify the concept of interest and associated expressions through written or oral language including substitute terms:⁷ in this stage, the following guiding questions: How is growth defined? How is it characterized? After reading the scientific production analyzed and supplemented by books, several concepts of the growth phenomenon were found.

2) Identify and select the proper domain (scenario and sample) for data collection:⁷ the scenario refers to the period of time to analyze literature, as well as subjects or other kinds of literature comprising the analysis. Literature research can be classified into the following categories: title; summary; key words; or some combination of these search processes. The method of integrative literature review was used in this stage, through an exhaustive search of material, to subsidize the analysis of concept about the phenomenon of growth.

An integrative literature review is a comprehensive analysis of literature that contributes to deeply understanding a given object of study. To that end, it should comprise the following stages: identification of the topic and selection of the search hypothesis; definition of criteria to include and to exclude studies; selection of information to be extracted from the studies selected and categorization of studies; evaluation of studies included; interpretation of results; and presentation of knowledge review/summary.⁸

The review set the following inclusion criteria: scientific studies electronically available at the databases or journals provided by the portal of the Coordination for the Improvement of Higher

Education Personnel, regardless the method of research; in English, Spanish or Portuguese; and that approached the growth phenomenon of child growth by age, including infants, children beginning to walk, and preschool children, according to the age classification established in axis V of NANDA-I.⁵ Following were the exclusion criteria: publications in duplicate on databases; and scientific studies that were not available in full.

Studies were searched for on the Scopus, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Latin-American and Caribbean Center on Health Sciences Information (LILACS) databases, the National Library of Medicine (PubMed), and the Cochrane Library, with the following terms: *crecimiento e desenvolvimento; pré-escolar; lactente; crescimento; desenvolvimento infantil; growth and development; preschool; infant; crecimiento y desarrollo; preescolar; and lactante*.

Controlled descriptors were crossed with Boolean operators AND and OR, as follows: Scopus: growth and development AND child; preschool OR infant; the search was restricted to studies published from 2006 to 2015. PubMed: growth and development AND child; preschool AND infant; the search was restricted to studies published in the last ten years. CINAHL: growth and development AND child; preschool OR infant. The search was restricted to studies published within the last ten years. For LILACS, the terms were: growth and development AND child; preschool AND infant, with no delimitations. For Cochrane, the terms were: growth and development AND child; preschool OR infant, with no delimitations.

3) Gather relevant data to identify concept attributes and the contextual grounds (antecedents, consequent; socio-cultural, and temporal variations): the concept attributes are a real definition against a nominal or dictionary-based definition that just replaces an expression with its synonym. Substitute terms are meanings that express the concept or another word or expression selected by researchers in the study.⁷

Recognizing that attributes are important elements because these define characteristics inherent to concepts, we aimed here to answer the following guiding question: Which attributes make up growth? The search for consequences in the literature was based on the following guiding question: Which consequences make up growth?

It is worth highlighting that this study did not seek the antecedents of the phenomenon, because the previous analysis of concept would be a core theoretical support to build a nursing diagnosis in the health promotion category, waiving the use of antecedents or related factors that preceded the phenomenon of growth.

4) Analyze data regarding the concept characteristics. In this phase data are organized and adjusted and,⁷ as such, the study articles were subjected to evaluation to be included in the concept analysis. In principle, the analysis focused on evaluating the title, abstract, and descriptors that approach the phenomenon of growth, according to the number of publications described in the databases: Scopus (169); PubMed (100); CINAHL (26); LILACS (9); and Cochrane (3). This stage included a process of organization/reorganization of ideas and essential information extracted from the literature that became important to guide the researchers in how to define and measure each core characteristic that comprised the phenomenon.

Further, it focused on extracting the essential characteristics: conceptual and operational definitions; attributes; and consequences regarding the phenomenon of growth through the concept analysis method.⁷ The essential characteristics, including attributes, antecedents, and consequences, were analyzed regarding cohesion and coherence, providing sense to the information gathered. To that end, the aforementioned number of publications was refined, resulting in 41 studies that were then analyzed. The literature reviewed was not sufficient to answer the search questions and other bibliographic sources were consulted, among which were handbooks issued by the Ministry of Health and five textbooks specific to the field of children's health.^{3-4, 9-13}

5) Identify hypotheses and implications of the concept development:⁷ this process identified the consensus of the state of the art of the concept, providing an important ground considered to be crucial for further research.

RESULTS

Were selected 41 studies to support the analysis of the concept of child growth. Table 1 shows the different definitions found in the literature.

Table 1 - Definitions extracted from literature regarding the concept of child growth. Fortaleza, Ceará, Brazil, 2013. (n=41)

Definitions of child growth
Growth comprises several changes including increase in the size and complexity of body function. ¹⁴
It is basically the increase of body mass followed by a process of morphological remodeling and functional maturation; these are the physiological characteristics that define the child and differentiate it from adult. ²
It is an individual process characterized by a nonlinear episode that results in change of size between similar ages within a short time span. ¹⁵
It is the major biological event in childhood. Morphologically, it reflects the integration of multiple signals in a dynamic process, and flexibility and diversity of results are documented by variability in the phenotypic size characteristics of the human population as a whole. Growth comprises spaces in the individual: cells; tissues; and process at the organic level mediated by the interrelation between genome and local physiology to set specific ways through which the organism increases in the size and age of the immature system. ¹⁵
Growth is cell division and the consequent increase of body mass that can be identified in units such as g/day, g/month, kg/year, cm/year—that is, increase in the mass unit in a given time unit. ⁴
Growth is configured by the physical increase of the body as a whole or in parts. That means an increase in cell size (hypertrophy) or number (hyperplasia). ⁴
Growth can be considered as a quantitative change. ¹¹
Growth is considered to be one of the best indicators of the child’s health because of its close dependence on environmental/extrinsic factors, including eating habits, diseases, general and personal care, in addition to proper housing and basic sanitation conditions that reflect the child’s past and current health status. ³
Physical domain includes changes in the size, form, and characteristics of the body. ¹²
Physical development is top-to-bottom (cephalocaudal pattern) and from the center of the body to outside (proximodistal pattern). ¹²
The growth of body and brain, sensorial capacities and motor skills, is part of physical development and can influence other aspects of development. ¹²
Growth is constant; the body becomes more slender and proportions are similar to those of an adult. ¹³
Linear growth is positively associate with the children’s cognitive development. ¹⁶
Growth is a measure largely used to assess the quality of the environment where the child lives, while growth deficits are related to adverse environmental conditions. ¹⁷

Investigation has identified different attributes to the phenomenon of growth that are related to terms involved with body measures: weight and length. These are: maturation; physical, linear, longitudinal, physiological, motor growth; growth

standard; weight gain; length speed.^{12-13,16-34} Basically, it refers to anthropometric changes expected to the child’s age.

Table 2 below presents the consequences of child growth, according to specific literature.

Table 2 - Consequences of child growth. Fortaleza, Ceará, Brazil, 2013. (n=41)

	Consequences
Growth	Fast growth ^{29,35-36}
	Gain in length; gain of weight ^{23,32,36-40}
	Changes on weight and length ²⁹
	Gain of weight; relations: weight/age, weight/stature, stature/age ^{19,35,41-43}
	Optimum gain of weight ⁴²
	High growth ⁴⁴
	Secular acceleration of weight and length ²
	Changes in body tissue mass - muscle, fat, and bone ⁴⁵
	Anthropometric measures in patterns of normality ³
	Adequate anthropometric indexes according to the child’s age and sex established through growth curves ³
	Performs general motor skills in accordance with the age pattern ¹³
	Performs refined motor skills in accordance with the age pattern ¹³
	Adequate initial sensorial capacities (touch, taste, smell, sight, hearing, and primitive reflexes) ⁴⁶
	Active and non-structured games increase the child’s capacity for controlling movements ¹²
	High Z length/age score ¹⁶⁻¹⁷
Duration and quality of sleep ⁴⁷	
High control of parents is decisive for the infants’ eating habits ⁴⁸	

Evaluating the consequence “gain of weight” demands the identification of the variables of age, stature, and weight.^{19,35,41-43,49} The consequence of child growth “expresses anthropometric measures within the patterns of normality” comprises measures of weight, length, cephalic, and brachial circumferences, triceps, and subscapular skinfold thickness.³ The consequence “adequate anthropometric indexes according to the child’s age and sex established through growth curves” comprises combinations of indexes that allow describing the child’s anthropometric condition.³

As regards motor skills, the following consequences are identified: “performs general motor skills in accordance with the age pattern” and “performs refined motor skills in accordance with the age pattern.”¹³

The consequence of child growth “adequate initial sensorial capacities” refers to the child’s ability to properly respond through primary sensorial areas of the cortex - touch, smell, taste, sight, hearing, and primitive reflexes.⁴⁶

Growth is also contemplated through the consequence “develops active and non-structured games that increase the child’s capacity of controlling movements,” which expresses a playful moment using physical and social movements; there is both linear and intellectual growth as the child develops.¹²

Based on these findings, the study concluded that growth and development phenomena are related, and thus considered that growth bears a quantitative connotation as part of a child development domain named “physical.”

DISCUSSION

As regards the identification of concepts related to child growth, controversies abound in relation to which aspects should be investigated, considering that the literature presents the phenomenon dissociated from or aggregated to the child development phenomenon. In addition, it shows that when studies attach priority to the physical domain they list it as the only one to be analyzed in order to investigate child growth, in their evaluation, just the checking of anthropometric measures when they use scales.

The studies analyzed identified situations unique to the phenomenon of child growth where the physiological aspects are highlighted. In this way, we observed the relation between this phenomenon and changes in size and form, referring to body measurements and specifically approaching

it as something that can be quantified or measured, denoting the physical character of this phenomenon.

Particularly, growth is expressed as a physical domain belonging to child development. It is related to the increase of the body and brain, sensory capacities, motor skills, and health, mainly including physical development.¹²

However, in another study,⁴ the definitions of child growth are focused on other aspects such as sensory capacities and motor skills, evidencing the relative integration of the concepts of growth and development in its meaning. In this sense, the authors state that growth and development phenomena include different comprehensive aspects, but present specificities through which they are integrated.⁴ Generally speaking, the phenomenon of growth is included in child development and both result from a complex evaluation of the child that involves the influence of genetic and environmental factors.

The attributes found relative to the growth phenomenon emphasize the physical domain. Moreover, there are attributes related to the phenomenon of evolutionary process, such as length speed and growth performance. The evaluation of child growth is directly related to the monitoring of physical measures, because the combination of these measures produces indexes that allow interpreting growth.⁵⁰ The physical measures required to evaluate a child’s growth are as follows: weight; length; and circumference. We emphasize that the monitoring of weight and length measures is important to the nutritional diagnosis and also enable evaluating the growth speed.⁵¹

The term “maturation,” which is considered to be a critical attribute of child growth, deserves special attention. In this regard, many studies^{9,12-13} state that child development is related to the process of maturation of organs and systems that have gained more efficiency and ability throughout human evolution. In this peculiar situation it is observed that this term was found in a study about child growth¹² corroborating with others when it refers to growth as part of child development.

The consequences the child growth phenomenon identified in the studies focus on situations resulting from child growth considered to be adequate. In this way, the child growth result is represented by variations on weight, length, and other body measures. Usually the expected growth evaluation observes the indexes of measurements of head circumference jointly with body weight and length in the early years of life.⁴⁹ The same authors

add that growth patterns are described as fluctuations on the growth path evidenced by acceleration and deceleration in daily gain of weight.⁴⁹

In relation to the consequence "gain of weight; relations: weight/age, weight/stature, stature/age," the relation weight/age presents the meaning of weight variations in relation to age, reflecting any deterioration or improvement in the child's status. The relation weight/stature, in turn, is important to find recent weight deficiencies (acute malnutrition) and the stature/age relation is important to the linear monitoring of the child.³

Based on the consequence "expresses anthropometric measures within the patterns of normality," a study shows that anthropometric indexes are important tools to evaluate growth because these allow better estimating the child growth pattern.³ Such measures can be used jointly with weight relations referring to sex and age, predicting the child's nutritional situation.⁵²

The analysis of growth curves based on the anthropometric indexes of weight and stature (length or height) is evidenced as a growth measure, as this phenomenon is closely related to genetic heritage and environmental factors; the interaction of these factors will either allow or not allow reaching this biological goal: increase in body size (cephalocaudal, proximodistal), justifying the consequence "adequate anthropometric indexes in accordance with the child's age and sex established through growth curves".³

As regards the consequences "performs general motor skills according the age pattern" and "performs refined motor skills according the age pattern," the authors¹³ affirm that when the central nervous system, muscles, and bones are ready and the environment offers proper opportunities for exploration and practice, children surprise adults with their new motor capabilities.

Motor development is characterized by changes in motor skills throughout life, resulting from the interaction between genetically defined biological processes and environmental processes. Moreover, this development follows a chronological sequence mainly regarding postural control and antigravity movements.⁵³

In this way, changes in body size, including the format of the torso as well as the maturation of the central nervous system gradually contribute to the child's acquisition of new skills related to the balance of the torso and lower limbs. These skills facilitate standing up, walking, running, jumping, as well as the coordination of the upper limbs to

accurately perform manual tasks such as catching objects, transferring these from one hand to the other, and throwing them.^{29,33,54-56}

Regarding the consequence "adequate initial sensorial capacities," the child's brain and response behavior act in harmony thanks to the network of peripheral nerves that stretch over all parts of the body, and through that network sensory messages reach the brain and motor commands are sent back.¹³ According to the same authors,¹³ touch is the sense that seems to have faster development; an example is when you caress the cheek of a hungry newborn and he responds by trying to find the mother's nipple, expressing his sensitivity to touch.

In line with the consequence "develops active and non-structured games that increase the child's capacity to control movements," one study⁴⁶ highlights that the act of playing involves building future behaviors and the reproduction of everyday situations that allow children to assimilate the roles played by the parents and/or caregivers.

In a broader sense, children in early age, when using their tinker toys, feel stimulated to the activity of "doing," not minding about the product resulting from the toy. In this way, this process takes place because playing is not a static activity; it develops and changes as the child grows, acquiring or improving motor (physical), cognitive, and psychosocial skills.⁵⁷

CONCLUSION

Child growth as investigated in the literature is still very controversial, as the literature presents it as a phenomenon dissociated from or aggregated to child development. The growth phenomenon comprises different connotations including physiological and social aspects. Physiological aspects are related to changes in size and form, referring to body measures and specifically addressed as something that can be quantified or measured. Social aspects are seldom identified in the definitions found for child growth. On the other hand, some definitions of child growth are focused on other aspects such as sensory capacities and motor skills, evidencing the relative integration of the concepts of growth and development in their meaning.

The attributes and consequences identified in the literature provide a broad view of the phenomenon analyzed, considering that these comprise the establishment of physical parameters; the consequences, in turn, comprise both physical and social/behavioral aspects.

This concept analysis brings a comprehensive theoretical structure referring to the child's growth that can provide nurses with a deeper understanding of factors involving this phenomenon, thus facilitating their decision-making through intervention measures regarding children care. In addition, this theoretical literature survey can serve as input to other studies, mainly those of specific methodological type, to formulate new diagnosis proposals attached to the NANDA-I taxonomic classification.

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