



## Catch-Up Growth or Catch-up Development? It's time to update the concept

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### Editorial

The concept of "Catch-Up Growth" was introduced by Tanner in 1963 [1] and refers to the phenomenon observed among children who went through periods of disease or nutritional deprivation and, being adequately treated, developed growth speed above that expected for their age, until they reached the programmed genetic pattern. The recovery outcome basically referred to anthropometric indicators, such as weight and height [1]. In fact, considering the scientific knowledge of that time and the unsatisfactory socioeconomic conditions prevailing in most of the world, the main focus was to ensure adequate weight and growth [2].

However, gradually, it began to be observed that children, especially the younger ones, who went through periods of malnutrition, did not only present losses of anthropometric indicators [3]. According to the World Health Organization, children with wasting and stunting have delayed mental development, poor school performance, and reduced intellectual capacity [4]. About 50% of children with moderate malnutrition and up to 70% of those with severe conditions may have neurodevelopmental delay [5]. When we think of the broader concept of development, it should be understood as the complex, lifelong process of change that occurs from conception to adulthood, involving

physical, cognitive, social, and emotional growth [6].

In the same way that physical growth depends on the supply of macro and micronutrients, neurodevelopment, psychosocial skills, and the immune system are also strongly influenced by the adequate supply of food. The brain is an extremely complex organ, and therefore its demands are high [7]. About 20% of the energy ingested and the oxygen inhaled is used by the central nervous system [8]. Lipids are fundamental constituents of the entire structure, and amino acids are needed at all times for the synthesis of neurotransmitters and protein components [8].

In addition, vitamins, minerals, and other dietary components are also necessary for structural and functional aspects [9]. Malnourished children have impaired brain development and lower cognitive performance [10]. There is a very negative impact on obtaining lifelong education, leading to lower aptitude for exam results, delayed enrollment, and a higher risk of school repetition and dropout [10]. Nutritional recovery, when early and successful, can reverse, even partially, these losses [11]. Some research shows that short-to-medium term oral nutrition supplement regimens improves sickness and weight recovery in preschool and picky-eater populations, supporting their role as practical outpatient interventions for at-risk

children [12].

Malnutrition can also impair the development of the immune system as the deficiency of macronutrients, vitamins, and minerals compromises the maturation, proliferation, and function of immune cells, especially T and B lymphocytes, neutrophils, and macrophages [13]. Malnourished children have lower production of antibodies, lower numbers of T lymphocytes, and impaired cellular oxidative and antioxidant response, which limits immune competence [13]. The integrity of the intestinal barrier becomes vulnerable, favoring the entry of pathogens and promoting dysbiosis, which aggravates immune responses and can trigger chronic inflammatory processes [13]. Nutritional recovery must also be accompanied by the reestablishment of the integrity of immune responses [14]. Children with a decrease in height velocity or stunting also need to be evaluated carefully when recovery is assessed. Faltering growth or failure to thrive is a determinant of being treated accordingly with these crucial needs [15].

Thus, it is evident that, in addition to the recovery of anthropometric measurements, nutritional care for malnourished or low-weight and/or height children, particularly in the first years of life, should also aim to ensure a catch-up of development [16]. Figure 1 illustrates the concepts, showing that growth is a part of development.

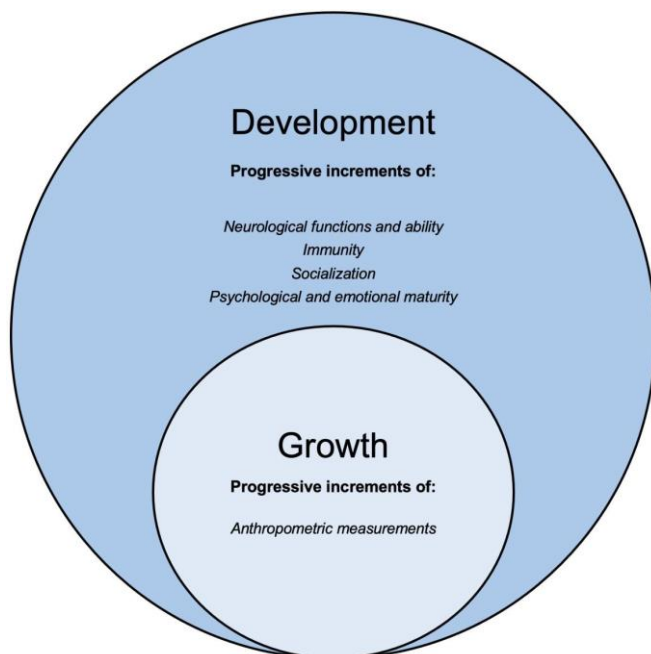


Figure 1. Growth and development. Source: Own authorship.

Considering the evolution of knowledge in child nutrition and the performance demands of the modern world, it no longer makes sense to seek weight, height, and other anthropometric measurements exclusively.

For this reason, a new nomenclature, "**catch-up development**", is suggested to reinforce the importance of professionals and researchers making their most extraordinary efforts so that malnourished and low-weight children can effectively recover in relation to their development as a whole.

## CRedit

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Not applicable.

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It was performed.

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