



Literature review on psychomotor development in infancy: areas, factors and warning signs

Análisis de la literatura sobre el desarrollo psicomotor en la infancia: áreas, factores y señales de alerta

Karina Fernanda Heras Figueroa

Licenciada en Estimulación Temprana en Salud. Magister en Educación Especial

Docente de la Unidad Educativa "Herlinda Toral"

karinaheras1993@hotmail.com

<https://orcid.org/0009-0008-5339-8725>

Cuenca, Ecuador

Andrea Esther Gualoto Meza

Licenciada en Educación General Básica. Magister en Innovación de la Educación

Docente de la Institución educativa: Unidad Educativa "José Ochoa Serrano"

andrea.gualotomeza@gmail.com

<https://orcid.org/0009-0001-2847-7666>

Cuenca, Ecuador

Fabiana Isabel Banegas Ulloa

Licenciada en Estimulación Temprana en Salud
Ministerio de Inclusión Económica y Social

fibu_1504@hotmail.com

<https://orcid.org/0009-0007-2918-8632>

Cuenca, Ecuador

Johanna Gabriela Jimbo Jerez

Licenciada en Educación General Básica. Magister en Educación Especial

Vicerrectora de la Unidad Educativa "Santa Mariana de Jesús"

johanna_jer@hotmail.com

<https://orcid.org/0009-0005-9373-4437>

Cuenca, Ecuador

ABSTRACT

Psychomotor development during infancy represents a multifaceted process shaped by several critical determinants and domains, and any delay in this development can profoundly affect a child's holistic growth. The objective was to analyze the scientific literature on psychomotor development in early childhood, identifying key areas, influencing factors and warning signs to facilitate early detection of possible developmental delays. The methodology employed included a literature review of the relevant academic literature, which was then categorized and reviewed in relation to key developmental domains, contextual determinants and indicators of concern. The results indicated that psychomotor development encompasses core domains such as motor skills, language skills, and cognitive processes, and that influencing factors such as family composition and nutritional health have important implications for developmental outcomes. It is concluded that early identification of developmental delays, coupled with a holistic approach, is critical to ensure timely intervention and appropriate support in the area of child psychomotor development.

RESUMEN

El desarrollo psicomotor durante la infancia representa un proceso multifacético moldeado por varios determinantes y dominios críticos, y cualquier retraso en este desarrollo puede afectar profundamente el crecimiento holístico del niño. El objetivo fue analizar la literatura científica sobre el desarrollo psicomotor en la primera infancia, identificando las áreas fundamentales, factores influyentes y signos de alerta para facilitar la detección temprana de posibles retrasos en el desarrollo.. La metodología empleada abarcó una revisión bibliográfica de la literatura académica pertinente, que posteriormente se clasificó y examinó en relación con los principales ámbitos del desarrollo, los determinantes contextuales y los indicadores preocupantes. Los resultados indicaron que el desarrollo psicomotor abarca ámbitos esenciales como las habilidades motoras, las habilidades lingüísticas y los procesos cognitivos, y que los factores que influyen, como la composición familiar y la salud nutricional, tienen importantes implicaciones en los resultados del desarrollo. Se concluye que la identificación temprana de los retrasos en el desarrollo, junto con un enfoque holístico, es fundamental para garantizar una intervención oportuna y un apoyo adecuado en el ámbito del desarrollo psicomotor infantil.

Keywords / Palabras clave

Childhood, Infancy, Psychomotor development, Influencing factors, Warning signs, Delayed development

Desarrollo psicomotor, Infancia, Factores de influencia, Signos de alerta, Retraso en el desarrollo

Introduction

Early detection of psychomotor developmental delays is imperative to facilitate timely interventions and mitigate potential adverse outcomes (Iceta, 2009). Numerous studies have delineated a variety of risk factors related to developmental delays, biological factors include preterm birth, low birth weight, and low Apgar scores (Drozd-Dąbrowska et al., 2018; Farid et al., 2020), maternal health problems during gestation, infections and chronic diseases (Ramirez et al., 2020), in addition, to socioeconomic factors, educational quality and low maternal education at home (McDonald et al., 2016). Thus also, empirical evidence suggests that family functionality, in particular aspects such as cohesion and adaptability, has a significant impact on several domains of early psychomotor development (Moretti et al., 2020, Bettio et al., 2019).

In this context, it can be asserted that psychomotor development during infancy constitutes a fundamental process that encompasses the acquisition of motor, cognitive and socioemotional competencies vital for the child's comprehensive development. However, a multitude of factors, including both biological and environmental influences, can facilitate or hinder this developmental trajectory. Despite the importance of early identification of potential psychomotor delays, many caregivers and health professionals have difficulty recognizing the warning indicators and understanding the underlying determinants. Consequently, a review of the literature is needed to analyze the main aspects of psychomotor development, the factors that influence it, and the criteria necessary to identify early manifestations of possible developmental difficulties in children.

Therefore, the aim of the manuscript was to analyze the scientific literature on psychomotor development in early childhood, identifying the key areas, influencing factors and warning signs to facilitate early detection of possible developmental delays.

Materials and Methods

The methodology employed for this literature review was based on a meticulous exploration of the relevant scientific literature on psychomotor development in infancy. For this purpose, internationally recognized academic databases such as PubMed, Scopus and PsycInfo were used, incorporating specific search terms: “psychomotor development”, “early childhood”, “infancy”, “influencing factors”, “warning signs” and “developmental delay”. The selected studies comprised original articles and reviews published within the last decade, which ensured the timeliness and relevance of the information presented.

32

The collected articles were then analyzed using a review matrix, which facilitated the classification and organization of the findings into three main categories: domains of psychomotor development, influencing factors, and warning signs in psychomotor development. The systematic organization of the data made it possible to identify prevalent patterns, inconsistencies, and gaps in the existing literature, as well as to synthesize the contributions of each study in a coherent manner. This analytic framework contributed to the development of a comprehensive framework on the topic, providing a critical and comprehensive perspective that can inform future research and practice in the field of child development.

Results

Fundamental Areas of Psychomotor Development in Early Childhood

Table 1 demonstrates that psychomotor development observed during early childhood is based on several interconnected domains: gross motor, fine motor, language, cognition, social skills, and autonomy. Each of these domains develops in a natural progression, influenced by both biological maturation and experiential learning in the environment.

Gross motor skills mature in a cephalocaudal trajectory, allowing the infant to control balance and body movements. This mastery is essential for a child to achieve effective physical engagement with his or her environment. In contrast, fine motor skills emphasize precision and evolve in an almost distal direction, facilitating the execution of more

complex activities involving small objects, which is essential for cognitive advancement and spatial mastery. Language is another fundamental domain, evolving through prelinguistic and linguistic stages that enable effective communication. This facet is vital not only for articulating needs but also for cultivating social-emotional competencies. Cognition is based on processing sensory experiences, enabling infants to understand their environment, improve their memory and solve problems. Social skills are cultivated from birth and are essential for establishing affective relationships and responding to human stimuli, competencies that persist throughout a person's life. Finally, the progression of autonomy equips children with the ability to achieve independence in fundamental activities, thus fostering their self-confidence. Together, these interrelated domains lay the foundation for holistic early childhood development. A deficiency in any one of these domains can jeopardize a child's overall developmental trajectory. Consequently, understanding each domain and its progression is vital to identify potential delays and facilitate timely interventions.

Table 1. Areas of Psychomotor Development

Developmental Area	Description	Approximate Age of Onset
Gross Motor Skills	Control of balance, posture and movement in cephalo-caudal sequence.	From birth
Fine Motor	Coordination of small and precise movements, mainly in proximal-distal direction.	From 3-4 months
Language	Fundamental learned behavior for communication, with prelinguistic and linguistic stages.	10-12 months (pre-linguistic); 15-18 months (linguistic)
Cognitive Development	Continuous and progressive process that allows understanding of the environment through experiences and senses.	From the first months

Social Development	Evolution of socioemotional skills, such as social smiling and eye contact.	From birth
Independence Development	Capacity for self-sufficiency, essential for meeting needs and making age-appropriate decisions.	From the first year onwards

Influencing Factors in Psychomotor Development

Psychomotor development during early childhood is subject to a multitude of contextual and environmental determinants that can enhance or impede an infant's competencies. A major factor in this regard is the family structure and the nature of the education provided. Research indicates that a stable and nurturing family environment, characterized by active participation and stimulation, is essential for a child's emotional and social maturation. Homes that encourage activities that encompass motor skills, cognitive functions and communication tend to promote more holistic psychomotor development.

The geographic location of residence also significantly influences this process, as it determines the availability of health services, educational opportunities, and stimulating activities. Children residing in rural settings, for example, may encounter obstacles, such as decreased access to educational and health resources, which can negatively affect their psychomotor growth. In contrast, children in urban areas tend to benefit from a greater variety of opportunities to participate in organized activities and specialized services. Nutritional status is another critical determinant. A nutritionally adequate diet provides the essential nutrients necessary for the development of the central nervous system and general body functions, which influences the infant's ability to interact dynamically with his or her environment.

Finally, the educational level of the parents is influential in determining the quality of stimulation the child receives at home. Parents with higher levels of education are more likely to be aware of effective infant stimulation and development practices, which can lead to parenting that fosters psychomotor progress. These interdependent factors underscore the need for a comprehensive approach tailored to each specific context, thus emphasizing the importance of timely interventions in less favorable environments.

Table 2. Influencing Factors in Psychomotor Development

Factor	Influence on Psychomotor Development
Family	Family structure, parenting style and quality of interaction influence the child's emotional and social development.
Place of Residence	Different contexts (urban/rural) affect the infant's access to resources and stimulating environment.
Nutritional Status	Adequate nutrition is essential for a child's growth and neuropsychological development.
Level of Education	Parental education levels influence the quality of stimulation and care the child receives at home.

Warning Signs in Psychomotor Development

Identifying the warning signs of psychomotor development during the early stages of infancy is essential to facilitate timely interventions and avoid lasting consequences. Among the most prominent warning signs is gross motor delay, as evidenced by difficulty in maintaining balance or executing asymmetrical movements, which may indicate underlying problems in the maturation of the central nervous system. Observation of these indicators may reveal difficulties in motor control that may affect the child's ability to navigate and relate to his or her environment. Delayed fine motor skills are another key indicator; lack of coordination in minute movements may hinder the child's ability to manipulate objects, impacting his or her autonomy and cognitive development. Language deficiencies, exemplified by the absence of babbling or the appearance of words within the expected time frame, may indicate communicative difficulties that, at the same time, impede social development. A deficiency in social skills, such as the absence of a social smile or inadequate visual engagement, is another relevant sign that may reflect difficulties in making affective connections and responding to interpersonal stimuli, limiting socioemotional growth. Ultimately, a lack of autonomy in relation to fundamental self-help activities may diminish the infant's self-esteem and ability to

independently meet personal needs. Early identification of these warning signs allows for the implementation of intervention strategies that not only mitigate the likelihood of prolonged delays, but also promote a healthy and harmonious developmental trajectory.

The intricate nature of psychomotor development during infancy is evident, a phenomenon shaped by a multitude of domains and factors involved in reciprocal interactions. Wallon (2017) postulates that the progression of development moves from actions to cognition, which establishes a transition from tangible experiences to abstract reasoning, characterized by psychomotor development as an evolutionary process marked by the continuous acquisition of skills, such that, he argues that the progressive and sequential nature of development, a widely recognized characteristic in the field of developmental psychology. However, Vericat's (2013) conceptualization introduces a dimension of variability in the pace of development, emphasizing that while developmental milestones follow a comparable sequence in all children, the speed at which these milestones are reached may differ substantially from one individual to another. These variations in the speed of skill acquisition underscore the need to recognize the individuality of each child in the assessment of psychomotor development, a consensus shared by all authors in emphasizing the distinctiveness of each developmental trajectory.

The analysis of the elements affecting psychomotor development underlines the fundamental influence exerted by the family context. Gutiérrez et al. (2015) characterizes the family as a collective of individuals interconnected by blood ties that, as a cohesive unit, exerts a direct influence on children's developmental processes, arguing that the type of family structure and the dynamics of interpersonal relationships significantly affect the child's socioemotional and cognitive development.

Furthermore, Martínez (2015) agrees that the configuration of family structures has evolved to encompass new forms, such as single-parent families and extended families, which consequently influences parenting practices and, by extension, the psychomotor development of children.

Conversely, the location of residence and the accessibility of fundamental and educational services are also recognized as key determinants Ramirez (2020). In rural regions, children often have limited access to educational and health resources, which can impede

their developmental progress (Vallejo et al., 2016). These circumstances illustrate how the socioeconomic and cultural environment shapes the developmental process, a finding that coincides with research linking nutritional status and parental educational level with progress in psychomotor development.

Regarding warning signs in psychomotor development, the literature highlights that early detection of delays is essential for timely intervention. The presence of alarm signs, such as delays in gross or fine motor skills and language acquisition, is pointed out as an indicator of possible neuropsychological difficulties in the child (Vericat, 2013).

Thus, it is also considered that the delay in psychomotor development is a provisional diagnosis until a definitive one can be established, emphasizing that this condition should not be diagnosed beyond the age of five years due to the variability in the speed of development. Regarding this premise, Argüelles (2016), for his part, highlights the need to consider a delay in two or more areas of development to suspect a global alteration, which reinforces the importance of a comprehensive assessment rather than limiting it to a single area. Thus, this holistic approach is necessary for appropriate intervention and to support the child in his or her developmental trajectory.

Conclusions

In conclusion, psychomotor development was perceived to comprise interdependent dimensions, including gross and fine motor skills, language acquisition, cognitive skills, social competencies and independence, each of which adheres to a distinct developmental trajectory, albeit with varying pace among individuals. This complexity underscores the need for a holistic approach to developmental assessment, in which the individual characteristics of each child are appropriately recognized.

In addition, contextual elements, such as family structure, geographic location, nutritional status, and parental educational level, were identified as key determinants influencing psychomotor development, suggesting that environmental attributes surrounding the infant may facilitate or obstruct developmental progress. Ultimately, warning indicators, including delays in motor skills, language acquisition, and socioemotional competencies, are imperative to identify potential

challenges in a timely manner and thus enable prompt and appropriate intervention measures to be taken.

References

- Argüelles, S. (2016). *Common developmental delay in full-term children: a common neurological profile to aid in clinical diagnosis*. iMedPub.
- Bettio, C. D. B., Bazon, M. R., y Schmidt, A. (2019). Factores de risco e de proteção para atrasos no desenvolvimento da linguagem. *Psicologia em Estudo*, 1(2). <https://api.semanticscholar.org/CorpusID:181478340>
- Cánovas, R., Martínez, L., Sánchez, M., & Roldán, L. (2010). *Retraso mental y psicomotor en la primera infancia: revisión de la literatura y propuesta de un protocolo de evaluación neuropsicológica*. Cuadernos de Neuropsicología, 4(2), 162-185.
- Castellán, M. (2013). *El concepto de familia en México: una revisión desde la mirada antropológica y demográfica*. CIENCIA ergo-sum.
- Drozd-Dąbrowska, M., Trusewicz, R., y Ganczak, M. (2018). Selected Risk Factors of Developmental Delay in Polish Infants: A Case-Control Study. *International Journal of Environmental Research and Public Health*, 15(12), 2715. <https://doi.org/10.3390/ijerph15122715>
- Farid, A., Maqbool, S., Ullah, E., Ali, A. S., y Farid, Z. (2020). Risk factors in children presenting with developmental delay. *Pakistan Armed Forces Medical Journal*, 70. <https://api.semanticscholar.org/CorpusID:225759555>
- Gutiérrez, R., Díaz, K., & Román, R. (2015). El concepto de familia en México: una revisión desde la mirada antropológica y demográfica. *CIENCIA ergo-sum*, 23(3), 219-228.
- Iceta, A. (2009). *Psychomotor development of the child and its evaluation in primary care*. Anales del Sistema Sanitario de Navarra, 25(Suppl 2), 35-43. <https://doi.org/10.23938/ASSN.0829>
- McDonald, S., Kehler, H., Bayrampour, H., Fraser-Lee, N., y Tough, S. (2016). Risk and protective factors in early child development: Results from the All Our Babies (AOB) pregnancy cohort. *Research in Developmental Disabilities*, 58, 20-30. <https://doi.org/10.1016/j.ridd.2016.08.010>
- Martínez, H. (2015). *La familia: una visión interdisciplinaria*. Revista Médica Electrónica, 37(5), 523-534.

- Moretti, M. P., Lechuga, M. J., & Torrecilla, N. M. (2020). *Desarrollo psicomotor en la infancia temprana y funcionalidad familiar*. *Psychologia*, 14(2), 37-48. <https://doi.org/10.21500/19002386.4646>
- Ramírez Pérez, E., Neme García, A., De la Cruz González, J. C., & García Rojas, E. (2020). *Factores de riesgo sociodemográficos y maternos asociados al retraso psicomotor en infantes menores de dos años en Tabasco*. *Revista Ciencias de la Salud*, 18(3). <https://doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.9792>
- Vallejo, M., Castro, L., & Cerezo, M. (2016). *Estado nutricional y determinantes sociales en niños entre 0 y 5 años de la comunidad de Yunguillo y de Red Unidos, Mocoa – Colombia*. *Revista Universidad de Salud*, 18(1), 113-125.
- Vericat, A. (2013). *El desarrollo psicomotor y sus alteraciones: entre lo normal y lo patológico*. *Ciência & Saúde Coletiva*, 18(10), 2977-2984.
- Wallon, H., Wernicke, K., & Illingworth, R. (2016). *El desarrollo psicomotor y sus alteraciones: entre lo normal y lo patológico*. *Ciencia & Salud Colectiva*, 18(10), 2977-2984.