

Impact of health-related habits on neurodevelopment and mental health in children and adolescents

Impacto de los hábitos relacionados con la salud en el neurodesarrollo y la salud mental en niños, niñas y adolescentes

Yuly-Yohana Bonilla-Flores¹, Vivian Peña-Parada², Paola Cárdenas-Malpica³, Angie Calderon-Balseca⁴, Marlen-Karina Fernández-Delgado⁵, Jesús Forgiony-Santos⁶

SUMMARY

Background: *Lifestyles during childhood and adolescence play a critical role in neurodevelopment and mental health, as the developing brain is particularly sensitive to environmental and behavioral factors. Habits related to nutrition, physical activity, and electronic device use influence cognitive, emotional, and social functioning.*

Objective: *This study aimed to analyze scientific evidence on the effects of dietary habits, screen time, and physical activity on neurodevelopment and mental health in children and adolescents.*

Material and methods: *A narrative literature review*

was conducted using scientific publications from the last five years. Observational, longitudinal, and clinical studies, as well as national and international narrative and systematic reviews, were identified through database searches. The analysis focused on outcomes related to neurodevelopment, cognitive functioning, language development, emotional regulation, social skills, and mental health indicators.

Results: *The evidence reviewed indicates that early and excessive exposure to electronic devices is associated with delays in language development, attentional difficulties, impaired social interaction, and an increased risk of neurodevelopmental alterations. In contrast, regular physical activity is associated with improvements in psychomotor development,*

DOI: <https://doi.org/10.47307/GMC.2026.134.S2.29>

ORCID: 0000-0002-7904-6110¹

ORCID: 0009-0003-8902-6062²

ORCID: 0000-0002-2336-4021³

ORCID: 0009-0009-1679-8532⁴

ORCID: 0000-0002-4964-1779⁵

ORCID: 0000-0002-2686-7679⁶

¹University of Pamplona, Faculty of Health, Cúcuta-Villa del Rosario, Cúcuta, Colombia. E-mail: yuly.bonilla@unipamplona.edu.co, yullyohanabf@gmail.com.

²University of Pamplona, Faculty of Health, Psychology, and Society, Pamplona, Colombia. E-mail: vivian.pparada@unipamplona.edu.co.

Recibido: 26 de noviembre 2025

Aceptado: 16 de enero 2026

³University of Pamplona, Faculty of Health, Program in Bacteriology and Clinical Laboratory, Research Group on Natural Resources and Care, Pamplona, Colombia. E-mail: Paola.cardenas2@unipamplona.edu.co.

⁴University of Pamplona, Faculty of Arts and Humanities, Bachelor's Degree Program in Art Education, Conquiro Research Group. Cúcuta, Norte de Santander. E-mail: angie.calderon2@unipamplona.edu.co.

⁵Unilasallista Corporación Universitaria, Facultad de Ciencias Sociales y Educación, programa de Psicología Grupo de Investigación en Psicología Aplicada GIPA. E-mail: mfernandez3@unilasallista.edu.co

⁶Simón Bolívar University, Faculty of Legal and Social Sciences, Center for Research in Border Studies, Cúcuta, Colombia. E-mail: jesus.forgiony@unisimon.edu.co

*Correspondence author: Jesus Forgiony-Santos. Simón Bolívar University, Av. 3 No. 13-34 La Playa, Cúcuta, Colombia. E-mail: jesus.forgiony@unisimon.edu.co

cognitive performance, and emotion regulation. In contrast, sedentary behavior is linked to a higher prevalence of emotional and behavioral problems. Adequate nutrition and early stimulation are protective factors, whereas malnutrition has adverse effects on neurodevelopment and mental health.

Conclusions: *Lifestyle habits are key determinants of neurodevelopment and mental health during childhood and adolescence, highlighting the importance of preventive strategies that promote healthy behaviors from early childhood.*

Keywords: *Neurodevelopment, lifestyle habits, mental health, childhood, adolescence, brain plasticity.*

RESUMEN

Antecedentes: *Los estilos de vida en la infancia y la adolescencia desempeñan un papel determinante en el neurodesarrollo y la salud mental, dado que el cerebro en desarrollo es especialmente sensible a factores ambientales y conductuales. Hábitos relacionados con la alimentación, la actividad física y el uso de dispositivos electrónicos influyen en el funcionamiento cognitivo, emocional y social.*

Objetivo: *Analizar la evidencia científica disponible sobre el impacto de los hábitos alimentarios, el uso de pantallas y la actividad física en el neurodesarrollo y la salud mental de niños, niñas y adolescentes.*

Materiales y métodos: *Se realizó una revisión narrativa de la literatura científica publicada en los últimos cinco años. Se incluyeron estudios observacionales, longitudinales y clínicos, así como revisiones narrativas y sistemáticas de alcance nacional e internacional. El análisis se centró en indicadores de neurodesarrollo, funcionamiento cognitivo, desarrollo del lenguaje, regulación emocional, habilidades sociales y salud mental.*

Resultados: *La evidencia indica que la exposición temprana y excesiva a dispositivos electrónicos se asocia con retrasos en el desarrollo del lenguaje, dificultades atencionales y alteraciones en la interacción social. En contraste, la actividad física regular se relaciona con mejoras en el desarrollo psicomotor, el rendimiento cognitivo y la regulación emocional. La malnutrición se asocia con efectos adversos sobre el neurodesarrollo y la salud mental.*

Conclusiones: *Los hábitos de vida son determinantes clave del neurodesarrollo y de la salud mental, lo que resalta la necesidad de estrategias preventivas y de promoción de estilos de vida saludables desde edades tempranas.*

Palabras clave: *Neurodesarrollo, hábitos de vida, salud mental, infancia, adolescencia, plasticidad cerebral.*

INTRODUCTION

A habit is defined as a pattern of behavior acquired through the repetition of similar actions, whose development begins between the ages of 3 and 8 years and may be maintained into adulthood (1). Therefore, the promotion of healthy lifestyles should start at early ages, integrating physical activity and adequate nutrition, and offering a range of alternatives tailored to each individual's context (2). In parallel, neurodevelopment is a maturational process of the central nervous system that begins at conception and extends through childhood and adolescence, enabling the acquisition of motor, cognitive, social, and emotional skills essential for adequate mental health in children and adolescents (3).

Consequently, cognitive and psychological functioning is shaped by the biological and psychosocial factors involved in neurodevelopment, which operate from the prenatal period and early childhood through adulthood and have implications for subsequent generations (4). According to Ramoni-Perazzi et al. (5), 51 % of children are affected because they do not achieve their full developmental potential; moreover, 90 % of adolescents live in low- and middle-income countries, where they are exposed to malnutrition, micronutrient deficiencies, and obesity across countries.

On the other hand, excessive screen use as a daily habit in children and adolescents may compromise adequate neurodevelopment, particularly during early developmental stages. This factor is compounded by reduced physical activity associated with sedentary lifestyles, which constrains the development of emotional self-regulation skills, the promotion of positive mood states, and the acquisition of adaptive emotion-regulation strategies (6). In this context, understanding brain dynamics and the influence of physical activity on neural functioning enables the design of social and pedagogical pathways that integrate movement, based on the premise that physical activity is increasingly scarce in the lifestyles of newer generations (7).

The brain supplies and regulates a wide range of organs and systems in the human body to

ensure optimal functioning and maintain adequate mental health (8). Likewise, the brain depends on the inputs it receives to provide the resources required for human functioning; therefore, lifestyle habits influence neurodevelopment, which in turn affects mental health quality (9). From this perspective, it becomes evident that addressing mental health problems requires consideration of lifestyle habits and how they affect neurodevelopment.

Therefore, the present study aims to analyze the impact of dietary habits, screen use, and physical activity levels on the neurodevelopment of children and adolescents, as well as their influence on mental health in this population. This objective is addressed through a narrative review of scientific evidence published over the last five years, considering variables related to cognitive, socioemotional, and behavioral aspects.

METHODOLOGY

The present research is a narrative literature review examining the evidence on how lifestyle habits affect neurodevelopment and their relationship with mental health in children and adolescents. The information search was conducted in internationally recognized scientific databases in the biomedical and behavioral sciences, including APA PsycNET, ScienceDirect, PubMed, Web of Science, and Scopus. Search terms related to the topic of interest were used and combined using logical operators, such as: habits, neurodevelopment, mental health, diet, exercise, electronic device use, as well as cognitive, emotional, and social aspects.

Publications in Spanish, English, and Portuguese were included, selected based on their thematic relevance and conceptual contribution to the analysis of the phenomenon under study. Given the narrative approach of the review, a systematic assessment of the methodological quality of the included studies was not conducted. Studies focusing on young adult and adult populations were excluded, as were letters to the editor, theoretical books, and reflective or opinion-based articles (Figure 1).

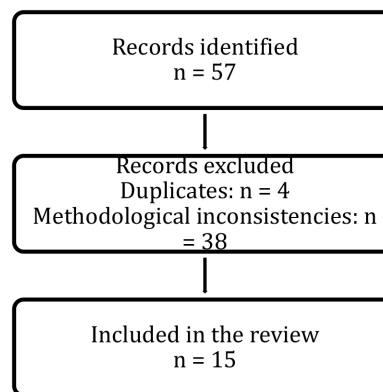


Figure 1. Flow diagram of the document identification and selection process.

Neurodevelopment in children and adolescents

Neurodevelopment refers to the series of both structural and functional transformations in the nervous system that occur across the lifespan, enabling the gradual acquisition of functional abilities. These transformations are particularly significant during critical developmental periods, when brain plasticity plays a central role by facilitating the nervous system's adaptation to environmental demands (10). Disruptions in this process may lead to brain dysfunctions that affect behavioral, cognitive, emotional, and social functioning in children and adolescents, underscoring the importance of the early years of life for overall well-being (11).

The evidence indicates that approximately 80 % of neuronal growth occurs during the first three years of life, with nearly 90 % of functional development achieved in the years that follow — a period in which core cognitive, emotional, and social skills are consolidated (12). These findings, primarily derived from observational and longitudinal studies, consistently emphasize the developing brain's high susceptibility to modifiable environmental factors (13).

Implication in food consumption

Nutrition is one of the environmental factors that most strongly influences the proper

development of the nervous system, both prenatally and during childhood (14). Multiple studies indicate that the developing brain requires substantial energy, accounting for more than half of available nutrients, making it particularly vulnerable to nutrient deficiencies (15).

The reviewed evidence indicates a consistent association between unhealthy dietary habits and impairments in emotional state, concentration, and behavior (16). In addition, studies have documented links showing that diets with low nutritional value are associated with increased symptoms of depression, anxiety, and cognitive difficulties in children and adolescents (17). Although most of these studies are observational, there is a broad consensus that nutritious diets are protective factors for neurological development and mental well-being.

Implication in screen use

Frequent and early use of electronic devices has been associated with difficulties in attention, impulse regulation, memory, and concentration capacity (18). Although heterogeneous, the available evidence indicates that adverse effects are related to exposure duration, individual age, and the type of content consumed (19).

Neurobiological studies indicate that continuous activation of reward systems, particularly those modulated by dopamine, may impair self-regulation and motivation in a still-developing brain (20,21). From a population-level perspective, a substantial proportion of children and adolescents has been observed to exceed recommended screen time limits, which is associated with academic difficulties and constraints in the development of social skills (22,23). The consistency of these findings is moderate, with predominantly cross-sectional studies reporting associations rather than causal relationships (24).

Physical activity

Reductions in physical activity and increases in sedentary behavior represent a significant challenge for the mental health of young people (25). The studies reviewed indicate a

strong association between insufficient physical activity and increased symptoms of depression, anxiety, sleep problems, and reduced emotional well-being (26).

In contrast, regular physical activity is associated with neurobiological benefits, such as increased levels of brain-derived neurotrophic factor and preservation of neuronal plasticity, particularly in regions such as the hippocampus, which is critical for memory and learning (27,28). Both longitudinal and experimental studies consistently report improvements in attention, memory, and emotional control among physically active children and adolescents, conferring a higher level of consistency to this body of evidence (29,30).

Neurodevelopment and mental health

Neurological development is a continuously evolving process that spans from pregnancy through adolescence and is characterized by high sensitivity to everyday experiences (31). Within this framework, lifestyle habits such as diet, physical activity, sleep, and the use of technology directly influence brain organization and mental health (32).

Continuous exposure to unhealthy lifestyles, such as physical inactivity, high consumption of ultra-processed foods, or the absence of structured habits, is consistently associated with an increased risk of emotional and behavioral problems, including anxiety and depression (33). Although most studies are observational, the convergence of findings underscores the clinical relevance of these factors.

Emotional, cognitive, and social implications

From a cognitive perspective, maintaining a healthy lifestyle is associated with higher academic performance and enhanced learning ability (34). Research indicates that adequate nutrition and regular physical activity benefit domains such as memory, attention, and processing speed (35). Conversely, excessive use of electronic devices and insufficient physical activity are linked to difficulties in attention,

IMPACT OF HEALTH-RELATED HABITS ON NEURODEVELOPMENT AND MENTAL HEALTH

planning capacity, and sustained academic motivation (36).

In the social domain, lifestyles have a substantial impact on how children and adolescents relate to their families, schools, and communities (37). Disorganized behaviors, sleep deprivation, and excessive technology use are associated with a higher risk of loneliness,

difficulties in behavioral regulation, and challenges in interpersonal relationships (38). In contrast, engagement in sports, artistic activities, and group-based experiences promotes healthy socialization, strengthens capacities such as empathy and teamwork, and supports the development of a sense of belonging, benefiting both the individual and the community (39).

Table 1. Summary of the main findings of the reviewed studies.

Author(s)	Central topic	Population / Context	Study type	Main findings
(40)	Video games and social development	Children and adolescents	Observational study	Prolonged video game use is associated with difficulties in social interaction and interpersonal communication.
(41)	Screen use and white matter	Pediatric population	Neuroimaging study	Excessive screen exposure is related to alterations in the integrity of cerebral white matter.
(42)	Screens and neuro-developmental disorders	Children	Review	An association is observed between early screen use and a higher risk of neurodevelopmental disorders.
(43)	Physical activity and psychomotor development	Early childhood	Cross-sectional study	Regular physical activity promotes psychomotor development and motor coordination.
(44)	Physical activity and ADHD	Children with ADHD	Clinical study	Physical exercise is associated with improvements in attention, self-regulation, and mental health.
(45)	Dietary habits and internalizing symptoms	Children and adolescents	Correlational study	Poor dietary patterns are associated with a higher prevalence of anxiety and depressive symptoms.
(9)	Neurodevelopmental disorders	Rural pediatric population	Epidemiological study	A significant prevalence of neurodevelopmental disorders is reported in rural contexts.
(10)	Early stimulation	Early childhood	Comparative study	Early stimulation promotes cognitive, motor, and socioemotional development.
(46)	Electronic media and language	Infants	Longitudinal study	Electronic media use is associated with delays in language development.
(47)	Screen exposure in children under 2 years	Early childhood	Review	Early screen exposure is linked to negative effects on cognitive and language development.
(48)	Sedentary behavior and mental health	Adolescents	Cross-sectional study	Sedentary behavior is associated with a higher risk of emotional and behavioral problems.
(24)	Physical fitness and intelligence	School-aged children	Correlational study	Better physical fitness is associated with higher levels of fluid intelligence.
(29)	Nutrition and neuro-development	Early childhood	Review	Adequate nutrition is essential for brain and cognitive development.
(49)	Malnutrition and mental health	Children	Review	Malnutrition negatively impacts neurodevelopment and mental health.
(50)	Video games and social skills	Children and adolescents	Systematic review	Evidence shows mixed effects, with increased risks when use is excessive.

Source: Authors' own elaboration.

The reviewed studies (Table 1) demonstrate a substantial association between lifestyle habits and neurological development, emotional health, and psychosocial growth in children and adolescents. Consistently, excessive and early use of electronic devices and video games is linked to difficulties in social interaction, delays in language development, alterations in brain structure, and an increased risk of neurodevelopmental disorders, particularly during early childhood.

In contrast, physical activity is considered a protective factor, as it promotes psychomotor development, coordination, fluid intelligence, and emotional well-being, even among groups with TDAH. In contrast, sedentary behavior is associated with a higher risk of emotional and behavioral problems. In addition, the evidence underscores the importance of adequate nutrition and early stimulation, showing that these factors positively support brain, cognitive, and socioemotional development. In contrast, malnutrition negatively affects neurological development and emotional health.

DISCUSSION

The evidence examined in this narrative review indicates that lifestyle factors significantly affect neurological development and psychological well-being in children and adolescents. Overall, the reviewed studies conclude that practices such as a balanced diet, adequate sleep, regular physical activity, and controlled use of electronic devices are associated with more favorable development of cognitive, emotional, and social skills (51). These findings reinforce the notion that daily habits constitute key determinants of overall well-being during critical developmental stages.

Consistently, the literature indicates that the absence of healthy habits is associated with an increased risk of emotional and behavioral problems, including symptoms of anxiety, depression, and conduct difficulties (52). Factors such as excessive technology use, frequent consumption of ultra-processed foods, and sedentary behavior not only impair individual development but also affect family dynamics, the school environment, and social interactions, thereby amplifying their negative impact.

The findings presented here are consistent with recent studies warning of an increase in mental health problems at increasingly earlier ages, within a context marked by lifestyle changes and limited implementation of preventive strategies. Furthermore, the reviewed evidence suggests that the relationship between habits and neurodevelopment is multidimensional, influenced by biological, social, cultural, and familial factors, thereby necessitating a comprehensive approach (53).

From this perspective, promoting healthy habits should be understood as a cross-cutting strategy involving health systems, educational institutions, and the community as a whole. Early and sustained interventions, grounded in health education and the creation of supportive environments, are associated with greater adaptability and reduced vulnerability to mental health problems during childhood and adolescence. These findings underscore the need to prioritize preventive approaches that recognize the importance of daily habits as social determinants of health.

CONCLUSIONS

The evidence examined in this narrative review suggests that lifestyle factors have a significant impact on neurological development and mental health in children and adolescents. The analyzed studies consistently indicate that adequate nutrition, sufficient sleep, and regular physical activity are associated with enhanced cognitive development, greater emotional stability, and more positive social functioning during critical periods of growth.

Conversely, the literature indicates that prolonged exposure to unhealthy habits, such as excessive device use, physical inactivity, and poor dietary patterns, is associated with attention difficulties, lower academic performance, and challenges in emotional regulation, as well as an increased risk of behavioral problems and symptoms of anxiety and depression. Although many of these findings derive from observational studies, there is substantial convergence supporting these associations.

Authors' Contributions

Yuly-Yohana Bonilla-Flores contributed to conceptualization, investigation, and writing of the original draft.

Vivian Peña-Parada contributed to formal analysis, data curation, and manuscript review.

Paola Cárdenas-Malpica contributed to investigation and formal analysis.

Angie Calderón-Balseca contributed to the critical revision of the intellectual content.

Marlen-Karina Fernández-Delgado contributed to methodology and supervision.

Jesús Forgiony-Santos contributed to conceptualization, supervision, and final review and editing of the manuscript.

Conflict of Interest. The authors declare no conflicts of interest related to the present manuscript.

Funding. This research received no specific grant from any funding agency in the public, commercial, or non-profit sectors.

REFERENCES

- Riaño-Garzón M, Bermúdez V, Escudero-Cabarcas J, Ortiz RE. Categorización de los hábitos desde un modelo dual: Contribuciones a la salud cardiovascular. *Rev Latinoam Hipertens.* 2022;17(6):436-445.
- Morera GE, Sánchez LC, Mateu SE, Grau MP. Fitcoin Race: Agamification proposal to work on healthy habits in initial teacher training. *Retos.* 2024;51:1234-1244.
- Arberas C. Genética de los Trastornos del Neurodesarrollo. Aspectos Prácticos. *Medicina (BuenosAires).* 2022;82(3):25-29.
- Jiménez-Martínez MC, Latorre-Velásquez DC, Ramírez-Roncancio NL, González-Valencia G. Percepción de dieta, hábitos de salud, agencia personal durante la COVID-19. *Duazary.* 2022;19(2):106-115.
- Ramoni-Perazzi J, Forero Gómez MA, Rincón Pérez AF. Determinantes del desarrollo integral infantil en Colombia (2010-2016). *Soc y Econ.* 2023;(50):e10612534.
- Cortés MEC, Aravena BCV, Silva AAA. Impact of physical activity on brain development and learning during childhood and adolescence. *Rev Infancia, Educ y Aprendiz.* 2021;7(1):39-52.
- Estrada ER, Perla S, Ovando C, Galvagno LGG. Uso de pantallas y su influencia en la cognición y los hitos del desarrollo motor de infantes mexicanos. *Rev Psicol Clín Niños Adolesc.* 2024;11(2):1-8.
- Fonseca-Rondón AC, Fajardo-Guzmán LN, Gutiérrez-Royo CL, Mogollón-Pulido V, Grau-González IA, Ortega L. Experiencias adversas y protectoras durante el desarrollo temprano: Un modelo transaccional de mecanismos psicobiológicos. *Rev Psicopatol Psicol Clínica.* 2023;28(2):151-165.
- Sempere J, Fuenzalida C. La psicoeducación interfamiliar en la atención a niños y adolescentes en los sistemas sanitarios, educativos y sociales. *Clín Contemp.* 2023;14(2):1-16.
- Förster J, López I. Neurodesarrollo humano: un proceso de cambio continuo de un sistema abierto y sensible al contexto. *Rev Méd Clín Las Condes.* 2022;33(4):338-346.
- Alonso-López N, Hernández-Valle V, Pedroza-Vargas ME, García-Medina NE. Prevalence of neurodevelopmental disorders in children from the rural population of Oaxaca evaluated by means of the Child Development Evaluation test. *Rev Neurol.* 2023;76(2):41-46.
- Álvarez-Izazaga MA, Galindo-Gómez C, Roldán-Amaro JA, Saucedo-Arteaga G, Díaz-Martínez M, Chávez-Villasana A, et al. Neurodesarrollo y estimulación oportuna en niños de madres indígenas migrantes y no migrantes en Chihuahua, México. *An Psicol.* 2022;38(2):239-250.
- Cruz-quintana F, Saforcada E, Fasfous AF, Muñoz-Vinueza A, Pérez-García M, Pérez-Marfil MN. Assessment of neurodevelopment in children and adolescents based on international development cooperation programmes. Report and progress of the BENCI (Computerised Neuropsychological Evaluation Battery for Children) project, 2009-2022. *Rev Erasmus.* 2022;24(2).
- Fernández CA, Soto GF, Conde LR, Amores FC, Arráiz GF, Cabrera M. Effects of malnutrition on child neurodevelopment and mental health. *Salud, Cienc y Tecnol.* 2024;4(7):1-15.
- Clapes Hernández Sonia, Fernández Romero Tammy, Prado González Karel. El desafío para el desarrollo del sistema nervioso central en la reproducción humana asociada con la diabetes. *Rev Cuba Endocrinol.* 2022;33(1):1-12.
- Ramón-Arбуés E, Granada-López JM, Satústegui-Dordá PJ, Echániz-Serrano E, Sagarra-Romero L, Antón-Solanas I. Distrés psicológico en estudiantes de enfermería: relación con tiempo de pantalla, dieta y actividad física. *Rev Lat Am Enfermagem.* 2023;31:39-59.

17. González Moreno A, Molero Jurado MDM. Estilo de vida saludable en la adolescencia: Relación con autoestima y diferencias según sexo. *Acción Psicol.* 2023;20(1):47-56.
18. Arufe Giráldez V, Cachón Zagalaz J, Zagalaz Sánchez ML, Sanmiguel-Rodríguez A, González Valero G. Equipamiento y uso de Tecnologías de la Información y Comunicación (TIC) en los hogares españoles durante el periodo de confinamiento. Asociación con los hábitos sociales, estilo de vida y actividad física de los niños menores de 12 años. *Rev Lat.* 2020;(78):183-204.
19. Rico MM, García CN, Rojo GP. Estudio de un Caso de Adicción a la Tecnología en un Adolescente con Sintomatología Disocial. *Clín Contemp.* 2024;15(1):1-23.
20. Soles-Núñez LC, Cieza-Mostacero SE. Influencia de los videojuegos en las habilidades sociales: Una revisión sistemática de la literatura. *Rev Ibérica Sist e Tecnol Informaçãõ.* 2023;(64):329-340.
21. Baranzoni S. Adicción y metabolismo digital. Una mirada desde la filosofía de la tecnología. *Rev Colomb Bioética.* 2020;15(2):1-17.
22. Ávalos-Ramos MA, Vidaci A, Pascual-Galiano MT, Vega-Ramírez L. Factors Influencing Physical Activity and Sports Practice among Young People by Gender: Challenges and Barriers. *Educ Sci.* 2024;14(9):967.
23. Saavedra M, Vicente B, Rúbí P. Plan nacional de salud mental. Reflexiones en torno a la implementación del modelo de psiquiatría comunitaria en Chile. *Rev Med Chil.* 2020;148(4):500-505.
24. Martínez JJ, Patricia C, Martínez R. Evaluation of sedentary lifestyle in Educational Institutions of Colombia. *Gade Rev Cient.* 2023;3(6):215-248.
25. Cuesta-Vargas AI, Biró A, Escriche-Escuder A, Trinidad-Fernández M, García-Conejo C, Roldán Jiménez CR, et al. Effectiveness of a gamified digital intervention based on lifestyle modification (iGAME) in secondary prevention: A protocol for a randomised controlled trial. *BMJ Open.* 2023;13(6):1-9.
26. Bazalo B, Morales-Sánchez V, Pérez-Romero N, Contreras-Osorio F, Campos-Jara C, Hernández-Mendo A, et al. Associations between Fluid Intelligence and Physical Fitness in School Children. *Healthc.* 2024;12(10):1-11.
27. Giménez GC, Olguín G, Almirón MD. Yoga: health benefits. A literature review. *An la Fac Ciencias Médicas.* 2020;53(2):137-144.
28. Letelier Gálvez ME. Understanding the Brain and the Education of Adult and Young People. *Estud Pedagog.* 2020;46(2):177-190.
29. Sánchez-Heredia N, Martha Álvarez-Medina G. Impacto da Neurociencia Cognitiva na Aprendizagem Ciências de la Educación Artículo de Revisión. *Polo del Conoc.* 2022;7(6):2382-2405.
30. Constantino S, Espada M. Análisis de los canales de desarrollo e inteligencia emocional mediante la intervención de una unidad didáctica de Mindfulness y Biodanza en Educación Física para secundaria. *Retos.* 2020;2041(40):67-75.
31. Araceli G, Llugsha T. Impacto de la nutrición en el neurodesarrollo de la primera infancia. *Rev Científ Salud BIOSANA.* 2025;5(3):110-126.
32. Almanza Barilla JC. Experiencias biopsicosociales para fortalecer los estilos de vida saludable: análisis desde la educación física en tres instituciones rurales del municipio de Planeta Rica Córdoba Colombia. *Cienc Lat Rev Científ Multidiscip.* 2024;8(4):4106-4125.
33. Campos JAP, Ortiz DIB. Consumo de comida ultraprocesada y manifestación de enfermedades crónicas no transmisibles a edad temprana. *Repos UTA.* 2024;9(7):76.
34. Ortiz K de las M, Cuenca EL, Muñoz JLV. Aportes de la nutrición y estilo de vida saludable para el desarrollo del pensamiento. *Rev Ecuatoriana Psicol.* 2024;7(18):238-253.
35. Mayorga DNS. Nutrición infantil y desarrollo cognitivo una revisión desde la etapa gestacional. *Rev Científica Arbitr Multidiscipl Pentaciencias.* 2024;6(7):243-258.
36. Morán FE, Morán FL, Albán J. El tiempo en pantalla en el desarrollo de las actividades académicas y la salud de los estudiantes de educación superior en la modalidad en línea. *Rev Ibérica Sist e Tecnol Informaçãõ Iber J Inf Syst Technol.* 2022;53(10):269-281.
37. Castro A, Matute G, Morales N, Zambrano P. Problemas emergentes de salud mental en adolescentes ecuatorianos. *Polo del Conocimiento.* 2023;8:145.
38. Tinoco WW, Juez PVV, Loja MRM, Tinoco WW. El entorno familiar y los derechos de las niñas, niños y adolescentes en el Ecuador. *Rev Mundo Financ.* 2024;5(14).
39. Quintero Martínez JI, Paternina Coronado A, De La Espriella Arenas FA. Actividades lúdico-recreativa para instituciones educativas. *GADE Rev Científica.* 2023;3(6):1-26.
40. Torres Hernández NA. Afectaciones en el desarrollo social y personal en niños y niñas de 6 años por el tiempo de exposición a los videojuegos. *Rev Interam Investig Educ y Pedagog RIIEP.* 2024;17(1):85-122.
41. Segovia G. Fracaso escolar : algunas consideraciones para los pediatras Asociación entre el uso de dispositivos con pantalla y la integridad de la sustancia blanca en niños preescolares. *Acta Pediatr Esp.* 2020;78:91-93.

IMPACT OF HEALTH-RELATED HABITS ON NEURODEVELOPMENT AND MENTAL HEALTH

42. Pons M, Caner M, Rubies J, Carmona M, Ruiz MÁ, Yáñez-Juan AM. Estudio comparativo del tiempo de pantallas recreativas en los trastornos del neurodesarrollo. *Rev Neurol.* 2022;74(9):291-297.
43. Ramírez, AGI, Olivo EI, Cetre PI. Child psychomotor development process from the focus of physical activity. *Rev Polo del Conoc.* 2021;6(08):1049-1061.
44. Castillo-Paredes A, Valenzuela FM, Miranda RN. Physical activity, exercise, and quality of life in children and adolescents with attention deficit hyperactivity disorder. *Rev Habanera Cienc Méd.* 2021;20(5):1-7.
45. Mercado M, González L, Romero K. Relación entre síntomas internalizados y riesgo de trastorno de la conducta alimentaria en adolescentes. *Psicol desde el Caribe.* 2020;39(1):2011-7485.
46. Stamati M, Gago-Galvagno LG, Miller SE, Elgier AM, Hauché RA, Azzollini SC. Association between electronic media use, development milestones and language in infants. *Interdisciplinaria.* 2022;39(3):151-166.
47. Rodríguez Sas O, Estrada LC. Incidencia del uso de pantallas en niñas y niños menores de 2 años. *Rev Psicol.* 2021;22(1):86-101.
48. Castro M, Delgado S, González L, Huga C. Impacto del sedentarismo en la salud mental. *Rev Cienc Salud Integr Conoc.* 2022;6(1):81-86.
49. Barrera-correa AC, Soriano-paredes EA. Effectiveness of multimodal intervention in the optimization of executive functions in educational institutions. *Rev Electrónica Ciencias la Educ Humanidades, Artes y Bellas Artes.* 2025;VIII(1):250-274.
50. Claudia Carolina Arévalo Proaño V, Pillco FN, Tello VIP, Espinoza MJV, Ximena A, Pesantez C. Crecimiento personal y buenas prácticas comunitarias. *Avances Psicol Latinoam.* 2025;38:1.
51. Colunga-Rodríguez C, Ángel-gonzález M. Investigaciones en salud y desarrollo humano sustentable. *Investigaciones en Salud y Desarrollo Sustentable.* 2024:8-123.
52. Martha M, Quiroz S, Salome EEA, Andrade G, Antonio EEC, Villavicencio G, et al. Prácticas de Autocuidado en Adolescentes y su Influencia Emocional. *Cienc Lat Rev Cient Multidiscip.* 2024;8(1):4220.
53. León Rodríguez DA, Cárdenas Parra LF. Experiencias Adversas en la Niñez: Modificaciones Neuroestructurales, Neurofuncionales y Comportamentales. *Psykhe (Santiago).* 2021;30(2):1-22