Influence of smartphone use on adolescent biopsychosocial health: An integrative review

RESUMO | Objetivo: identificar na literatura científica evidências sobre a influência do uso de smartphone na saúde biopsicossocial do adolescente. Método: revisão integrativa norteada pela questão: Qual a influência do uso do smartphone na saúde biopsicossocial do adolescente? As buscas ocorreram nas fontes da PubMed, Science Direct, Scopus, Web of Science e CINAHL. Os descritores controlados utilizados foram, "Adolescent Health", "Adolescent Behavior" e "Smartphone" combinados através de operadores booleanos. Inclui-se artigos primários, disponíveis na íntegra, nos idiomas inglês, português e espanhol, sem recorte temporal. Os estudos foram avaliados conforme o nível de evidência. Resultados: identificou-se 1070 estudos, destes, 20 foram selecionados para a leitura na íntegra e, três compuseram a amostra final. A dependência de mídia social, foi associada a um menor bem-estar mental, escolar e social. Conclusão: o uso do smartphone por adolescentes está relacionado à riscos relacionados à saúde biopsicossocial, porém é necessário o investimento de novos estudos nesta área.
Descritores: Saúde do adolescente; Smartphone; Comportamento do adolescente.

ABSTRACT | Objective: to identify evidence in the scientific literature about the influence of smartphone use on adolescent biopsychosocial health. Method: integrative review guided by the question: What is the influence of smartphone use on adolescent biopsychosocial health? Searches took place in PubMed, Science Direct, Scopus, Web of Science and CINAHL sources. The controlled descriptors used were "Adolescent Health", "Adolescent Behavior" and "Smartphone" combined using Boolean operators. Primary articles are included, available in full, in English, Portuguese and Spanish, without time frame. Studies were evaluated according to the level of evidence. Results: 1070 studies were identified, of which 20 were selected for full reading and three made up the final sample. Social media dependence was associated with lower mental, school, and social well-being. Conclusion: the use of smartphones by adolescents is related to risks related to biopsychosocial health, but it is necessary to invest in new studies in this area.
Keywords: Adolescent health; Smartphone; Adolescent behavior.

RESUMEN | Objetivo: identificar evidencias en la literatura científica sobre la influencia del uso de teléfonos inteligentes en la salud biopsicosocial de los adolescentes. Método: revisión integradora guiada por la pregunta: ¿Cuál es la influencia del uso de teléfonos inteligentes en la salud biopsicosocial de los adolescentes? Las búsquedas se realizaron en las fuentes PubMed, Science Direct, Scopus, Web of Science y CINAHL. Los descriptores controlados utilizados fueron "Salud del adolescente", "Comportamiento del adolescente" y "Teléfono inteligente" combinados mediante operadores booleanos. Se incluyen artículos primarios, disponibles en su totalidad, en inglés, portugués y español, sin marco de tiempo. Los estudios se evaluaron según el nivel de evidencia. Resultados: se identificaron 1070 estudios, de los cuales 20 fueron seleccionados para lectura completa y tres conformaron la muestra final. La dependencia de las redes sociales se asoció con un menor bienestar mental, escolar y social. Conclusión: el uso de teléfonos inteligentes por adolescentes está relacionado con riesgos relacionados con la salud biopsicosocial, pero es necesario invertir en nuevos estudios en esta área.
Palabras claves: Salud del adolescente; Smartphone, Comportamiento del adolescente.

Martina Mesquita Tonon
Nurse. Master's student at the Graduate Program in Nursing at the State University of Maringá. Maringá, Paraná, Brazil.
ORCID: 0000-0001-9113-9750

Marcela Demitto Furtado
Nurse. Doctor in Nursing. Professor at the Graduate Nursing Program at the State University of Maringá/UEM, Maringá, Paraná, Brazil.
ORCID:0000-0003-1427-4478

Marcelle Paiano
Nurse. Doctor in Nursing. Professor at the Graduate Program in Nursing at the State University of Maringá/UEM, Maringá, Paraná, Brazil
ORCID: 0000-0002-7597-784X

Bianca Machado Cruz Shibukawa
Nurse. Doctor in Nursing. Professor at the Nursing Department at the State University of Maringá. Maringa, Paraná, Brazil
ORCID:0000-0002-7739-7881

Maria de Fátima Garcia Lopes Merino
Nurse. Doctor in Nursing. Professor at the Graduate Nursing Program at the State University of Maringá/UEM, Maringá, Paraná, Brazil.
ORCID: 0000-0001-6483-7625

André Estevam Jaques
Nurse. Doctor in Nursing. Professor at the Graduate Nursing Program at the State University of Maringá/UEM, Maringá, Paraná, Brazil
ORCID: 0000-0001-7874-9589

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INTRODUCTION

Called the digital age or virtual world, the ways to relate, communicate, seek information, acquire knowledge and socialize take place through information technologies (ICT) such as computers, cell phones and internet, being inserted in the daily life of all families, especially among teenagers. [1]

Data show that Brazil is the second country with the highest daily time connected to the internet, with about 9 hours a day. [2] With a few clicks that are facilitated through the touchscreen, you can access the internet, content, games, social networks, socialize and program dialogues on your smartphone. [3]

This facility accompanies many children and teenagers who were born in the digital age. However, it is essential to remember that the internet opens the doors of the world, and in addition to the fact that adolescence is a phase marked by several transformations, in which rules imposed by parents are often broken or questioned due to different feelings and pressures, concerns about making plans, making decisions and finding their own identity. In this way, many find virtual technology as a safe environment to express their emotions and opinions. [4]

Psychological problems such as depression and anxiety can be installed as a result of excessive use of smartphones, since the dependent disorder is related to some technological addiction. [5-6]

Despite the advantages of smartphone use, such as quick access to information, meeting new people and not having to be in the same physical space, adolescents are not exempt from consequences in relation to their biopsychosocial health. [7]

It is justified, therefore, that understanding how teenagers use the smartphone is of paramount importance, as excessive use can result in psychological and behavioral impact and trigger negative behavioral changes, such as loss of control, guilt, isolation, family conflict, and decline in school performance. [8] Based on the above, the objective was to identify evidence in the scientific literature on the influence of smartphone use on adolescent biopsychosocial health.

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METHOD

This is an integrative literature review, structured in six phases: 1) Development of the research question; 2) Establishment of inclusion and exclusion criteria for studies; 3) Categorization of extracted information; 4) Analysis of information; 5) Interpretation of results and 6) Presentation of the review. [9] In order to guarantee the methodological quality of the study, the recommendations contained in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist were used during the development of this manuscript. [10]

To formulate the guiding question of this study, we used the acronym PICo (P: Population, I: Phenomenon of interest and Co: Context). Adolescents were defined as the population of this research. The phenomenon of defined interest was the influence of smartphone use. The context of the analysis was biopsychosocial health, thus forming the guiding question of this study: "What is the influence of smartphone use on adolescent biopsychosocial health?"

The survey of articles was carried out from August to September 2021 by pairs, in the following databases: PubMed, Science Direct, Scopus, Web of Science and CINAHL. For the search, the controlled descriptors in Health Science (DeCS) and Medical Subject Headings (Mesh) were used: "Adolescent Health", "Adolescent Behavior" and "Smartphone", crossing the descriptors through the Boolean operators AND and OR. The inclusion criteria adopted were: original articles, available in full, in Portuguese, English or Spanish, published without a time frame. The lack of time frame is justified by the increasing use and accessibility of technology use by adolescents in recent decades. [11] Exclusion criteria were: non-primary articles, such as opinion articles, reviews and those that, after reading them in full, did not respond to the objective of this review.

After identifying the primary studies

in the databases, all articles were analyzed through reflection on the objective, eligibility and exclusion criteria pre-established by this study. All articles from the initial identification were analyzed in terms of title and abstract. When the authors considered the information available in the title and abstract to be insufficient, they proceeded to read the article in its entirety.

To certify the standardization and organization of data collection, the researchers used a structured questionnaire of their own elaboration containing information such as the title of the manuscript, objective, methodology, year of publication, and the following question: Does this study report the influence of smartphone use on adolescent biopsychosocial health? What are these influences?

It is also noteworthy that the studies of the final sample were analyzed in a qualitative and descriptive way. The articles selected for the final sample were named by the letter "A", referring to the word "article", added by an ordinal number. They were also evaluated according to the level of evidence, [12] as shown in Chart 1.

After rigorous reading and evaluation according to the levels of evidence presented above, the articles were classified in order to analyze the methodological characteristics of the final sample. As this research is an integrative review, it was not submitted to the Research Ethics Committee.

RESULTS

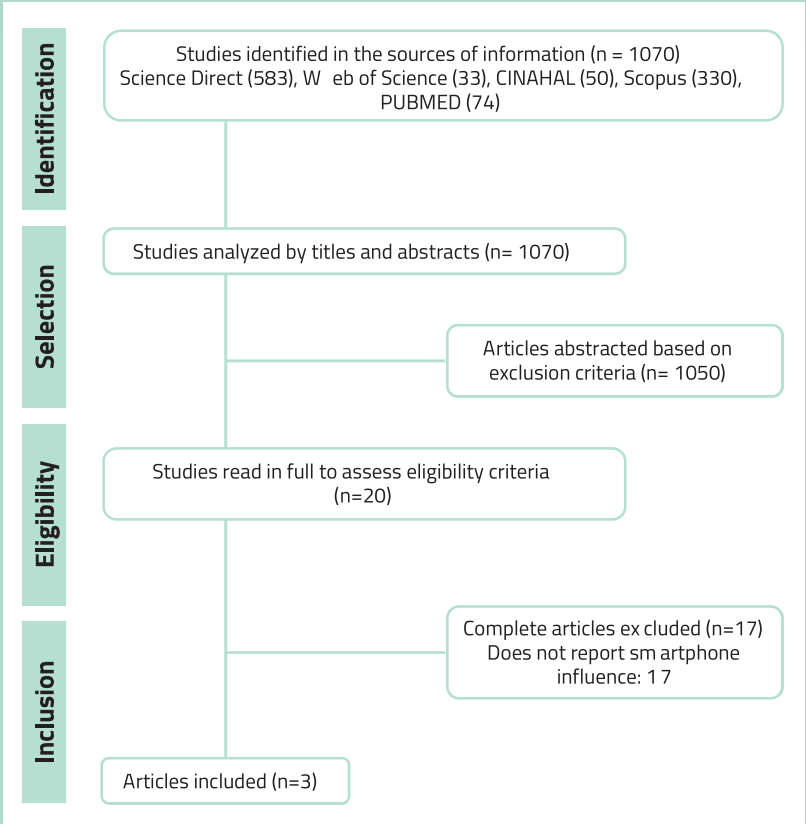
Initially, 1070 studies were identified, whose titles and abstracts were read. From this initial reading, 20 studies were selected to be read in full. However, 17 did not answer the guiding question of this research and were excluded. The final sample consisted of three scientific manuscripts. To facilitate the reader's understanding of the methodological path for the selection of studies, flowchart 1 is presented.

Chart 1. Description of levels of evidence. Maringá, Paraná, Brazil, 2022.

Level of Evidence	
I	Evidence from syntheses of cohort or case-control studies.
II	Evidence derived from a single cohort or case-control study.
III	Evidence obtained from meta synthesis or synthesis of descriptive studies.
IV	Evidence from descriptive or qualitative studies.
V	Evidence from expert opinion.

Source: Ribeiro, 2019.

Figure 1. PRISMA flowchart of articles found in the integrative literature review. Maringá, Paraná, Brazil, 2022.



Source: Adapted from Preferred Reporting Items for Systematic Reviews and Meta-Analysis. 10

The three articles selected to compose the final sample are in the English language, published in an international journal, one from the Netherlands and two from the United States and regarding the study design, there were quantitative and qualitative articles.

Table 2 describes the characteristics of each article selected for the final sample according to author, year of publication, source of information, research design and influence of smartphone use on adolescent biopsychosocial health.

DISCUSSION

Increased levels of anxiety, depression, and dissatisfaction were the main results found in this study. However, it is considered that the moderate use of the smartphone does not bring significant harm when there is screen time control. However, social media dependence generates lower mental, school and social well-being. [13-15]

Smartphone addiction is related to multiple factors, such as the search for following patterns among teenagers, virtual recreation, emotional support, search for relationships and instant feedback. It is also noteworthy that the smartphone is the main way to access the internet, making a true dependence on the device. [16]

In 2015 the average internet connection usage was 6 hours and 20 minutes, these numbers have been growing exponentially. The 2021 numbers show that Brazilians currently spend more than 10 hours connected to the internet in general. In the United States the average is 7 hours. [2]

We still have to consider the pandemic scenario in which we have been living for 2 years, which arouses different stressors in this generation of adolescents. One of these stressors is precisely the preventive measures of the pandemic, in which face-to-face classes became online, and social distancing and curfews were implemented. In this situation, the excessive use of smartphones and online games are attempts to minimize stressful moments and uncertainties in the future. [17]

At a time when visits to friends, outings and gatherings are not allowed, the use of the smartphone has become essential for human approximation in a virtual way. However, excessive screen time and depression share many common associated behaviors, such as increased physical inactivity, poor sleep, and decreased physical social interactions. In addition, increased screen time is associated with increased use of toxic substances. [18]

Corroborating these data, a study carried out in the state of Minas Gerais showed sedentary behavior as high in more than half of the adolescents, and high screen time is associated with overweight and body dissatisfaction. [19]

When analyzing screen time, sleep quality and episodes of parasomnia, it is clear that excessive screen time is related to insufficient sleep time, negative perception of sleep quality and episodes of parasomnia – sleep disorders characterized by abnormal movements and interruptions of the healthy pattern of rest. [6]

Knowing that the relationship between health and electronic devices refers to technologies that cause behavioral change, mainly influencing the practice of physical activity and healthy eating habits, a study carried out in New Zealand revealed greater understanding among those who used electronic games that indicated healthy diets and lifestyle, also addressing the blood sugar level from diet choices. [20]

It is noteworthy that the targeted use of the smartphone provides an exchange of knowledge and teachings between generations, a feeling of security, aid in studies, ease of communication and a feeling of the presence of another person. All of these are positive impacts of the controlled use of the smartphone in the family and personal sphere. Overall, the evidence indicated that moderate use of digital technology is not inherently harmful and can be beneficial in a connected world. [1,4,6]

In this scenario, the performance of primary health care in schools is essential, as they can develop activities aimed at health education, warning and teaching about screen addiction. [21] It is necessary to broaden the understanding of the impact that these technologies will have on functionality in the daily activities of adolescents. Therefo-

Chart 2. Summary of the main findings. Maringá, Paraná, Brazil, 2022.

ID/Year	Local/FI	Method	Smartphone influence	LE
A1 [20] 2013	Netherlands Science Direct	Multicenter study with 29 countries. Quantitative design. A total of 154,981 adolescents participated, with a mean age of 13.5 years. Mental, school and social well-being were evaluated. The analysis was carried out by means of logistic regression.	Lower levels of life satisfaction and family support. There are more psychological complaints than non-heavy users..	IV
A2 [20] 2014	United States of America PubMed	Cross-sectional, quantitative study with the participation of 1,701 adolescents. Depression, anxiety and screen time were investigated using scales.	Risk of substances increase. Risk of depression. isk of severe anxiety..	IV
A3 [15] 2017	United States of America Scopus	Cross-sectional, quantitative study, with the participation of 120,115 adolescents. Data were collected through a questionnaire.	Moderate smartphone use is not negative, however its use increases on weekends.	IV

Source: Authors, 2022

re, the importance of carrying out new studies involving digital technology and the health of children and adolescents is highlighted. [17-18]

CONCLUSION

Smartphone use by adolescents is related to exposure and risks related to biopsychosocial health, such as anxiety and depression, which can serve as a barrier to physical, mental and social well-being. Understanding personal limits in using this technology is essential to reaping its benefits.

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