Autism Spectrum Disorder and Assistive Technologies in Primary Care: An Integrative Review

Transtorno do Espectro Autista e Tecnologias Assistenciais na Atenção Primária: Uma Revisão Integrativa
Trastorno del Espectro Autista y Tecnologías de Asistencia en Atención Primaria: Una Revisión Integradora

RESUMO
O estudo objetivou mapear tecnologias utilizadas na atenção primária para assistência a crianças com Transtorno do Espectro Autista. Trata-se de uma revisão integrativa da literatura, realizada em bases nacionais e internacionais. Foram selecionados sete estudos que evidenciaram o uso de tecnologias tradicionais e não tradicionais para a assistência ao autismo dentre eles instrumentos de rastreio específicos, uso de tecnologias digitais, incluindo plataformas online, teleconferências e rastreio por telefone. Os resultados mostram que escalas gerais de desenvolvimento são insuficientes para identificar sinais precoces do autismo e que protocolos específicos devem ser utilizados em associação na atenção primária. O uso combinado de ferramentas específicas e recursos digitais amplia a capacidade diagnóstica e fortalece a rede de cuidado. Conclui-se que a adoção dessas estratégias pode qualificar a atenção primária, reduzir desigualdades no acesso ao diagnóstico e favorecer intervenções oportunas, ressaltando a necessidade de políticas públicas que integrem essas tecnologias.
DESCRITORES: Transtorno autístico; Atenção primária à saúde; Tecnologias leves

ABSTRACT
The study aimed to map technologies used in primary care to assist children with Autism Spectrum Disorder. This is an integrative review of the literature, carried out on national and international bases. Seven studies were selected that demonstrated the use of traditional and non-traditional technologies for autism care, including specific screening instruments, use of digital technologies, including online platforms, teleconferencing and telephone screening. The results show that general development scales are insufficient to identify early signs of autism and that specific protocols should be used in combination in primary care. The combined use of specific tools and digital resources expands diagnostic capacity and strengthens the care network. It is concluded that the adoption of these strategies can qualify primary care, reduce inequalities in access to diagnosis and favor timely interventions, highlighting the need for public policies that integrate these technologies.
DESCRIPTORS: Autistic disorder; Primary health care; Light technologies.

RESUMEN
El estudio tuvo como objetivo mapear las tecnologías utilizadas en atención primaria para la atención a niños con Trastorno del Espectro Autista. Se trata de una revisión integrativa de la literatura, realizada a nivel nacional e internacional. Se seleccionaron siete estudios que demostraron el uso de tecnologías tradicionales y no tradicionales para la atención del autismo, incluyendo instrumentos de cribado específicos, el uso de tecnologías digitales, como plataformas en línea, teleconferencias y cribado telefónico. Los resultados muestran que las escalas generales de desarrollo son insuficientes para identificar signos tempranos de autismo y que se deben utilizar protocolos específicos en combinación en atención primaria. El uso combinado de herramientas específicas y recursos digitales amplía la capacidad diagnóstica y fortalece la red de atención. Se concluye que la adopción de estas estrategias puede cualificar la atención primaria, reducir las desigualdades en el acceso al diagnóstico y favorecer intervenciones oportunas, lo que resalta la necesidad de políticas públicas que integren estas tecnologías.
DESCRIPTORES: Trastorno autista; Atención primaria de salud; Tecnologías blandas.

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INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent deficits in social communication and restrictive and repetitive patterns of behavior, interests or activities. Its manifestation is heterogeneous and can vary significantly in terms of severity and clinical presentation, which often contributes to considerable challenges in diagnosis [1]

Early detection of ASD is fundamental, since the first years of life represent a critical window of brain development, during which specialized interventions can generate significant impacts on the child's functional trajectory, promoting cognitive, social and adaptive gains . [2]

However, the diagnosis of autism still faces several obstacles, such as the shortage of qualified professionals, the difficulty in accessing specialized services,[3] which makes ASD a public health challenge, requiring articulated responses between the health, education and social assistance systems .[2]

In this context, the use of innovative technologies and digital tools has proved to be a promising strategy for increasing access to diagnosis, speeding up screening processes and supporting professionals in clinical decision-making .[4]

Thus, investigating and developing technological solutions aimed at the early detection of autism not only contributes to the effectiveness of public health policies, but also represents an important advance in promoting equity in care.

In view of the above, the aim of this study is to map the technologies used in primary care to assist children with autism spectrum disorder.

The aim of the study is to provide insights based on scientific evidence that can contribute to the qualification of primary care in order to optimize early screening, therapeutic management and monitoring of children throughout the health care network.

METHOD

This is an integrative literature review.

The integrative review allows for the synthesis of knowledge through a systematic and rigorous method consisting of 6 stages: definition of the review question, selection of primary articles, data extraction, critical evaluation of the studies, synthesis of the results and presentation of the review [5]

The guiding question was answered using the PVO strategy (acronym for population, variables, outcomes). The syntax for applying this strategy is described in Chart 1.

Chart 1 - Application of the PVO strategy.

Step	Definition	Description	Health Sciences Descriptors (DeCS)	*Medical Subject Headings (MeSH)*
P	Population	Children with autism spectrum disorder	("Autistic disorder") OR (autism)	("Autistic disorder") OR (autism)
V	Variables	Technologies used in primary health care	("Health technologies") OR ("Primary health care")	("health technologies") OR ("Primary Health Care") OR ("Access to primary care)
O	Outcome	Health care	("health care") OR ("health assistance" OR ("child care")	("health care") OR ("assistance to health") OR ("child care")

Source: Authors, 2024.

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Thus, the guiding question of this research was: What technologies are used in the health care of children with autism spectrum disorder in primary care?

The search for primary articles was carried out in May and June 2024 in the following databases: Scientific Electronic Library Online (SCIELO), Latin American and Caribbean Health Sciences Literature (LILACS), U.S. National Library of Medicine and the National Institutes Health (PubMed) and the Spanish Bibliographic Index in Health Sciences (IBECS).

The following descriptors and alternative terms were used, obtained from the Health Sciences Descriptors (DeCS) and their respective combinations in English, extracted from the Medical Subject Headings (MeSH). The Boolean operators AND and OR were used, as well as search strategies such as parentheses and quotation marks, in order to broaden and direct the search to the subject under study. The search key for each database is described in Chart 2.

Chart 2 - Application of the search strategy in the databases.

BASE	SCIELO	LILACS	PubMed	IBECS
Strategy	autistic disorder and primary health care and health care	"autistic disorder" and ("primary health care") and "health care"	"Autistic disorder" and ("Primary Health Care") and "health care"	"Autistic disorder" and ("Primary Health Care") and "health care"
Partial 1 (P1)	0	3	139	9
	autism and primary health care	"Autistic disorder" OR autism and ("Primary Health Care") and "health care" OR "assistance to health"	"Autistic disorder" OR autism and ("Primary Health Care") and "health care" OR "assistance to health"	"Autistic disorder" OR autism and ("Primary Health Care") and "health care" OR "assistance to health"
Partial 2 (P2)	1	7	342	13
Total (P1 + P2)	1	10	481	22

Source: Authors, 2024

The inclusion criteria were: full text available, Portuguese, English and Spanish languages. On the other hand, those not pertinent to the subject matter, repeated studies, as well as dissertations, theses, books and book chapters were excluded. No time limit was set for the selection of articles. The parameters were established as a way of finding as many studies as possible, with the highest level of evidence, raising the quality of the article developed.

The articles were screened and selected using rayyan software. Initially, an exploratory reading of the material found was carried out, with the aim of verifying the closeness of the articles to the subject of the study. This was followed by selective reading to determine which material was related to the research objective. Subsequently, an analytical reading was carried out, the aim of which was to order and summarize the information in order to extract answers to the research problem. Finally, the material was interpreted in order to discuss the findings.

In order to define the level of evidence of the studies, we used the classification according to Melnyk, Schultz, Feneout-Overholt [6]

RESULTS

A total of 1 article was found in SCIELO, 10 articles in LILACS, 481 in PubMed and 22 in IBECS. Of the total of 514, a careful reading of the titles and abstracts of all the publications located by the search strategies was carried out, after comparing them with the established inclusion and exclusion criteria, 11 articles were selected; then a complete reading of each material was carried out, and four articles were excluded, one for not answering the research question and three for not being scientific research, leaving seven productions that served as a data source for the production of this article. [7]

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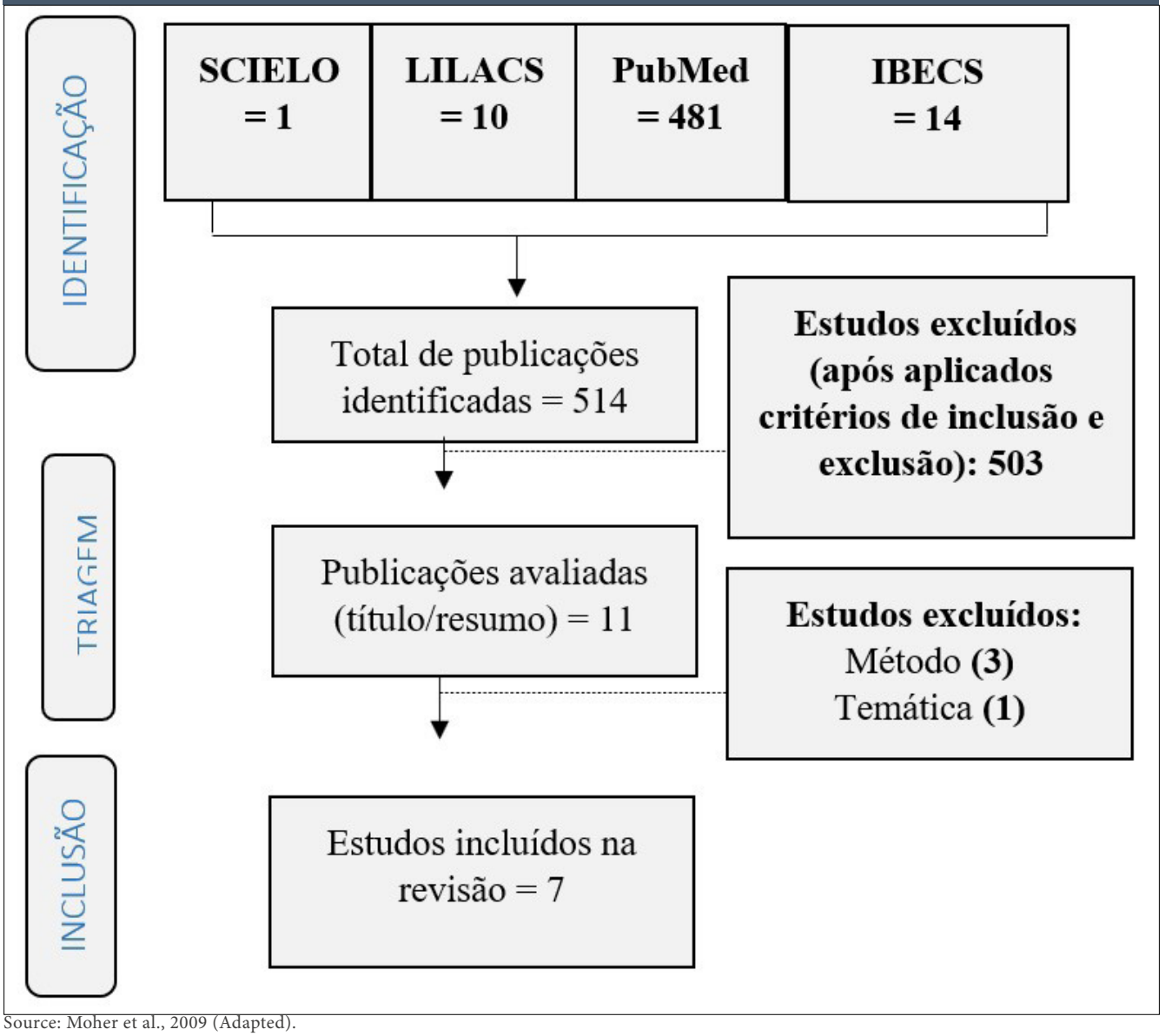
FIGURE 1 - Flowchart for selecting studies according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).



Source: Moher et al., 2009 (Adapted).

Table 3 - Summary of included studies.

Authors/ year of publication	Objective	Research design	Main results	Level of evidence	Journal / Database
1 MAZUREK Micah; PACKER Robert; CHAN James, et al. 2020	To test the effectiveness of the telementoring model applied to primary care for autism	Randomized trial	Telementoring services to connect primary care professionals and interdisciplinary teams of specialists although it did not show significant changes in practice (screening and therapeutic management) it did obtain significant improvements in confidence and knowledge about autism.	II	Pubmed

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2 STURNER Raymond; HOWARD Bárbara; BERGMANN Paul; et al. 2016	To assess the feasibility, validity and reliability of the MCHAT/F, with online support, by primary care pediatricians in children previously positive in MCHAT screening	Clinical trial	The M-CHAT when used with the follow-up interview (M-CHAT/F) has been shown to reduce unnecessary referrals to specialized services. The study found that the results of the application of M-CHAT/F by a primary care pediatrician were equivalent to those administered by a trained team with virtual contact.	III	Pubmed
3 BARBARO, Josefine; WINATA Teresa; GILBERT, Melissa; et al. 2023	To examine and compare the perspectives and experiences of Australian primary care general practitioners in relation to a digital developmental surveillance program for autism.	Qualitative study derived from randomized controlled trial	The study recognizes that primary care professionals can identify and intervene early in autism. With digital surveillance, some facilities and difficulties of the process were perceived. Facilities: communication between primary and specialized networks, link between PHC professionals and the community, use of an instrument to assess developmental milestones, screening test applied by parents and professionals, specific management protocols. Difficulties: poor knowledge of autism by professionals and parents, cultural barriers, lack of specialized services and professionals (long wait), parents' availability of time to go online, technical issues.	II	Pubmed
4 ZUCKERMAN, Katharine; CHAVEZ, Alison; UNGER Katie; et al. 2021	Improving the identification and management of autism through a screening tool and referral training for specialized intervention.	Prospective quasi-experimental study	Professional training program in primary care services for ASD screening through ASQ 3 and MCHAT-R with teleconference support for professionals allowed an increase in adherence to screening guidelines from 46% to 91%. The age range of referrals to specialties increased over the course of the intervention, as did the qualification of referrals.	III	Pubmed
5 PINTO-MARTIN, Jennifer; YOUNG, Lisa; MANDELL, David; et al. 2008	To compare the number of children identified at risk of ASD in health consultations aged between 18 and 30 months, using a general developmental screening tool and an autism-specific screening tool.	Clinical trial	General developmental assessment tool used in primary care for children lacks specificity and sensitivity for ASD screening, requiring the additional use of a specific form (M-CHAT) in childcare consultations between 18 and 30 months.	III	Pubmed
6 ROUX, Anne; HERRERA, Patrícia; DUNKLE, Margaret; et al. 2012	Evaluating the effectiveness of developmental and autism screening by telephone in a population of low-income children	Non-randomized clinical trial	The results suggest the potential of non-traditional screening models for autism: telephone referrals and monitoring.	III	Pubmed
7 ROBINS, Diana. 2008	Providing evidence on the usefulness of ASD screening in the context of primary care.	Non-randomized clinical trial	The study suggests that developmental surveillance alone is not sufficient to identify all children with ASD, and therefore demonstrates the usefulness of specific screening for ASD in young children using the M-CHAT in the primary care setting. It also reformulates the M-CHAT as a two-stage screening instrument	III	Pubmed

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DISCUSSION

Autism Spectrum Disorder (ASD) is associated with adverse social, educational, family and health impacts throughout life.[8]

Primary care professionals have an essential role in screening for autistic traits, as most of the time they are the only professionals with whom the child will have access to developmental assessment before the school day.[9,10]

Screening and early intervention are essential for public health and minimize the costs of rehabilitating a child with ASD over time. [8,10,11]

Studies show that intervention before the age of 3 has a greater impact on the lives of children and their families. The studies by Robins, Zuckerman et al. and Barbaro et al. say that although the American Academy of Pediatrics recommends ASD screening in association with general developmental screening at routine primary care visits, the average ASD diagnosis is still above 4 years of age .[8]

There are barriers to the universal implementation of ASD screening. These include: unequal access to primary care, low screening rates by health professionals, frequent use of non-specific instruments and inconsistent referrals for specialist assessment [8,10,11,12].

The findings of this review point to conventional and unconventional technology strategies to overcome these barriers.

Among the possibilities of conventional technologies, it is important to note that the use of general developmental scales does not have significant specificity for autism, especially in terms of communication and socialization, making it necessary to add specific forms for ASD screening to the childcare routine). [9,11,13]

From this perspective, the Modified Checklist for Autism in Children (M-CHAT) and the follow-up interview (M-CHAT-R/F) have emerged as scientific evidence for screening for autistic traits in childcare visits .[8,10,12, 13,14]

Studies have provided evidence that professionals can carry out screening by computerizing the form and also by unconventional means (telephone, online) carried out by trained teams without prejudicing the results)[8,9,12].

Since not all children have equal access to developmental and autism screening through primary care services in a timely manner, non-traditional methods, through phone calls, are useful for reaching underserved or uncovered populations.[10,11]

Technological resources such as call centers, digital platforms, webinars and teleconferences not only help to screen children with ASD but also contribute to professional qualification, integration of the health network and follow-up of children .[12,14]

A professional training program in primary care services for ASD screening with teleconferencing support for professionals has improved adherence to screening, qualified referrals to specialized networks and broadened the age range of children referred for intervention .[10]

The use of digital platforms and surveillance allows for better communication between the primary and specialist networks, increases the link between primary care professionals and the community, facilitates the use of autism screening tools by parents and professionals, and allows for the monitoring and follow-up of children after diagnosis [12,14].

Even when digital tools do not enable significant changes in the practice of screening and therapeutic management, they improve the confidence and knowledge of professionals who do not feel prepared to work with autism.[14]

CONCLUSION

The use of conventional and unconventional technologies is necessary to improve autism screening in primary health care.

The results of the research demonstrate the efficiency of using digital technologies in screening and monitoring children with ASD.

The main difficulty in the research was finding articles that accurately covered the subject of the study. We tried to mitigate this limitation by not establishing a time frame in the selection of articles. We didn't find any national productions that were positively related to the subject of the study.

Despite the limitations, the research achieved its objective by providing technological possibilities for optimizing early screening and therapeutic management of autistic children in primary care.

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