EDUCATIONAL RESOURCES USED FOR STUDENTS WITH AUTISM SPECTRUM DISORDER (ASD): SYNTHESIS OF QUALITATIVE EVIDENCE

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ABSTRACT

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that compromises communication and social skills. This study aimed to analyze the educational resources used by technical and higher education professionals who deal with students with ASD. This review was registered in PROSPERO CRD42020212986 and followed the recommendations of the Standards for Reporting Qualitative Research (SRQR) checklist. The scientific databases used in the search were Medline via PubMed, Embase, Web of Science and Lilacs. Ten articles were selected for the review. The educational resources that stood out along the way were: training in social and organizational skills; educational/ professional support and monitoring; technological artifacts for audiovisual interaction; and assessment tools with educational capabilities. It is understood that the improvement of educational resources, emphasizing clear and objective communication, as well as the sociability of classes, becomes essential to promote a more effective and stimulating educational environment for the learning of autistic students.

Keywords: autism; educational technology; university education

Recursos educacionais para estudantes com transtorno do espectro do autismo (TEA): síntese de evidências qualitativas

RESUMO

O Transtorno do Espectro do Autismo (TEA) é um transtorno do neurodesenvolvimento que compromete a comunicação e as habilidades sociais. Este estudo teve como objetivo analisar os recursos educacionais utilizados por profissionais de nível técnico e superior que lidam com alunos com TEA. Essa revisão foi registrada no PROSPERO CRD42020212986 e seguiu as recomendações da lista de verificação *Standards for Reporting Qualitative Research* (SRQR). As bases científicas utilizadas na busca foram *Medline* via *PubMed*, *Embase*, *Web of Science* e *Lilacs*. Dez artigos foram selecionados para a revisão. Os recursos educacionais que se destacaram ao longo do percurso foram: a formação em competências sociais e organizacionais; apoio e acompanhamento educacional/profissional; artefatos tecnológicos para interação audiovisual; e ferramentas de avaliação com capacidade educacional. Entende-se que a melhoria dos recursos educacionais, enfatizando a comunicação clara e objetiva, bem como a sociabilidade das aulas se torna fundamental para promover um ambiente educacional mais eficaz e estimulante para o aprendizado dos estudantes autistas.

Palavras-chave: autismo; tecnologia educacional; ensino superior

Os recursos educacionales para estudiantes con trastorno del espectro del autismo (TEA): síntesis de evidencia cualitativa

RESUMEN

El Trastorno del Espectro del Autismo (TEA) es un trastorno del neuro desarrollo que compromete la comunicación y las habilidades sociales. En este estudio se tuvo como objetivo analizar los recursos educacionales utilizados por profesionales de nivel técnico y universitario que lidian con alumnos con TEA. Esta revisión se registró en el PROSPERO CRD42020212986 y siguió las recomendaciones de la lista de verificación Standards for Reporting Qualitative Research

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(SRQR). Las bases científicas utilizadas en la búsqueda fueron Medline vía PubMed, Embase, Web of Science e Lilacs. Para la revisión, se seleccionaron diez artículos. Los recursos educacionales que se destacaron a lo largo del recorrido fueron la formación en competencias sociales y organizacionales; apoyo y acompañamiento educacional/profesional; artefactos tecnológicos para interacción audiovisual; y herramientas de evaluación con capacidad educacional. Se entiende que el mejoramiento de los recursos educativos, enfatizando la comunicación clara y objetiva, así como la sociabilidad de las clases, se vuelve esencial para promover un ambiente educativo más efectivo y estimulante para el aprendizaje de los estudiantes autistas.

Palabras clave: autismo; tecnología educacional; enseñanza universitaria

INTRODUCTION

Autism Spectrum Disorder (ASD) is understood as a neurodevelopmental disorder that presents impairment in communication and social skills, in addition to triggering repetitive or restrictive behaviors of varying intensity[1]. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (APA, 2014), Autism Spectrum Disorder (ASD) encompasses the following disorders: global developmental disorders, autistic disorder, and Asperger's disorder (Barokova & Tager-Flusberg, 2020). In 2015, the United Nations (UN) found that the prevalence of ASD is increasing and has already reached 70 million individuals worldwide (Vos et al., 2016). Furthermore, it is estimated that in the transition from adolescence to adulthood, 50 thousand individuals with ASD each year do not access intervention services that act with academic specific criteria, discouraging cognitive and sensory aspects of learning, contributing to non-verbalization and lack of interest dialogical in teaching (Nyrenius & Billstedt, 2020).

Despite the great importance of ASD in the scenario of neurodevelopmental disorders, only in recent decades has social inclusion asserted itself on the world stage and sought to outline a line of care with the improvement of actions aimed at the teaching-learning process of students with ASD, both in technical and higher education institutions (Waligórska et al., 2019). In view of the above, adequate teaching-learning conditions for students with ASD are fundamental for the assimilation of knowledge (Lucas, Mahler, Tierney, & Olympia, 2020).

Although there are many strategies using educational resources within the scope of basic education, systematic construction based on evidence with students who have ASD in technical and higher education is still incipient (Nyrenius & Billstedt, 2020). It is noted that the development of strategies in basic education is probably strengthened with public policies to encourage early childhood, which differs from technical and higher education. In this sense, developing intersectoral public policies at all levels of education and knowing the educational tools that are used worldwide is a latent demand. Furthermore, it is necessary to associate the limitations and challenges that permeate comorbidities related to ASD such as hyperactivity, attention deficit disorder, depression, anxiety, sleep disorders, gastrointestinal disorders, in addition to epilepsy (Isenberg et al., 2019).

Therefore, this study aims to analyze the educational resources used by technical and higher education professionals who deal with students with Autism Spectrum Disorder. The results of the present study may indicate possible interventions based on educational strategies and resources that can strengthen public policies in education and health with the development of multidisciplinary programs that provide emotional comfort with a focus on the well-being of students with ASD (Dawson-Squibb & de Vries, 2019).

METHOD

Study identification

This study is a synthesis of qualitative evidence that was conducted with the purpose of informing decision-making based on health and education from the perspective of providing an in-depth analysis for the development of intersectoral public policies in accordance with the recommendations of the Standards for Reporting Qualitative Research (SRQR) checklist (O'Brien, Harris, Beckman, Reed, & Cook, 2019). This synthesis was registered in PROSPERO with protocol CRD42020212986.

The acronym Population, Intervention, Comparison, Outcome, Study Design – PICOS structured the following research question: "What educational resources are used by technical and higher education professionals who deal with students with Autism Spectrum Disorder?". The search strategy was obtained using the acronym PICOS, in which the population comprised students with Autism Spectrum Disorder in technical and/or higher education. Intervention covered educational resources used by technical and/or higher education professionals. Comparison was not applied in this study. Outcome were the actions used to improve the teaching-learning conditions of students with Autism Spectrum Disorder in technical and/or higher education. The Study Design was qualitative studies (Eriksen & Frandsen, 2018).

Search Strategy

The literature search was carried out in the following databases: Medline via Pubmed, Embase, Web of Science and Lilacs, in October 2020. The manual search in the references of the selected articles aimed to find additional studies, possibly not identified, and they were also indicated studies by specialists in the field of health, education and social assistance in order to complement the findings. Furthermore, authors were contacted in an

attempt to obtain unavailable references.

The search strategy used terms based on the Health Sciences Descriptors (DeCS) and their corresponding Medical Subject Headings (MeSH) contained in the title and/or abstracts of the studies. Furthermore, the Boolean operators "AND" and "OR" were used, in addition to the use of quotation marks in order to improve the specificity of the article search. The search string presented terms, descriptors and connectives, in addition to being adapted according to the singularities and specificities of each database. The basic search string was: "Autism Spectrum Disorder" [Mesh] OR "Spectrum Disorders, Autism" OR "Autism Spectrum Disorders" AND "Students" [Mesh] OR "Student" OR "School Enrollment" OR "Enrollment, School" OR "Enrollments, School" OR "School Enrollments" AND "Professional Education" [Mesh] OR "Education, Professional" OR "Education, Graduate" OR "Graduate Education" OR "Educations, Graduate OR "Graduate Educations" OR "Education, Higher" AND "Education, Continuing" [Mesh] OR "Staff Development" [Mesh] OR "Education, Distance" OR "Teaching materials" [Mesh] OR "Education" [Mesh].

Eligibility Criteria

As inclusion criteria, original articles were selected with full text, in any language and without temporal restrictions, covering themes of professionals who worked with students with ASD in technical and/or higher education, also including studies that addressed more than one comorbidity in conjunction with TEA. In this research, professionals were defined as those who had any type of higher academic training. No limit was set for the age range of students.

The exclusion criteria were: incomplete articles, reports, conference proceedings, newspaper comments, editorials, case reports, quantitative studies and narrative, integrative and systematic reviews, as well as those studies that exclusively addressed educational resources aimed at professionals and clinical aspects of students with Autism Spectrum Disorder.

Data selection

For reference management, Mendeley Desktop software version 1.18 was used, which allowed the exclusion of duplicate publications. The selection of articles began with the reading of titles and abstracts independently by two of the authors (AMA and JMG) using the Rayyan QCRI software and disagreements were discussed with a third reviewer (WMCS). After the selection, independently, the variables author/year, country, study design, data collection method, types of ASD, type of resource, type of teaching, academic area, type of educational resource, description, intervention

and main outcomes using Microsoft Excel® 2016 software.

Quality assessment

The quality of the studies was assessed by two authors (MNM and JMG) using the Checklist for Qualitative Research Critical Appraisal, a tool from the Joana Briggs Institute (JBI) Systematic Reviews. This tool is originally composed of 10 questions that evaluate the quality of the information in the qualitative study (each yes answer is measured with 1 point, no, not clear and not applied answers were not scored) (Lockwood, Munn, & Porritt, 2015). The quality categories were adapted according to the study by Mendes, Hoga, Gonçalves, Silva, and Pereira (2017) into high (10-8 points), moderate (7-5 points) and low (4-1 point). A third reviewer (AMA) decided about disagreements in the studies.
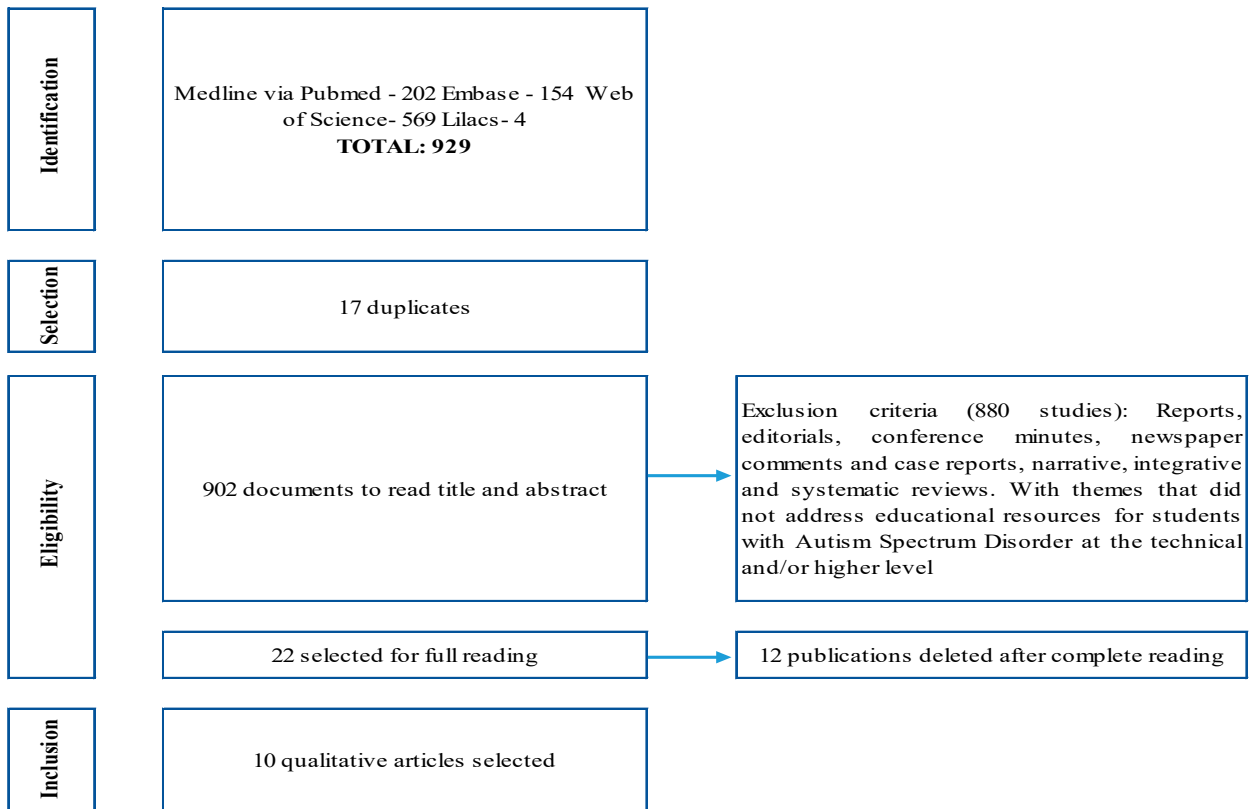
RESULTS

Characteristics of the included studies

929 publications were initially identified. After eliminating 27 duplicates, 902 publications remained for title and abstract reading. Hereof, 880 publications were excluded as they were unrelated to the theme of this research. Thus, the 22 eligible for full text reading, 12 articles were removed as they were not included in the inclusion criteria, leaving 10 articles analyzed for the present synthesis of qualitative evidence (Figure 1).

The 10 eligible studies were compiled in a table (Table 1) ordered by: year of publication, place of study, type of data collection, types of ASD, type of educational resource modality, students' academic area and comorbidities. The publication of qualitative articles found in this research took place over the last 10 years, with 80% of them published since 2013. When it comes to the origin of the studies, the majority (5) were carried out in the United States of America (USA).

Considering that all the studies analyzed were qualitative, the data collection method mostly used was the focus group (5), while the educational resource modality was predominantly face-to-face (9) (Table 1). The types of ASD identified mostly included the combination of the three specificities: Autistic Disorder, Asperger Disorder and Pervasive Developmental Disorder in 70% of the studies. It is worth noting that three studies individually addressed Asperger Disorder (Chart 1). All studies whose students presented ASD were at higher education, and in one of them, both technical and higher education. It was also observed that the majority of articles did not inform the area of study studied by the students, however, among those that contained this information, the areas with the greatest coverage were science, technology, health and education as shown in Chart 1.

Figure 1 - *Flowchart of Selected Articles Adapted Based on the PRISMA Statement.*

Identification	Medline via Pubmed - 202 Embase - 154 Web of Science- 569 Lilacs- 4 **TOTAL: 929**
Selection	17 duplicates
Eligibility	902 documents to read title and abstract → Exclusion criteria (880 studies): Reports, editorials, conference minutes, newspaper comments and case reports, narrative, integrative and systematic reviews. With themes that did not address educational resources for students with Autism Spectrum Disorder at the technical and/or higher level
	22 selected for full reading → 12 publications deleted after complete reading
Inclusion	10 qualitative articles selected

Source: Prepared by the authors.

Table 1 - *Characterization of Selected Studies (n=10).*

Author, Year	Country	Study Design	Data Collection Method	Types of ASD *	Modality	Type of Teaching	Academic Area
Fleischer, 2012	Sweden	Intervention Research	Interviews	AS	In person	Higher	Not included
Mason, Rispoli, Ganz, Boles, & Orr, 2012	USA	Intervention Research - Case Study	Focus Group/Meetings	AS	In person	Higher	Not included
Adolfsson & Fleischer, 2013	Sweden	Descriptive Qualitative Research	Method described by Graneheim and Lundman with linking rules	AS	In person	Higher	Not included
Gobbo & Shmulsky, 2014	USA	Descriptive Qualitative Research	Focus Group	PDD, AD, AS	In person	Higher	Not included
Weiss & Rohland, 2014	EUA	Pesquisa de Intervenção	Focus group/Powell model meetings	PDD, AD, AS	In person	Higher	Not included
Cai & Richdale, 2016	Australia	Descriptive Qualitative Research	Focus groups and questionnaires	PDD, AD, AS	In person	Higher	Not included
Ames, McMorris, Alli, & Becko, 2016	USA	Intervention Research	Interview, Questionnaire, Meetings and Assessment Tool	PDD, AD, AS	In person	Higher	Arts, technology, science, politics and health
Roberts & Birmingham, 2017	Canada	Intervention Research	Semi structured interview	PDD, AD, AS	In pearson	Higher	Education and Health
Anderson, Carter, & Stephenson, 2018	Australia	Pesquisa Qualitativa Descritiva	Online Questionnaire	PDD, AD, AS	DE	Higher	Sciences, education, technology, engineering, administration and law, health
Sarrett, 2018	USA	Pesquisa Qualitativa Descritiva	Focus Group	PDD, AD, AS	In pearson DE	Higher and Technical	Science, education, health and technology

* Types of ASD - PDD: Pervasive Developmental Disorder; AD: Autistic Disorder; AS: Asperger's Syndrome. Source: Written by the authors.

Table 2 - *Quality Assessment using the Checklist for Qualitative Research - JBI Systematic Reviews.*

Author/Year	Checklist for Qualitative Research- JBI Systematic Reviews										Quality
	1	2	3	4	5	6	7	8	9	10	
Fleischer, 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
Mason et al., 2012	Y	Y	Y	Y	Y	Y	N	Y	N	Y	High
Adolfsson et al., 2013	Y	Y	Y	Y	Y	Y	N	Y	UN	Y	High
Gobbo et al., 2014	Y	Y	Y	Y	Y	Y	UN	Y	UN	Y	High
Weiss & Rohland, 2014	Y	Y	Y	Y	Y	Y	Y	UN	UN	UN	Moderate
Cai & Richdale, 2016	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	High
Ames et al., 2016	Y	Y	Y	Y	Y	Y	N	Y	N	Y	High
Roberts & Birmingham, 2017	Y	Y	Y	Y	Y	Y	N	Y	UN	Y	High
Anderson et al., 2018	Y	Y	Y	Y	Y	Y	UN	Y	Y	Y	High
Sarrett, 2018	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	High

Y= Yes, N= No, UN= Unclear, NA= Not Applicable. Source: Prepared by the authors

Quality assessment

The majority of studies (90%) demonstrated high quality, according to the JBI Systematic Reviews Checklist for Qualitative Research Critical Appraisal (Table 2).

Educational Resources

The educational resources identified in 60% of the studies were about training in social and organizational skills, such as complete courses or free modules and meetings with focus groups, as shown in Table 3. The interventions elucidated varied theoretical-practical perspectives on the participation of professionals in the learning process of students with ASD in technical or higher education. In this context, the most mentioned theoretical-practical perspectives were mentoring programs involving professional practice, through monitoring and counseling the academic, social and emotional needs of students with ASD during the academic period (Chart 3).

The main outcomes analyzed highlighted important aspects for structuring and adapting the teaching-learning process in the daily lives of students with ASD, such as lack of knowledge and inaccessibility to academic and non-academic supports and services; neurodiversity in the classroom; stigma and prejudice in academic and social life; communication strategies in academic and social environments for more active participation; relational interaction with mentoring; academic motivation; organization in carrying out educational processes; recognition of the singularities of students with ASD; invisibility of the ASD diagnosis; and the need or improvement of practices aimed at sensory cognition (Chart 3).

DISCUSSION

The qualitative method applies to representations and forms aimed at social relations, values, beliefs and customs (Taquette & Minayo, 2016). A contribution of this evidence synthesis was to expand the analysis, which integrated, in addition to studies with a clinical or epidemiological focus, psychosocial aspects about the use of educational resources that showed substantial assistance in overcoming obstacles arising from the communication and social interaction of students with ASD. From this significant contribution, perspectives can emerge to guide the work of multidisciplinary education and health teams.

Morgan's (1996) strategy regarding data collection in qualitative research is elaborated in depth when carried out by focus group. This process of building student attitudes and perceptions must be open and safe. On the other hand, many interviewers may not be prepared or qualified for a dialogical group approach, which can harm the analysis and interpretation of the results obtained (Mendonça & Gomes, 2017). Therefore, in addition to training, it is worth noting that it is necessary to advance in the creation, improvement, development and application of educational resources aimed at technical and higher education students with ASD. Strengthening the educational care network for disabilities must be a priority to allow multidisciplinary teams access to support and advice for decision-making in the academic and socio-emotional spheres (Spaulding, Lerner, & Gadow, 2017).

Chart 3. Description of the Types of Educational Resources, Interventions and Main Outcomes (n=10).

Author, Year	Type of Educational Resource	Intervention	Description	Main Outcomes
Fleischer, 2012	Educational/ professional support and monitoring	University Support Group	A support group that the university coordinator directs to students with comparable difficulties that helps in managing everyday life regarding academic knowledge.	Support needs to be adjusted individually, as no two students are identical. They can get help with difficulties regarding planning schedules, losing things, forgetting to pay bills, forgetting to eat and other activities of daily life. Coordinators know that students often do not seek support until they are in a situation where they fail.
Mason et al., 2012	Audiovisual interaction technological artifacts	Video modeling	Video modeling is an empirically evidenced intervention to improve social skills. The target student views a videotaped vignette of a behavioral model providing an opportunity to imitate a behavior described in the video using affective, social, and reciprocal verbal and nonverbal communication.	Video modeling drove improvements across all skills. Improvements occurred with participation, eye contact and facial expression. Visual analysis of shared emotion demonstrated improvement with the start of facial expression intervention. The video modeling intervention increased the use of skill-directed communication in the social environment.
Adolfsson et al., 2013	Tools and Instruments	International Classification of Functions Disability and Health (ICF)	A structured tool to provide coordinators with options to enable students to manage their education and guide dialogues between students and coordinators.	The distribution of links between the ICF components shows the relationship between participatory activities with products/ technology in medicines, assistive technology, family support, teachers and other professionals, financial support, services, systems and policies on regulations that had an impact on the student's daily life with the right to part-time studies and social assistance.
Gobbo et al., 2014	Social and organizational skills training; Educational/ professional support and monitoring	Focus group meetings	Meeting: teachers' perception of the strengths and weaknesses of students with ASD; skills, critical thinking challenges, and effective instructional strategies.	Challenges were observed such as a lack of perception when changing a topic under discussion, when it is time to turn off computers or when and how to contribute to a group activity. Student motivation increases when practice is focused on research, reading and writing skills. Instructional approaches must be clear with a predictable pattern of routines.
Weiss & Rohland, 2014	Social and organizational skills training	Communication Coaching Program (CCP)	CCP is tasked with supporting and maximizing the academic and social success of college students diagnosed with Autism Spectrum Disorder through a multifaceted program designed to meet the needs of each student.	They learned more in conversational strategies (finding common topics, preparing for interviews, using prosody for emphasis, using written feedback in informal conversation), taking initiative, understanding body language cues, academic skills (note taking, email communication, scheduling weekly to account for all tasks), establishing goals.

Author, Year	Type of Educational Resource	Intervention	Description	Main Outcomes
Cai & Richdale, 2016	Educational/ professional support and monitoring	Team mentoring	Supports students with disabilities in several areas: timetables, subject selection, exams and assignments, lecture or class aids on behavioral issues, peer guidance, class notes, awareness of ASD classification, advocacy and referral to other services.	When students with ASD received appropriate academic support from their university, their anxieties were greatly reduced. Mentors' negative attitudes were slow support, inadequate provision of ASD diagnostic help, lack or insufficient human and financial resources. Need for support targeted to the requirements of each student.
Ames et al., 2016	Social and organizational skills training	ASD Mentoring Program (AMP)	AMP is developed from a peer mentoring model based on student development theory and disability theory.	The students were satisfied with the program. The level of satisfaction was rated higher for one-on-one meetings compared to group events. Several students enjoyed being able to discuss topics and issues openly, closely, and honestly with their mentor. Students would also like to have group events more frequently.
Roberts & Birmingham, 2017	Social and organizational skills training	Social and organizational skills training)	AMI is a collaborative program administered by the Center for Students with Disabilities. It is a model created with several guidance schemes that involves the relationship between a student with ASD and a fellow graduate or undergraduate student. Each student is paired with a mentor over the course of two semesters.	Supportive mentors were seen as supportive and flexible. During the meeting process, they met at the same time and place to implement goals. Academic goals were addressed first and then social goals when the student felt better academically. Mentor communication provided a comfortable environment to share personal and academic information.
Anderson et al., 2018	Treinamento de habilidades sociais e organizacionais; e Artefatos tecnológicos de interação audiovisual	Academic and non-academic supports and services	Non-academic supports and services: mentor/friend/coach; counseling support; consultation with coordinator; weekly guidance; ASD support group; social/sports clubs; online wellness course; others. Academic supports and services: training in time management skills and/or task prioritization; tutoring center; note taker; lecture transcripts; recorded classes (video or audio); online discussion forums; and reduced course load.	Many supports and services have never been used by students. The use of supports was considered occasional and useful. Four academic supports/services stand out (liaison with academics, recorded lectures, online discussion forums, and reduction of course hours) and two non-academic supports/services (consultation with coordinator and weekly guidance) with greater use by students with ASD.
Sarrett, 2018	Social and organizational skills training	Mentoring and Follow-up courses	Mentors work to advise on the practical activities of students with ASD, helping with their socio-emotional needs. Courses use online communication methods or in-person introductory experiences to guide autistic students and facilitate fluency in language communication.	The support of mentors was positive in the services. In the courses, the books on tape provided were not useful, although the reading was good, there was no need to receive written instructions. Negative aspects were related to the classes taught and textbooks that describe ASD in an offensive and entirely neurotypical way, however they must seek the idea of neurodiversity.

Source: Prepared by the authors.

In 1952, the United States of America (USA) launched the Diagnostic and Statistical Manual of Mental Disorders 1st edition (DSM-I), a guiding framework in the field of mental health for health professionals with a listing of multiple categories of mental disorders presenting the clinical symptoms and characterization of the diagnosis (Grob, 1991). Corroborating this research, it is possible to assume that North Americans have developed more studies due to the first reference standard being the DSM-I. In this sense, it is important to mention the lack of research in South America and Central America, as well as in the Asian and African continents, possibly related to the lack of funding and investments.

It is observed in this synthesis that most of the studies took place from 2013 onwards, which demonstrates that efforts in educational resources for students with ASD in technical and higher education have only recently gained ground. It is also clear that the DSM-V (APA, 2014) allowed researchers to approach the topic seeking a perspective aimed at understanding the biopsychosocial aspects of technical and/or higher education students with ASD, despite being a very clinical and not comprehensive in relation to the individuals' social characteristics (Martinhago & Caponi, 2019).

The American Psychiatric Association (APA) continued with updates to the DSM, publishing its latest version in 2013/2014. This edition is presented broadly and with specificity in the subcategories of Autism Spectrum Disorder (ASD) with different levels of severity and the insertion of new nomenclatures. The DSM-V criteria were standardized to help professionals from different areas of care, but with psychiatrists at the center.

The stigma and prejudice practices towards students with disabilities are not infrequently evident even in particularly inclusive environments such as universities. On the other hand, it is also necessary to avoid excessive protection, as both situations are culturally structured to impede academic growth, contributing to isolation and social exclusion (Van Hees, Roeyers, & De Mol, 2018).

The difficulties of students with ASD in technical or higher education need to be overcome. The directive support of technical schools and universities is essential for this improvement to occur. The structuring of a strategic plan is essential to support the activities constantly experienced in academic relations, from the selection process of registration to the issuance of the course diploma (Meimes, Saldanha, & Bosa, 2015). Corroborating with Goldberg et al. (2003), introspection and lack of proactivity on the part of educators can increase students' lack of motivation regarding educational resources, often causing them to drop out of the course.

Identifying the particular needs of each student with ASD is considered a challenge due to the variability of signs and symptoms belonging to each level of severity (grade 1, grade 2 and grade 3). However, knowing the needs in the academic environment provides the opportunity for the articulation of different strategies through educational resources, such as, for example, the mentor who goes beyond the role of a simple communicator of information to act by mediatizing academic and social relations as a knowledge trainer, facilitating the process teaching learning (Kodak, Cariveau, LeBlanc, Mahon, & Carroll, 2018).

According to Tanaka, Negoro, Iwasaka and Nakamura (2017), providing knowledge in a lucid and intentional way allows for better cognition by students with ASD. This reinforces the role of the educator who seeks responsible engagement in the content taught in a sensitive, systematized and planned way. Therefore, adapting the didactic method to the reality of each student with ASD is a huge challenge, but it must be practiced daily with the help of educational resources in order to exponentially effect inclusion.

Furthermore, students with ASD feel encouraged and motivated when their needs are solved through the use of educational resources, such as mentoring or the use of electronic devices that act to guide thinking, in situations of choice, sensory difficulties, hyperfocus, distraction and difficulty with sequencing and organizing tasks. It is believed that by making educational resources available in advance in the student's academic life, didactic-pedagogical relations are also brought closer (Stokes, 2016).

It is noteworthy that support directed to family members is essential to support the decision-making of students with ASD, as they often need guidance during the academic process. Multidisciplinary teams work in this context with psychopedagogy, occupational therapy, psychotherapy, music therapy, physical activity, speech therapy, among other activities that strengthen not only students with ASD, but also family members and other social actors who can assist in the teaching-learning process (McDonald et al., 2019).

Limitations and strengths

The limitations of this research included data collection for convenience, making it impossible to extrapolate the findings to populations from different countries; technical education was not representative in studies, reducing the applicability of educational resources in other technical education institutions. In this sense, not all studies used the same form of data collection, compromising the absolute comparability of findings. Regarding the quality of the studies, the application of JBI's Checklist for Qualitative Research Critical Appraisal classified only one study with moderate quality. On the other hand, the reviewers considered the permanence of the study to be satisfactory for

analyzing the outcomes that emerged regarding the use of educational resources with students with ASD in technical and higher education.

The strengths of this synthesis of evidence lie in the multidisciplinary and intersectoral actions that enhance the organization and mental and social capabilities to become outstanding human beings (Freire, 2005). The practical theoretical training process needs to present itself in its collective and individual relations through the diversity of critical reflections. Therefore, through reflective action, the existence of students with ASD completing courses in technical schools and universities around the world was recognized and publicized, being an important step towards breaking stigma and prejudice.

CONCLUSION

This review of qualitative evidence allowed us to identify and understand educational resources about the reality experienced by technical or higher education students with ASD. We consider that students with ASD are unique in their needs and potential and that their social and academic demands need to be overcome so that they are no longer circumstantially excluded. Therefore, regarding educational resources for students with ASD in technical and higher education, it is necessary to implement them where there are none, and to improve them where they are already applied with a view to providing more participatory socialization processes.

The inclusion of students with ASD in different levels and modalities of teaching comprises multiple aspects in the educational space. However, there is a scientific gap related to this topic, which highlights the importance of promoting research aimed at students with ASD in technical or higher education. It is known that development in learning is heterogeneous, but it is gradual, especially when stimulated and guided in making decisions and completing activities. It is not appropriate to limit student access to physical space only, it is necessary to provide a welcoming social space. At this point, educational resources can significantly contribute to the appropriation of everything the teaching process has to offer.

Practical implications

Despite the important support that mentoring and other educational resources offer to students, it is clear that further progress is still needed in improving educational resources that dialogue with the interactivity of classes, clear and objective communication, flexibility in the delivery time of academic activities, seeking structure more motivational strategies for students with ASD, placing less pressure on correcting assignments and exams for high grades.

Furthermore, it is important to understand that universities and schools are social actors responsible for seeking the integration of students with ASD in technical and/or higher education, and it is clear that inclusion is not a utopia. Therefore, it is a reality that has been achieved with varied educational resources that support the complement of intersectoral and multidisciplinary structuring efforts to transform attitudes and behaviors in academic institutions, government and society in order to embrace social diversity.

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