

Alteration in the pragmatics of Brazilian Portuguese-speaking children diagnosed with autism spectrum disorder: a systematic review

Alterações na pragmática de crianças falantes de português brasileiro com diagnóstico de transtorno do espectro autista: uma revisão sistemática

Cambios en la pragmática de los niños brasileños de habla portuguesa diagnosticados con trastorno del espectro autista: revisión sistemática

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Abstract

Introduction: Pragmatics is characterized by the social use of language. Autistic Spectrum Disorder (ASD) is a developmental disorder that affects social and communicative skills. Therefore, the common sense is that there are differences in the pragmatic abilities of children with ASD. **Objective:** To verify

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Authors' contributions

CB, DOM, ACOM: Study conception Methods: Data collection; Manuscript drafting; Critical revision.

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the occurrence of changes in pragmatic abilities of Brazilian Portuguese-speaking children diagnosed with ASD. **Method:** Researches without period restriction in various databases, wherein the inclusion criteria were: children, ASD diagnosis, BP speakers, observational and experimental studies, language development. Studies that did not address the development of pragmatic abilities were excluded. The following phases were developed: description of main results, critical reading involving the STROBE initiative, and methodology analysis using the GRADE system. **Results:** Nine researches were selected to summarize the work. Among them, two did not find changes in the pragmatic skills of children with ASD. The changes presented in the results of the other researches were heterogeneous. **Conclusion:** The diversity of methodologies prevents precise conclusions at the end of this review. The need for a reference protocol and a standardization in its application is evident, so that these studies can be compared and replicated.

Keywords: Linguistics; Autistic Spectrum Disorder; Child.

Resumo

Introdução: A pragmática é caracterizada pelo uso social da linguagem. O Transtorno do Espectro Autista (TEA) é um transtorno invasivo do desenvolvimento que afeta as habilidades sociais e comunicativas. Existe, então, um senso comum de que as crianças com TEA possuem alterações nas habilidades pragmáticas. **Objetivo:** Verificar a existência de alterações nas habilidades pragmáticas de crianças falantes de Português Brasileiro (PB) diagnosticadas com TEA. **Método:** Buscas de pesquisas sem restrição de período em várias bases de dados, em que os critérios de inclusão foram: crianças, diagnóstico de TEA, falantes de PB, estudos observacionais e experimentais, aquisição dos domínios linguísticos. Estudos que não abordassem o desenvolvimento da pragmática foram excluídos. Foram realizadas as seguintes etapas: descrição dos principais resultados, leitura crítica envolvendo a Iniciativa STROBE e análise de metodologia utilizando o Sistema GRADE. **Resultados:** Nove pesquisas foram selecionadas para síntese do trabalho. De todas, duas não encontraram alterações nas habilidades pragmáticas de crianças com TEA. As alterações apresentadas nos resultados das demais pesquisas foram heterogêneas. **Conclusão:** A diversidade de metodologias impossibilita conclusões precisas ao final desta revisão. Fica evidente a necessidade de um protocolo de referência e com padronização na aplicação, para que estudos possam ser comparados e reproduzidos.

Palavras-chave: Linguística; Transtorno do Espectro Autista; Criança.

Resumen

Introducción: La pragmática se caracteriza por el uso social del lenguaje. El Trastorno del Espectro Autista (TEA) es un trastorno invasivo del desarrollo que afecta las habilidades sociales y comunicativas. Por lo tanto, existe un sentido común de que los niños con TEA tienen cambios en sus habilidades pragmáticas. **Objetivo:** Verificar la existencia de cambios en las habilidades pragmáticas de los niños hablantes del Portugués Brasileño (PB) diagnosticados con TEA. **Método:** Búsquedas de investigaciones sin restricción de período en varias bases de datos, em que los criterios de inclusión fueron: niños, diagnóstico de TEA, hablantes de PB, estudios de observación y experimentales, adquisición de dominios lingüísticos. Se excluyeron los estudios que no abordaron el desarrollo de la pragmática. Las siguientes etapas fueron realizadas: descripción de los principales resultados, lectura crítica envolviendo la iniciativa STROBE y el análisis metodológico mediante el sistema GRADE. **Resultado:** Se seleccionaron nueve investigaciones para síntesis del trabajo. De todas, dos no encontraron cambios en las habilidades pragmáticas de los niños con TEA. Los cambios presentados en los resultados de las otras encuestas fueron heterogéneos. **Conclusión:** La diversidad de metodologías hace imposible tener conclusiones precisas al final de esta revisión. Se hace evidente la necesidad de un protocolo de referencia y con estandarización en la aplicación, para que los estudios puedan ser comparados y reproducidos.

Palabras clave: Lingüística; Trastorno del Espectro Autista; Niño.

Introduction

Pragmatics is the linguistic domain characterized by the social use of language. Pragmatic studies deal with language functions in social, situational and communicative contexts by investigating the set of rules that explain or regulate the intentional use of language. These rules, as part of a shared social system, make the adequate use of language possible in concrete contexts. Pragmatics relies on the speaker's communicative intentions and their language use to achieve those intentions¹. As it is present in people's lives from the earliest age, studies may observe and study its development.¹

Communicative functions (communicative skills) and conversation (conversational skills) are the focus of pragmatic studies about child language. Communicative functions reflect the communicative intention (motivation) of the speaker, and conversation is the result of the communicative exchanges between interlocutors. These exchanges take place in a social context that determines which skills should be put into play.

The functional, sociolinguistic development of language has three phases²: phase I – child's initial linguistic system; phase II – transition to the adult linguistic system; and phase III – adult linguistic system. The functions in phase I are: instrumental - "give me that"; regulatory - "do as I tell you"; interactional - "me and you"; personal - "I don't like it"; heuristic - "Why?"; imaginative - "let's pretend"; informative - "I've got something to tell you"². In Phase II, the person learns grammar, interposing content and expression. In Phase III, function is no longer synonymous with use, as adults use language in several ways. A typical utterance, no matter what its use, has a component of meaning that is both ideational and interpersonal.

In children language, pragmatics has a developmental order, and certain communicative functions appear and increase the complexity of the communication of a child. Pragmatic development begins at birth, in the form of social interactions, such as looking, crying, smiling and pointing, even before infants perform speech acts, and continues up to six years of age¹. Along this time, children already respect turns of talk and gradually master all communicative functions: instrumental, regulatory, interactive, personal, heuristic, imaginative, representational and ritualistic. In the next phase,

which lasts up to 12 years of age, children perceive themselves as the center of communications, and their skills become more complex. At this point, children have already mastered all communicative functions, sometimes to a sophisticated level.

Communicative functions and conversation^{1,2} are part of pragmatics acquisition, but other factors also affect this acquisition. The Social-Pragmatic Theory³ explains the effect of language acquisition on the nature of a child's cognitive representations, and points out that three inter-related linguistic skills are essential in this process: joint attention, role reversal and understanding of communicative intention.

According to this theory, children establish joint attention as they perceive that sounds directed to them by adults are an attempt to communicate and, from that point on, try to understand what is being communicated. That is, joint attention is intrinsic to the ability to understand a communicative intention. Role reversal arises as a differentiated form of learning by imitation: instead of replicating one's action in relation to a third person, such as kicking a ball, children take up the role of interlocutor and direct to the other person what was previously directed to them.

The sociocultural nature of linguistic symbols requires that they be learned in the interactions with others. Linguistic skills and symbols enable children to manipulate another person's attention, so that their communicative intention is understood at the time when the child enters a joint attentional state with a mature language user, a prerequisite for the acquisition and use of linguistic symbols³.

In agreement with that theory, another study⁴ describes pragmatic skills as the ability to use language in different contexts, in which language elements are used functionally according to the communicative situation. Therefore, pragmatic skills are functional characteristics of this linguistic domain that emerge in social interactions.

Autism spectrum disorder (ASD) is an invasive developmental disorder in which a person has difficulties in social and communicative skills⁵. Theoretical references⁶ for diagnostic criteria indicate that, among other signs, people with ASD have difficulties in communication and social interactions, and these difficulties persist regardless of context. Other characteristics are: lack of emotional reciprocity in social interactions; deficits in nonverbal communications during social inter-

actions; difficulties in building, maintaining and understanding social relations; restricted, repetitive and stereotypical behavior, interests, activities, motor movements, object handling and speech; inflexible routine; ritualized patterns of verbal and nonverbal behaviors; intense focus on restricted and abnormal interests; hyper- or hypo-reactivity to sensory input, with an interest in sensory aspects of the environment.

Therefore, people with ASD have deficits in communications and social interactions and, thus, in the social use of language. Joint attention, which is part of pragmatics, is also impaired in children with ASD. Joint attention emerges in the second semester of an infant's life, and evidence suggests that this emergence is different in groups of children with ASD. This difference may, therefore, be used as an early sign of autism.

According to common sense, there are abnormalities in the pragmatic skills of children with ASD. However, is this association clearly defined? What did studies conducted with children that speak Brazilian Portuguese (BP) find about it? Are the pragmatic skills of young BP speakers with ASD impaired? If yes, what skills?

This study examined findings of studies about these questions in an attempt to understand the details of specific results in this target population, and to contribute to the practice of speech-language therapy. Its objective was to confirm the existence of impairments of the pragmatic skills of BP-speaking children with ASD.

Methods

Search strategy

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist, and its protocol was registered in the Prospective Register of Systematic Reviews (PROSPERO) under ID CRD42020215606. The search for publications and their analyses were conducted by three researchers independently. Disagreements during all the phases of the search and the analyses were resolved by consensus, according to previously defined criteria. The following databases were used: PubMed, LILACS, BIREME, SciELO, Google Scholar and Portal Capes.

The research question was, "What are the impairments of pragmatic skills in BP-speaking children with ASD? The search keywords were selected according to the Health Science Descriptors (DeCS) for the indexation of scientific materials, created by the Regional Library of Medicine of the Latin American and Caribbean Center on Health Sciences Information (BIREME). The search string used was child AND autism spectrum disorder OR autistic syndrome OR Asperger syndrome AND pragmatic OR pragmatics AND Brazil OR Brasil OR Portuguese Or Brazilian OR Brasileira OR Brasileiro.

Databases were searched from August to September 2020, and publication dates were not limited. The 290 studies retrieved were tabulated, and duplicates and publications not classified as scientific papers, such as event indexes, summaries and books, were removed, and 246 studies remained in the study. The next step in the selection of academic studies was reading their titles. The papers about children with ASD that included a pragmatic analysis were selected. Those whose title did not meet the criteria of the systematic review were excluded, and 109 studies were included in the study. In the third step, abstracts were read, and studies were kept in the review if their study population was composed of BP-speaking children. The abstract and the institutions responsible for the study were examined to confirm that each study met this criterion. Figure 1 shows that the first and the third steps of the search were included in the same stage, called selection. At this point, 10 studies were selected. In the fourth and final step, the studies were fully read to define which responded to the research question and should be included in the study. Finally, 9 studies were included.

Selection criteria

The studies included in this review should meet the following selection criteria: BP-speaking children with ASD; observational or experimental design; acquisition of linguistic domains. Studies that did not discuss the development of pragmatic skills were excluded.

The parameters used were defined according to the Population, Intervention, Comparison, Outcome and Time (PICOT) criteria: BP-speaking children with ASD; and analysis of observational or experimental studies. According to the study

criteria, studies that described the acquisition of linguistic domains in general were included in the review. However, when texts were read in full, those that did not describe aspects of the development of pragmatic skills were excluded to ensure that the review remained focused on its research question.

Data analysis

The nine studies included in this review were analyzed in three steps. In the first, the main data about the study were tabulated: outcomes, sample, object of study and discussions about the pragmatic domain. The next steps were conducted according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for a critical reading of the studies, followed by the analysis of methodology using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) system for a thorough evaluation of each study.

The STROBE statement makes recommendations for an adequate conduction of observational studies. It may be used by future authors, as well as by readers for a critical reading. However, its purpose is not to evaluate study quality⁸, but to provide a checklist of items that should be found in each section - title, abstract, introduction, methods, results and discussion - of observational studies included in scientific reviews⁹.

The GRADE system evaluates both evidence quality and strength of study recommendations¹⁰. It defines levels according to the certainty of evidence

of the study, and classifies these levels as: high – strong evidence and confidence that the true effect is similar to the estimated effect, and it is unlikely that additional studies change estimates; moderate – true effect is probably close to the estimated effect, and additional studies may even change estimates; low – true effect might be markedly different from the estimated effect, and it is very likely that additional studies change estimates; and very low – true effect is probably markedly different from the estimated effect, and there is no certainty about any effect estimate.

Results

At first, 290 studies retrieved for the analysis were available at the time the selection was conducted (Figure 1). Studies were then selected according to title, and 109 studies remained for abstract reading. After reading abstracts, only 10 studies were selected to be read in full, and, after that, 9 were selected.

Data were extracted using a table built with the main information about each study. The studies selected for this review, according to the criteria defined for inclusion, as described in Chart 1.

Sample size ranged from four to 40 individuals, and total sample size was 174. There were 149 boys, and three studies¹²⁻¹⁴ included only boys. There were 25 girls, and they participated only in the studies¹⁵⁻²⁰ whose samples included boys and girls. However, no study investigated the effect of the variable sex.

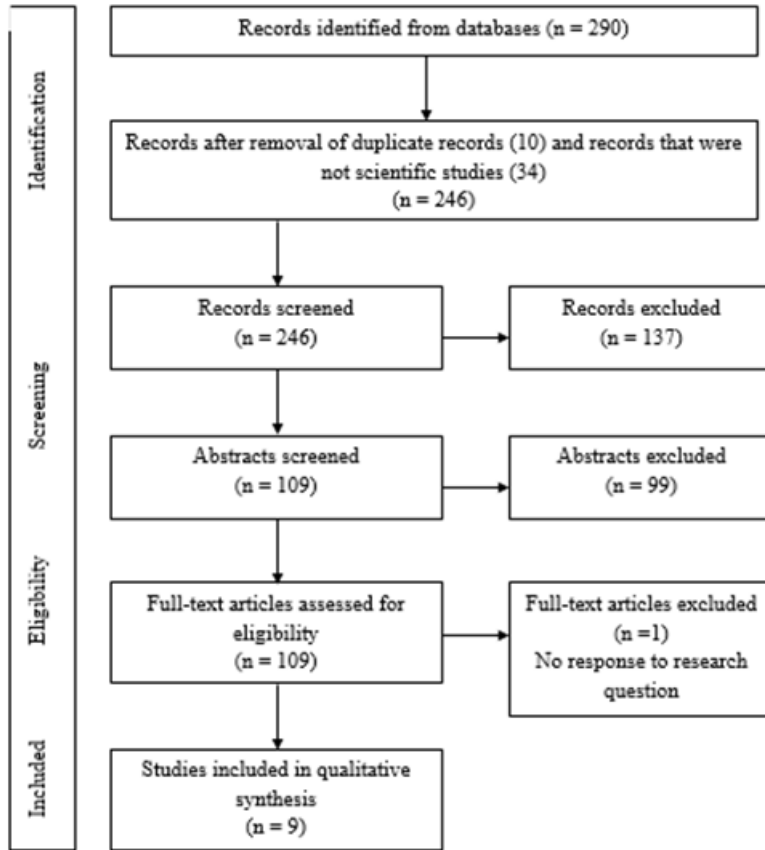


Figure 1. Flow of information through the different phases of systematic review.

Chart 1. Tabulation of studies included in the systematic review.

STUDY	DESIGN:	OBJECTIVE	SAMPLE	PRAGMATIC SKILLS EVALUATION	INSTRUMENTS	MAIN RESULTS
Bó, 2019	Cross-sectional study	Compare communicative profiles and verify the discriminative capacity of the CCC.	40 children and adolescents aged 4 to 16 years. 20 in the group with ASD (GASD) and 20 neurotypical children in the control group (CG)	Tests of functional use of language in interactions of children with their guardians. Descriptive statistics using a chi-square test to verify data distribution normality. The t test and the non-parametric Kruskal-Wallis test were also used.	Interviews with guardians using CCC-2 to evaluate communicative skills in several aspects of language, especially pragmatics.	The subscale scores were lower in all the results in the GASD, especially in the pragmatics and interest subscales. CG scores revealed weak points in general communication in GASD.
Pascual et al., 2017	Cross-sectional study	Describe and analyze verbatim fictive speech (echolalia) used as communicative strategy.	15 children. 5 children with ASD (GASD), 5 with a mental age similar to those with ASD (CG1), and 5 with the same chronological age as those with ASD (CG2)	Descriptive evaluation of video recordings of therapy sessions. Evaluation of functional echolalia as a compensatory strategy for difficulties in communication.	Video recordings of 20 therapy sessions with each child.	GASD had 47.4% of all verbatim discourse and interactions. CG1 had a total of 29.46%, and CG2, 23.04% The study found that fictive enunciations in GASD were verbatim

STUDY	DESIGN:	OBJECTIVE	SAMPLE	PRAGMATIC SKILLS EVALUATION	INSTRUMENTS	MAIN RESULTS
Sawasaki, 2017	Cross-sectional study	Investigate the effectiveness of pragmatic language and social communication skills in the identification of pragmatic changes with communication disorders.	40 children divided into two groups: one with 20 children with communication disorders - 10 with ASD (GASD) and 10 with other language disorders (GOLD); and 20 with typically developing language (GTDL). All children were accompanied by a parent or teacher.	Building child's social communication through interactions with parents and teachers. Statistical analysis used the one-sample Kolmogorov-Smirnov test to verify whether data followed a normal distribution. The non-parametric Kruskal-Wallis and by Mann-Whitney U tests were also used, as well as a parametric t test.	Parents (Pa) and teachers (Te) filled out the APLSC questionnaire. Evaluation of types of communicative acts and number of times that they were used, comparison of home and school, association between Pa and Te questionnaire answers.	Experimental and control Pa and Te GASD had statistically significant differences. Mean score for GASD was 47.0 in Pa and 56.8 in Te, but 108.8 in Pa and 103.7 in Te in GOLD (comparison). There were no statistically significant differences between the experimental and control GOLD. Scores for GOLD were much higher than for GASD.
Dias et al., 2015	Cross-sectional study	Investigate the field of pragmatic language.	31 children, aged 3 to 7 years, diagnosed with ASD. divided into groups of verbal children, who used 75% or more of the BP phonemes, and nonverbal children, who used vocal and gestural communication predominantly.	Mother-child interactions and their linguistic engagement for communication. The nonparametric Mann-Whitney test and the Spearman correlation coefficient were used to compare means between verbal and nonverbal groups.	Pragmatic language profile of the ABFW Child Language Test. Evaluation of communicative acts, and of whether vocal, verbal or gestural means were used. Communicative functions (CF) were classified as interpersonal or non-interpersonal.	Interpersonal "narrative" and "permission request" CFs were not found in either verbal or non-verbal group; the non-interpersonal "self-regulatory" CF was also not found. The non-verbal group had a higher percentage of gestural communicative means. The verbal group had a higher percentage of vocal communicative means.
Ishihara et al., 2015	Cohort study.	Verify and compare performance in a formal, standardized test that assesses specific language competence in comprehension of ambiguity.	19 boys and girls, aged 6 to 14 years, divided into two groups: 9 in the ASD group, and 10 in the specific language impairment (SLI) group.	The non-parametric Mann-Whitney test was used for statistical analyses. Social interaction and verbal and non-verbal communication were tested using an ambiguity test.	Stanford-Binet Intelligence Scale. The Ambiguous Sentences subtest of the Test of Language Competence was used.	The ASD group had a poorer performance in the ambiguity test. Results confirmed the greater difficulty in social cognition associated with primary linguistic impairment.
Milher, Fernandes, 2013	Cohort study.	Compare pragmatic profile of communicative initiatives and bi-dimensional profile of initiative and responsivity, and analyze the most common types of responses.	10 children with ASD interacting with their speech-language therapist for 6 months. 30 samples (3 for each child) were recorded during therapy sessions.	Child-therapist interactions that recreated scenes of social, linguistic and cognitive demands. Data were analyzed using Analysis of Variance (ANOVA) at a level of significance of 0.05 (5%), together with a t test when necessary.	Pragmatic Recording Protocol was used to evaluate communicative acts and means used (vocal, verbal and Total number of participations corresponded to sum of initiatives and responses.	The comparison of number of initiatives and total number of participations revealed a statistically significant difference. All values for communicative means were significant. The comparison of communicative means in the evaluations revealed a significant difference only for the vocal means. The values of "adequate answer" were substantially high.

STUDY	DESIGN:	OBJECTIVE	SAMPLE	PRAGMATIC SKILLS EVALUATION	INSTRUMENTS	MAIN RESULTS
Armonia, Misquiatti, 2011	Cross-sectional study	Characterize and compare communicative profile between two interlocutors.	4 boys with ASD undergoing speech-language therapy for at least 3 months.	Interaction between child and known therapist compared with interactions with unknown therapist. Statistical analyses used the Wilcoxon signed-rank test to compare results and evaluate means, standard deviations and significance.	Pragmatic Recording Protocol was used to evaluate communicative acts through communicative functions and means used (vocal, verbal Interactions were evaluated using recorded samples.	Results were not statistically significant. Mean number of more interactive functions was greater for interactions with known therapist, whereas mean number of less interactive functions was higher in interactions with unknown therapist.
Brito, Misquiatti, 2011	Cross-sectional study	Investigate communicative initiatives between children and their mothers using pragmatic analysis.	20 participants: 5 children with ASD and their mothers (GASD), and 5 children with neurotypical development and their mothers (CG) Children were 5 to 12 years old.	Evaluation of child-mother interaction. The non-parametric Wilcoxon test was used for the statistical analysis of comparisons of children in the GASD and in the CG, whereas the non-parametric Mann-Whitney test was used for the comparisons between mothers in both groups	Information form: Scale was used to evaluate Autistic Behaviors. The Pragmatic Recording Protocol was used to measure and classify communication initiatives, means (verbal, vocal and gestural) and communicative functions.	Numbers were significantly lower than in the CG. Number of communicative acts per minute (mean = 4.0); verbal (mean = 2.9) and gestural (mean = 1.5) communicative means. More interactive (mean = 2.6); less interactive (mean = 1.5) communicative functions. The mean number of mothers' communicative acts per minute was lower in GASD.
Miher, Fernandes, 2009	Cohort study.	Observe and analyze the grammatical and pragmatic development of children during 12 months of therapy.	10 boys aged 2 to 11 years with ASD. Samples recorded at 3 time points in speech-language therapy.	Pragmatic profiles were evaluated by identifying communicative functions used by interlocutors, mean length of utterance (MLU) and grammatical morphemes (GM) The Pearson correlation test was used for statistical analyses.	The Pragmatic Recording Protocol was used to evaluate communicative acts and means used (vocal, verbal and Mean MLU and GM were also determined.	MUL – words: 34 correlations; MUL –verbs: 31; GM – 1: 29; MUL – morphemes: 29; percentage of interpersonal acts: 29.

Participant age, which ranged from two to four years, was determined by one of the selection criteria in this review: study samples should be composed of children. Two studies^{15,16} included adolescents, but no selected study made specific considerations about age.

All studies evaluated the pragmatic skills of BP-speaking children with ASD by observing and analyzing their interaction with an interlocutor. Two studies observed their interaction with their mothers^{12,19}; in two others^{15,18}, the interlocutors were any of the child's guardians; one of them¹⁸ included the children's teachers; in five^{13,14,16-18,20}, the interaction was conducted by a therapist already known by the child; and in one of them¹³, the results of interac-

tions with the known therapist were compared with results when interacting with an unknown therapist.

The studies used different assessment instruments. Five studies^{12,13,14,19,20} used the Pragmatic Recording Protocol²¹; one¹⁶ used the Ambiguous Sentence subtest of the Test of Language Competence^{22,23}; two others^{15, 18} evaluated the quality of the assessment instruments used - the Children's Communication Checklist-2 (CCC-2)^{24,25} in one of them, and the Assessment of Pragmatic Language and Social Communication (APLSC)²⁶ questionnaire in the other; and one study¹⁷ only analyzed conversations in the material recorded during therapy sessions.

Impairment of pragmatic skills were recorded in the following areas and functions: literal

discourse, that is, discourse repetitions¹⁷; lower number of communicative acts^{18,19}; use of verbal and gestural communicative means at a lower degree than that of the control group¹⁸; more or less interactive communicative functions, at a lower rate than that of the control group¹⁸; lower number of communicative acts used by mothers¹⁸; greater difficulty in social cognition aspects associated with primary linguistic impairment¹⁶; poorer performance in the ambiguity test¹⁶; low scores in the pragmatic and interest subscales¹⁵; low percentage of interpersonal acts¹⁴.

Some studies also indicated that results were not statistically significant¹³; that the interper-

sonal communicative functions of “narrative” and “permission request” and the non-interpersonal “self-regulatory” function were not found in the non-verbal group¹²; and that the number of “adequate responses” was high²⁰.

After critical readings using the STROBE Statement, the studies included in this systematic review were classified according to the checklist recommendations: adequate, if they met what was recommended; and inadequate, if data were missing and the study did not meet STROBE recommendations. Table 1 shows the number of studies that were adequate and inadequate for each checklist item.

Table 1. STROBE System checklist

Items – Classification	Adequate n (%)	Inadequate n (%)
1a – Indicates study design in title or abstract	2 (22.22%)	7 (77.77%)
1b – Informative and balanced abstract	9 (100%)	0
2 – Background/Rationale (Introduction)	8 (88.88%)	1 (11.11%)
3 – Objectives (Introduction)	4 (44.44%)	5 (55.55%)
4 – Study design (Methods)	6 (66.66%)	3 (33.33%)
5 – Setting (Methods)	6 (66.66%)	3 (33.33%)
6 – Participants (Methods)	7 (77.77%)	2 (22.22%)
7 – Variables (Methods)	2 (22.22%)	7 (77.77%)
8 – Data sources/measurements (Methods)	8 (88.88%)	1 (11.11%)
9 – Bias (Methods)	1 (11.11%)	8 (88.88%)
10 – Study size (Methods)	1 (11.11%)	8 (88.88%)
11 – Quantitative variables (Methods)	5 (55.55%)	4 (44.44%)
12 – Statistical methods (Methods)	2 (22.22%)	7 (77.77%)
13 – Participants (Results)	1 (11.11%)	8 (88.88%)
14 – Descriptive data (Results)	0	9 (100%)
15 – Outcome data (Results)	8 (88.88%)	1 (11.11%)
16 – Main results (Results)	1 (11.11%)	8 (88.88%)
17 – Other analyses (Results)	1 (11.11%)	8 (88.88%)
18 – Key results (Discussion)	9 (100%)	0
19 – Limitations (Discussion)	6 (66.66%)	3 (33.33%)
20 – Interpretation (Discussion)	6 (66.66%)	3 (33.33%)
21 – Generalizability (Discussion)	7 (77.77%)	2 (22.22%)

Items 12, 13, 14 and 16 have separate criteria according to type of study: cohort, cross-sectional or case-control. Therefore, to evaluate whether the criteria for one of these items was met for this review, the number of criteria met was considered, and if most were not met, the whole item was classified as inadequate.

Table 1 also shows that the observational studies did not meet all the quality criteria of the STROBE Statement. Only two items were met by all the studies: the abstract and the presentation of main results in the Discussion section. The criteria for item 14, descriptive data, were not met by any study, as no study included the description of participant characteristics, information about

exposure and confounding factors, and number of participants with missing data about each variable of interest. In addition, items 7, 9, 10, 13, 16, 17, 22 were met in only a few of the studies (11.11%).

Discussion

The results of this review revealed the scarcity of studies about pragmatics of BP-speaking children with ASD. This systematic review, conducted using six databases, did not include any time limit. The few studies found were enough to demonstrate the diversity of procedures and protocols and their different effects on the evaluation of pragmatic skills of children with ASD. Study heterogeneity was evident, which may be explained by the fact that there is no reference evaluation protocol in the field of BP pragmatics, although the Pragmatic Recording Protocol was the instrument most often used. The studies reviewed evaluated different objects, such as mother-child and therapist-child dyads, and the views of parents and teachers about these children.

The critical reading of the observational studies included in this systematic review revealed that they do not follow any standardized writing or researching model. Many included what is recommended by the STROBE Statement, but in different places in the text. Information that should be in the Results section, for example, was found in the Discussion or in Methods. This affected the classification of items in the STROBE Statement. Another problem was the lack of statistical data, as well as of an analysis of sensitivity, which was conducted in only one study¹⁵.

At the same time, the use of the GRADE System revealed that the level of evidence of this group of studies was low. All the studies analyzed were observational and, therefore, their level of evidence was initially classified as low, even before the GRADE System was applied. No serious inconsistencies were found in the nine studies^{12-16,18-20}, but one of them had methodological limitations, as the intervention was not standardized for the sample participants. Although this may have led to the loss of relevant data and a reduction in outcome reliability, the impact of this study was not considered high enough to reduce the final level of evidence of the whole group of studies. No study met criteria for a higher level of evidence.

Seven of the studies analyzed found pragmatic impairments in children with ASD, which demonstrated that ASD affects the pragmatic skills of BP-speaking children. However, each study found impairments in a different communicative function or area, and only two found the same changes. However, one of them¹⁹ evaluated the number of communicative acts per minute, whereas the other¹⁸ evaluated communicative acts using a questionnaire answered by parents and teachers.

Two of the studies that used the Pragmatic Recording Protocol²¹ did not find any statistically significant differences^{12,13}. One of them¹², which included 31 children, evaluated the interaction between children and their mothers and their linguistic adaptations for communication. The other, with only four participants, evaluated the interactions of children with known therapists and compared them with those with an unknown therapist. The low number of participants might have affected results, as well as the object of observation, mother-child or therapist-child dyads. A third study²⁰, which analyzed communication initiatives and responses, found that the level of adequate responses by children with ASD was high, despite their impairments.

The final analyses revealed that very few studies had all the parameters investigated, and that, therefore, the conclusions drawn from these materials are limited. Although common sense says that there is an impact of ASD on the pragmatic skills of children, studies of BP speakers do not offer any evidence-based validation or qualification of that belief. That is mainly explained by a lack of protocol standardization and the frequently low number of samples, which makes it impossible to draw generalizations and comparisons between studies. Finally, the critical readings using the GRADE and STROBE parameters pointed to a demand for studies that use high quality methodologies and report results with a better level of evidence. Therefore, future studies that consider these limitations may respond to the gap identified in this review.

Conclusion

This systematic review yielded nine¹²⁻²⁰ studies that investigated the topic of the research question. Seven of these studies concluded that there are impairments in the pragmatic skills of BP-speaking children with ASD in different contexts. The studies that found these changes investigated

different skills. Two^{12,13} reached the conclusion that ASD does not affect the results of pragmatic skills. Therefore, the findings of this review were inconclusive.

Further studies including BP-speaking children and reference protocols for the evaluation of pragmatic skills are fundamental to build high-quality evidence-based knowledge in this area. Pragmatics is a linguistic domain that is difficult to evaluate, because results of analyses are subjective. However, they are fundamental for diagnoses and treatments using speech-language therapy.

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