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MULTI-INFORMANT EVALUATION IN AUTISM SPECTRUM DISORDER: A REVIEW STUDY

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Para poder realizar el diagnóstico del trastorno del espectro autista (TEA) se requiere de la evaluación por parte de diferentes informantes. Sin embargo, en ocasiones, se producen ciertas discrepancias entre evaluadores. Con el objetivo de aportar luz a las posibles discrepancias entre informantes, este trabajo incluye una revisión actualizada de la literatura para examinar el grado de acuerdo entre diferentes informantes en lo que respecta a la sintomatología característica del TEA en niños y adolescentes (hasta los 17 años de edad). Se analizaron un total de 20 estudios, en los que los niveles de correlación entre las evaluaciones realizadas por diferentes informantes fueron moderados o bajos. Gran parte de los estudios incluidos en la presente revisión obtuvieron que un mayor grado de acuerdo entre informantes fue asociado con menor sintomatología, mayor CI y mejores resultados en habilidades cognitivas y adaptativas. Considerando estos resultados, es necesario continuar investigando en aspectos contextuales que pueden estar condicionando los resultados de las evaluaciones multi-informantes.

Palabras clave: Acuerdo entre informantes. Evaluación multi-informante. Revisión sistemática. Trastorno del espectro autista (TEA).

In order to establish a diagnosis of autism spectrum disorder (ASD), assessment by different informants is required. Sometimes, however, there are certain discrepancies between evaluators. With the aim of shedding light on possible discrepancies between informants, this work includes an updated review of the literature to examine the degree of agreement between different informants regarding the characteristic symptomatology of ASD in children and adolescents (up to 17 years of age). A total of 20 studies were analyzed, in which the levels of correlation between the evaluations carried out by different informants were moderate or low. A large part of the studies included in this review found that a greater degree of agreement among informants was associated with lower symptoms, a higher IQ, and better results in cognitive and adaptive skills. Considering these results, it is necessary to continue investigating contextual aspects that may be conditioning the results of multi-informant evaluations.

Key words: Autism spectrum disorder (ASD). Informant agreement. Literature review. Multi-informant assessment.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by the presence of restrictive and repetitive patterns of behavior, interests, or activities, as well as persistent difficulties in communication and social interaction in various contexts (DSM-5; APA, 2013). The fact that the diagnostic criteria of ASD emphasize the need for the presence of the symptomatology in various contexts, makes it necessary that, in order to make the diagnosis, an evaluation be carried out by different informants who relate to the individuals with ASD in different contexts, the most common cases being evaluation by family and teachers.

On many occasions, the results of these evaluations, based on the information provided by families and teachers about the same student, show notable differences (De Los Reyes,

2011). In fact, numerous studies have shown that the levels of correlation between the evaluations performed by different informants are usually moderate to low (Jepsen, Gray, & Taffe, 2012; Kanne, Abbacchi, & Constantino, 2009; Mattila et al., 2009). These differences in the assessment of students with ASD could be attributed to factors such as measurement error, possible differences in the informants' interpretations of the questions, the evaluator's expectations, the frequency of the informants' interaction with the person with ASD, or differences in the structure of the environment, such as the school setting (structured) versus the home environment (unstructured) (Achenbach, 2011).

Although multi-informant assessment has been widely studied in the case of the population with mental health problems (see meta-analysis of De Los Reyes et al., 2015), in the case of ASD, to date, there has only been one meta-analysis. It included 49 studies, in which the possible agreement in the assessment of emotional, behavioral, and social skills problems in children and youths not only with a diagnosis of ASD, but also with intellectual disability was reviewed quantitatively (Stratis & Lecavalier, 2015). The results of this meta-analysis show a moderate degree of agreement among

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informants, obtaining, as in other previous studies, a significantly higher degree of agreement in externalizing problems than in internalizing problems and social skills (De Los Reyes et al., 2015).

Considering the limited number of review studies and the time elapsed since the Stratis and Lecavalier meta-analysis (2015), the aim of the present study was to provide an updated review of studies to examine the degree of agreement among different informants regarding the characteristic symptomatology of ASD. The analysis of the degree of agreement between informants in the case of ASD is an especially relevant aspect that should be studied in depth because certain characteristics of the context (e.g., stimulation conditions) can modulate the severity of the symptomatology, and can make it difficult for the things that children with ASD learn in a given context to be extrapolated to different one (Stratis & Lecavalier, 2015).

METHOD

The articles included in this review were selected from a search in the PsycInfo and Scopus databases. The title, abstract, and keywords of these databases were searched for a combination of the term *autis** with one of the following terms: *agree**, *concord**, *discrepanc**, *informant**, *interrat**, *multi-inform** and *multiple inform**.

Searches were limited to: a) journal articles (excluding other types of publications); b) papers published between January 2014 and December 2018 (given that the meta-analysis by Stratis & Lecavalier (2015) already includes a review of the literature from previous years), and c) additionally, in PsycInfo the age of participants was limited to children or adolescents (up to 17 years of age).

The total number of results obtained in the two databases was 706 articles (273 in PsycInfo and 433 in Scopus). After excluding duplicate results, this figure was reduced to 460.

Additionally, a manual search was conducted in the

journals: *Autism*, *Journal of Autism and Developmental Disorders*, and *Research in Autism Spectrum Disorders*, which added 8 new articles. Finally, the bibliographic references of articles whose content was directly related to the content of the review were also tracked, with 4 more articles being added.

Works excluded: a) did not compare results among informants, b) did not have as participants subjects with a diagnosis of ASD, or c) had participants older than 18 years of age.

After applying these exclusion criteria, a total of 20 articles were obtained as the subject matter for this review. The search process is summarized in Figure 1.

In the vast majority of the studies, the following participated as informants: 1) parents or primary caregivers; and 2) teachers of the participating children. However, in some of the works, instead of teachers, it was clinical professionals or researchers that participated; but in all cases the families reported.

RESULTS

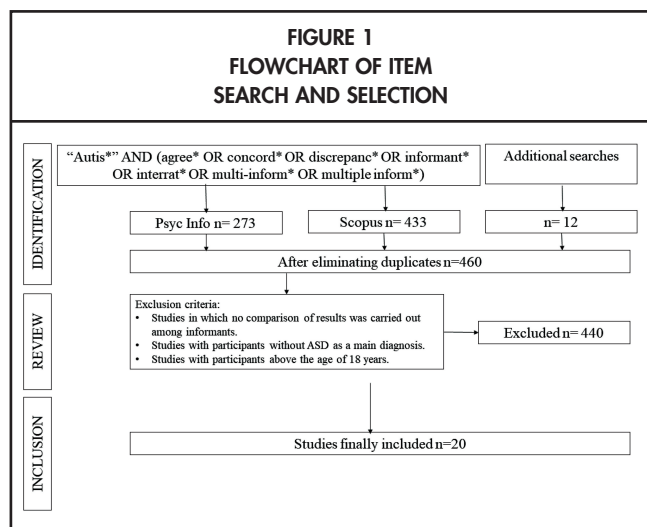
Table 1 includes detailed information of the 20 articles selected in relation to: a) the authors and year of publication; b) the description of the participants; c) the instruments used; d) the objectives; e) the results; and f) the main conclusions.

DISCUSSION

In line with previous research findings, in practically all of the studies included in this review, the levels of correlation between the evaluations conducted by different informants were moderate or low (Jepsen, Gray, & Taffe, 2012; Kanne, Abbacchi, & Constantino, 2009; Mattila et al, 2009); with the exception of the study by Azad et al. (2016), in which high correlation levels were obtained, but only for children with more severe ASD symptoms, not for children with less severe symptoms.

Many of the studies included in this review also found that a higher degree of agreement among informants was associated with fewer symptoms, higher IQ, and better cognitive and adaptive skills outcomes for children or adolescents with ASD (Burrows et al., 2018; Dickson et al., 2018; Kaat & Lecavalier, 2015; Lopata et al., 2016; Magiati et al., 2014; Ooi et al., 2016; Stratis & Lecavalier, 2017).

In the same way as the classic meta-analysis by Achenbach, McConaughy, and Howell (1987), in the study by Ung et al. (2017), the only work included in the present review in which age was taken into account, greater differences in the degree of agreement were obtained in older children, compared to younger children. These differences seem to suggest that as the age of the subjects with ASD advances, the differences in their behavior in different contexts grow larger, or at least in the perception of this behavior by parents and teachers. These differences can be explained by changes in academic and social demands in the school environment at older ages, or by the existence of a different impact of the interventions in the school and family contexts.



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TABLE 1
RESULTS OF THE STUDIES INCLUDED IN THE REVIEW

Author/s (year)	N	Instruments	Objectives	Results	Conclusions
Azad et al. (2016)	Parents and teachers of 123 children with ASD (5-8 years old)	<i>Social Responsiveness Scale</i>	To evaluate the concordance between parents and teachers in the social behavior assessment of a sample of children with ASD at the beginning and end of a school year; and to analyze if this concordance varies according to the degree of severity of the ASD symptomatology.	Correlations in parent and teacher assessment were high for children with more severe ASD symptoms, but not for children with less severe symptoms.	In the case of children with less severe symptoms, it is necessary to analyze the reasons for the discrepancy obtained between evaluators.
Burrows et al. (2018)	144 children with ASD (12.79 years) and 135 children without ASD (13.32 years), and their parents	<i>Social Anxiety Scale</i> (self-report and parent versions)	To analyze the degree of agreement between self-report of social anxiety in children with ASD and the parents' assessment of anxiety; and to identify factors that affect this agreement.	In the case of the ASD group, no significant differences were obtained between the self-report measures and the parents' assessment. A higher degree of agreement was associated with better results in adaptive skills and less ASD symptomatology. Demographic factors such as age, verbal IQ, and gender were not related to the degree of agreement.	The results obtained present important clinical effects, since parents' greater understanding of the social anxiety of children with ASD, enables greater involvement and an improvement in the efficacy of the treatment.
Dickson et al. (2018)	Parents and teachers of 246 children with ASD (age at start of longitudinal follow-up: 5.58 years)	1) <i>Vineland Adaptive Behavior Scales</i> 2) <i>Pervasive Developmental Disorder Behavior Inventory</i> .	To evaluate longitudinally the agreement between parents and teachers of the adaptive functioning and autistic symptoms of children with ASD.	The agreement on parent and teacher ratings was variable, but consistent over time. The severity of ASD symptomatology and the cognitive abilities of the children influenced the degree of agreement.	The advisability of taking into account other clinical factors associated with ASD in the assessment of adaptive functioning is emphasized.
Hume et al. (2018)	547 adolescents with ASD (16.1 years old), their parents or primary caregivers and their teachers	1) <i>Secondary School Success Checklist</i> (versions for teens, parents, and teachers). 2) <i>Social Responsiveness Scale-2</i> . 3) <i>Vineland Adaptive Behavior Scale-II</i> (teacher version)	To compare the perception of a group of adolescents with ASD, their parents, and teachers on skills for transition from one educational stage to another.	The teens rated their transition skills as significantly better than parents and teachers rated them. Teachers rated the teens' skills significantly better than parents did.	Educational transition skills are a key factor in successful adaptation to educational settings. These skills, such as problem solving, planning, and self-advocacy, should be evaluated from different perspectives.
Kaat & Lecavalier (2015)	46 children with ASD (12.4 years old) and their parents	1) <i>Revised Children's Anxiety and Depression Scale</i> . 2) <i>Multidimensional Anxiety Scale for Children</i>	To assess the reliability and validity of the <i>Revised Children's Anxiety and Depression Scale</i> and the <i>Multidimensional Anxiety Scale for Children</i> in the assessment of parents and self-reports of children with ASD.	The reliability of the two instruments was good within the group, but low between the groups. The correlation between the self-report measure and the parents' assessment was higher in cases of higher IQ, higher cognitive skills, and less severe ASD symptoms.	Convergence between parental assessment and self-reported anxiety was low, which may limit the validity of self-reported anxiety in ASD, especially when ASD symptoms and intellectual difficulties are higher.
Larsen et al. (2018)	Parents and caregivers of 27 children with ASD and 25 undiagnosed children (comparison group) between 36-64 months of age	Parents and caregivers were given a list of 73 ASD symptoms (taken from standardized screening instruments). Participants were asked to mark the symptoms they remembered being present in children between 12 and 24 months of age.	To evaluate the degree of agreement between parents and professional caregivers in the retrospective assessment of ASD symptoms at early ages (12-24 months).	There were no statistically significant differences between the assessment of parents and caregivers, so a good degree of agreement was obtained among informants.	Caregivers and early childhood education professionals can play an important role in the early identification of ASD symptoms.
Lerner et al. (2017)	Parents and teachers of 283 children with ASD (10.5 years old)	<i>Child and Adolescent Symptom Inventory</i> (CASI-4R).	To examine whether the degree of disagreement between parents and teachers about the severity of ASD symptoms can contribute to identifying clinically useful ASD subgroups.	Four subgroups emerged, ranging from large discrepancies among informants to relative absence of discrepancy.	The degree of disagreement between parents and teachers about the severity of ASD symptoms can provide clinically valuable information that may even lead to the establishment of discrete subgroups with clinical utility through a cost-effective procedure.
Lopata et al. (2016)	Parents and teachers of 120 children (8.78 years old) with high functioning ASD.	<i>Developmental Social Disorders Scale of the BASC-2</i> (parents and teachers).	To compare the parent-teacher ratings of the BASC-2 social developmental disorders subscale in a sample of children with ASD.	Correlations between informants were low but significant. Differences between evaluators increased as scores increased and when the perception of ASD symptomatology was greater.	In cases of increased ASD symptomatology, divergences between evaluators may increase.



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TABLE 1
RESULTS OF THE STUDIES INCLUDED IN THE REVIEW (Continuation)

Author/s (year)	N	Instruments	Objectives	Results	Conclusions
Macari et al. (2018)	Parents and clinical evaluators of 137 children at high risk for ASD (with older siblings with ASD), (12.46 months old); and 76 children at low risk for ASD (no ASD precedent in siblings), (12.34 months old).	1) <i>First Year Inventory</i> . 2) <i>Mullen Scales of Early Learning</i> . <i>ADOS-T</i> .	To compare parent and clinician assessments of social communication in children at high and low risk for ASD at 12 months of age.	Parents and clinicians rated the children's behavior similarly. Assessment by parents and clinicians is affected by the format of the assessment items.	Well-designed multiple-choice items provide a greater wealth of information as well as less disparate results among evaluators than Likert-type scales.
Magiati et al. (2014)	38 children with ASD (12 years, 10 months old) and their primary caregivers	<i>Spence Children's Anxiety Scale</i> (caregiver and self-report versions)	To analyze the degree of agreement in the assessment of anxiety between the self-report measures of the children themselves and the assessment of their primary caregivers.	There was moderate agreement between the two assessments of anxiety. The greater presence and severity of ASD symptoms was associated with lower levels of agreement among informants.	The authors conclude that the instrument used to assess anxiety is suitable for the population with ASD.
McDonald et al. (2016)	Parents and teachers of 118 children with high-functioning ASD (8.74 years old)	<i>Behavior Assessment System for Children-2nd Edition (BASC-2)</i> (versions for parents and teachers).	To analyze the degree of agreement between parents and teachers in the assessment of externalizing and internalizing symptoms and adaptive skills in a sample of children with high functioning ASD.	There were no statistically significant differences between parents' and teachers' assessment of scores on BASC-2 and its subscales, except in the hyperactivity scale. There were differences in the adaptive skills scale; teachers rated these skills significantly higher than parents. The correlation of the parents' and teachers' assessment in the scores on BASC-2 and its subscales was statistically significant and of moderate magnitude.	The agreement between parents and teachers in this study was higher than that found by other studies, except for the assessment of adaptive skills.
Mörické et al. (2016)	124 mothers and 119 fathers of children (4-5 years) belonging to a general population cohort in the Netherlands.	1) <i>Social Communication Questionnaire</i> 2) <i>Autism-spectrum Quotient</i>	To analyze the presence of bias in the assessment of ASD symptoms by parents.	There was an acceptable rate of agreement in the assessment of mothers and fathers regarding their children. There was no evidence of the presence of this bias in the assessment of the children, but there was in the parents' own self-assessment of the ASD symptoms.	It is advisable to involve multiple informants when conducting the evaluation of autistic traits and to make use of measures to control possible bias.
Ooi et al. (2016)	70 children with ASD (11.21 years old) and their parents	<i>Spence Children's Anxiety Scale</i> (parent and self-report versions)	To analyze the degree of agreement between the assessment of anxiety by a sample of children with ASD and their own parents; and to identify the factors that may affect the degree of agreement.	The children provided a significantly higher anxiety rating than their parents. Significant correlations were obtained in the following scales: separation, social, and generalized anxiety, as well as for the global score; but the correlation was not significant in the following scales: panic attacks and obsession-compulsion. The degree of agreement was higher in the scales corresponding to clearly observable behaviors. It was also higher the higher the child's verbal IQ and the lower the parental stress. The greater the parental stress, the greater the discrepancy in social anxiety.	It is necessary to include self-report measures of anxiety to complete the assessment of families.
Ozonoff et al. (2018)	N= 230. Parents and researchers of 147 children at high risk for ASD (with older siblings with ASD); and 83 children at low risk for ASD (no ASD precedent in siblings). Age at start of investigation: 3.2 months. In the last evaluation, 32 children out of 230 participants were diagnosed with ASD.	Longitudinal follow-up at 6, 9, 12, 15, 18, 24 and 36 months. Evaluation according to 3 variables: 1) <u>Informant</u> : parents or researchers. Instrument used: <i>Early Development Questionnaire</i> , <i>ADI-R</i> . 2) <u>Time perspective</u> : prospective (evaluation at each visit) or retrospective (evaluation at 36 months). 3) <u>Type of evaluation</u> : dimensional or categorical	To determine the frequency of the existence of an initial typical developmental pattern followed by a pattern of loss of previously acquired skills in children with ASD (autistic regression). For this purpose, several variables were manipulated, including the informant (parents or researchers).	The existence of this typical developmental pattern followed by a regressive developmental pattern was very common in the participants. There were no significant differences in this assessment between parents and researchers. The differences between evaluators were greater when the onset of symptoms was evaluated retrospectively than when it was evaluated prospectively. They were also greater when the questions were posed categorically than when they were dimensional.	The presence of a regressive developmental pattern was the rule rather than the exception. It may be an under-identified pattern in the research because of the methodology used so far to detect it.
Sacrey et al. (2018)	Parents and clinical professionals of 188 children from a cohort at high risk for ASD (younger siblings of children with ASD). Evaluated at 12 and 18 months.	Parents: <i>Autism Parent Screen for Infants (APSI)</i> . Clinical: <i>Autism Observation Scale for Infants (AOSI)</i> (both measures start from the same model and they share 19 items).	To examine the degree of agreement between parents and clinicians in the assessment of ASD symptoms at early ages (12 and 18 months) in a sample of children at high risk for ASD.	The agreement between parents and clinicians in the assessment of ASD symptomatology was low (correlations between -.01 and .23), with parents being better able to detect possible symptoms.	Parents can detect some behaviors based on their daily observations more easily than clinicians during the brief clinical assessments.



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As we stated in the hypotheses, in line with previous literature (Achenbach et al., 1987; De Los Reyes et al., 2015; Duhig, Renk, Epstein, & Phares. 2000; Stratis & Lecavalier, 2015), the studies that analyzed behavioral aspects also obtained a greater degree of agreement among the informants on scales corresponding to clearly observable behaviors (McDonald et al., 2016; Ooi et al., 2016; Ung et al., 2017).

In some of the studies reviewed, such as Stadnick et al. (2017), the caregivers rated behavior problems, especially externalizing disorders, as more severe than the teachers did when the child had comorbidities with ASD. Along the same lines, McDonald et al. (2016), found that teachers rated adaptive skills better than parents rated them; and Hume et al.

(2018) also found that teachers rated the transition skills of a group of adolescents significantly better than their own parents did. Thompson and Winsler (2018), in contrast, found that parents rated their children’s social skills and behavior problems more positively than teachers rated them.

Parents of children with ASD may have a more positive view than their teachers, possibly because teachers can compare the developmental status of many more children of the same age, while parents do not have as many opportunities for comparison. However, in some cases, as we see from the works of Stadnick et al. (2017), McDonald et al. (2016), or Hume et al. (2018), a worse evaluation was obtained by the parents, which may be due to different factors, among them parental stress, an aspect which, in spite of its relevance, is

TABLE 1
RESULTS OF THE STUDIES INCLUDED IN THE REVIEW (Continuation)

Author/s (year)	N	Instruments	Objectives	Results	Conclusions
Stadnick et al. (2017)	Primary caregivers and teachers of 141 children with ASD (9.07 years old) receiving mental health support.	Caretakers: 1) <i>Eyberg Child Behavior Inventory</i> . 2) <i>Mini-International Neuropsychiatric Interview, Parent Version</i> . Teachers: 3) <i>Sutter-Eyber Student Behavior Inventory-Revised</i> .	To analyze the degree of agreement of caregivers and teachers in behavioral assessment of children with ASD receiving mental health support; and to analyze whether the children’s psychiatric comorbidities affect this agreement.	The agreement of the assessment of caregivers and teachers was low, but statistically significant. Caregivers rated behavior problems as more severe than teachers in cases where the child had comorbidities to ASD, especially externalizing disorders. There were no significant differences in cases where there were no comorbidities.	The information provided by different informants is relevant to the approach of the interventions. The differences between informants can be explained in part by the presence of comorbid diagnoses.
Stratis & Lecavalier (2017)	403 families of children with ASD (125.42 months) and their siblings without ASD (129.9 months)	Parents and teachers: 1) <i>Achenbach System of Empirically Based Assessment</i> . 2) <i>Social Responsiveness Scale</i> . 3) <i>Broad Autism Phenotype Questionnaire</i> .	To analyze the degree of agreement between parents and teachers in the assessment of emotional and behavioral problems and ASD symptoms in students with ASD and their undiagnosed siblings; and to identify predictors of agreement in the assessment of parents and teachers.	The agreement in the assessment between parents and teachers was higher for the group of children with ASD than for their siblings without ASD. Few predictors of the degree of agreement were identified. It was only detected that the greater the ASD symptomatology reported by the parents, the greater the differences in the evaluation of the three analyzed variables.	Parent-teacher agreement was in the low to moderate range. Further research is needed to identify more predictors of the degree of agreement.
Teglasi et al. (2017)	Parents and teachers of 73 children with ASD (70.04 months)	1) <i>Behavior Rating Inventory of Executive Functioning (BRIEF)</i> . 2) <i>Social Skills Improvement System Social Skills Scale (SSIS)</i> .	To analyze the degree of agreement between parents and teachers in the assessment of social competence and executive functioning in a sample of children with ASD.	Correlations of parent and teacher scores were significant, although low (.24 on the BRIEF and .18 on the SSIS).	The differences in the assessment of parents and teachers can be explained by the different relevance of the evaluated constructs in the different contexts (home and school).
Thompson & Winsler (2018)	Parents and teachers of 257 children with ASD (4.58 years old), of low economic status and ethnic and cultural diversity.	<i>Devereaux Early Childhood Assessment</i>	To assess the degree of agreement between parents and early childhood teachers in the assessment of social skills and behavioral problems of a group of children with ASD	Correlations in the assessment of social skills by parents and teachers were moderate and significant, but close to zero in the assessment of behavioral problems. Parents rated their children’s social skills and behavior problems more positively than teachers rated them.	It is necessary to consider that the parents of children with ASD can offer a more positive vision (in comparison to the teachers), in the valuation of social abilities and behavior problems of their children.
Ung et al. (2017)	Ages 2-5: Parents and teachers of 26 children with ASD (4.08 years) and 21 children without ASD (4.38 years). Ages 6-10: Parents and teachers of 32 children with ASD (7.47 years) and 21 children without ASD (7.71 years)	Parents: 1) <i>Child Behavior Checklist</i> . Teachers: 2) <i>Teacher Report Form</i> .	To analyze the degree of agreement between parents and teachers in the assessment of internalizing and externalizing behavior problems in children with and without a diagnosis of ASD.	In younger children with ASD (2-5 years), there were significant differences between parents and teachers in the assessment of behavioral problems related to emotional reaction, somatic complaints, depressive symptomatology, and attention difficulties. In older children (6-10 years), new differences were added in the assessment of externalizing problems.	There is a moderate degree of agreement between parents and teachers in assessing the behavior of children with and without ASD. The greatest differences are in older children, compared to younger children.

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not usually taken into account in multi-informant studies. In fact, in the study by Ooi et al. (2016), the only study in this review that considers the influence of parental stress, a greater degree of agreement was obtained among informants the lower the parental stress.

These discrepancies between informants, as proposed in *The ABC Model* (De Los Reyes & Kazdin, 2005), highlight the need to consider contextual aspects, so that factors such as the parental stress level or the experience of teachers themselves with ASD students are aspects that should be considered when conducting a multi-informant assessment.

Regarding multi-informant evaluation between parents and clinical professionals, Sacrey et al. (2018) found that parents are more capable than clinicians of detecting possible characteristic symptoms of the disorder, since they can detect some behaviors based on their daily observations more easily than professionals (who have fewer opportunities to observe children). This result, however, should be reconsidered, since as Macari et al. (2018) point out, it is possible that the assessment of parents and professionals in the clinical setting is affected by the format of the evaluation items, another relevant factor that should be taken into consideration when analyzing the results obtained in the multi-informant evaluations.

As for the pattern of involution with respect to loss of previously acquired skills by children with ASD, Ozonoff et al. (2018), in line with previous studies, suggest a more common pattern of involution than might be thought (Thurn, Manwaring, Luckenbaugh, Lord, & Swedo, 2014). In this study, we found that the differences among evaluators were greater when the onset of symptoms was evaluated retrospectively than when it was evaluated prospectively, and when questions were posed categorically than when they were dimensional. According to the same authors, these results may be due to the fact that categorical classifications, which inherently require a comparison with previous functioning and also require a judgment of all or nothing (presence or absence of a phenomenon), are more difficult discriminations to make than the frequency classifications of current behavior. These results have important practical implications when evaluating assessment tests.

In conclusion, in most studies a moderate-low agreement has been found among informants, with a greater degree of agreement being obtained in the cases in which either the ASD symptomatology is less, or the children present a higher IQ and/or better results in cognitive and adaptive skills. In addition, a greater degree of agreement is obtained among informants when evaluating clearly observable behaviors. The differences obtained among informants may be due to contextual factors such as the level of parental stress or the teachers' own experience, in addition to the differences observed in the formulation of the assessment tests, aspects that should be taken into account when performing a multi-informant assessment.

In the present review, a number of limitations have been found, such as the heterogeneity in the characteristics of the participants, without taking into account in most studies the degree of severity of ASD and the possibility of co-occurrence with comorbid diagnoses; the use of different assessment tools in the different studies, and also among informants in the same study; and the absence of analysis of contextual factors that can condition the results of the assessments, such as the level of parental stress, or the experience of professionals in the intervention of children with ASD. Although a review of twenty studies has been conducted in the last five years (a reasonably large number), it should be considered that the objective of some studies was not limited only to the study of the degree of agreement among informants about ASD symptoms (in some studies this was only one of the objectives within a more general study). This heterogeneity in the objective of the study has allowed a global analysis to be made which future research should study in depth considering each one of the objectives specifically, in addition to analyzing the different sources of information in greater depth, whether it be an analysis of the degree of agreement between parents and teachers, between parents and children, between parents and clinicians, between parents and researchers, or other possible combinations.

The multi-informant evaluation allows us to obtain in a simple way an assessment not only of informants living in different contexts, but also of informants who live in the same context, as is the case of the two parents. This aspect of being able to compare the assessments made by the two parents enables the reduction of the influence of possible biases in the evaluation, an aspect little studied to date (in fact, this was included only in the study by Mörcke et al. (2016) in this review).

Due to the discrepancies in the multi-informant evaluation and its importance in the diagnosis of disorders such as ASD (a diagnosis that is made giving great weight to behavioral assessment), it is necessary to continue research on the different variables that influence the degree of agreement of different evaluators on the behavior of the same subject.

CONFLICT OF INTEREST

There is no conflict of interest in the content of the article.

REFERENCES

- References marked with an asterisk (*) contain the studies included in the review:
- Achenbach, T. M. (2011). Commentary: Definitely more than measurement error: But how should we understand and deal with informant discrepancies? *Journal of Clinical Child & Adolescent Psychology*, 40(1), 80-86. doi: 10.1080/15374416.2011.533416
- Achenbach, T. M., McConaughy, S. H. & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for

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- situational specificity. *Psychological Bulletin*, 101(2), 213. doi: 10.1037/0033-2909.101.2.213
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- *Azad, G. F., Reisinger, E., Xie, M. & Mandell, D. S. (2016). Parent and teacher concordance on the Social Responsiveness Scale for children with autism. *School Mental Health*, 8(3), 368-376. doi: 10.1007/s12310-015-9168-6
- *Burrows, C. A., Usher, L. V., Becker-Haimes, E. M., McMahon, C. M., Mundy, P. C., Jensen-Doss, A. & Henderson, H. A. (2018). Profiles and correlates of parent-child agreement on social anxiety symptoms in youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 48(6), 2023-2037. doi: 10.1007/s10803-018-3461-9
- De Los Reyes, A. (2011). Introduction to the special section: More than measurement error: Discovering meaning behind informant discrepancies in clinical assessments of children and adolescents. *Journal of Clinical Child & Adolescent Psychology*, 40(1), 1-9. doi: 10.1080/15374416.2011.533405.
- De Los Reyes, A. & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: a critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin*, 131(4), 483. doi: 10.1037/0033-2909.131.4.483
- De Los Reyes, A., Augenstein, T. M., Wang, M., Thomas, S. A., Drabick, D. A., BURGERS, D. E. & Rabinowitz, J. (2015). The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychological Bulletin*, 141(4), 858. doi: 10.1037/a0038498.
- *Dickson, K. S., Suhrheinrich, J., Rieth, S. R. & Stahmer, A. C. (2018). Parent and teacher concordance of child outcomes for youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 48(5), 1423-1435. doi: 10.1007/s10803-017-3382-z
- Duhig, A. M., Renk, K., Epstein, M. K. & Phares, V. (2000). Interparental agreement on internalizing, externalizing, and total behavior problems: A meta analysis. *Clinical Psychology: Science and Practice*, 7(4), 435-453. doi: 10.1093/clipsy.7.4.435
- *Hume, K., Dykstra Steinbrenner, J., Sideris, J., Smith, L., Kucharczyk, S. & Szidon, K. (2018). Multi-informant assessment of transition-related skills and skill importance in adolescents with autism spectrum disorder. *Autism*, 22(1), 40-50. doi: 10.1177/1362361317722029
- Jepsen, M. I., Gray, K. M. & Taffe, J. R. (2012). Agreement in multi-informant assessment of behaviour and emotional problems and social functioning in adolescents with Autistic and Asperger's Disorder. *Research in Autism Spectrum Disorders*, 6(3), 1091-1098. doi:10.1016/j.rasd.2012.02.008
- *Kaat, A. J. & Lecavalier, L. (2015). Reliability and validity of parent-and child-rated anxiety measures in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45(10), 3219-3231. doi: 10.1007/s10803-015-2481-y
- Kanne, S. M., Abbacchi, A. M. & Constantino, J. N. (2009). Multi-informant ratings of psychiatric symptom severity in children with autism spectrum disorders: The importance of environmental context. *Journal of Autism and Developmental Disorders*, 39(6), 856-864. doi: 10.1007/s10803-009-0694-7
- *Larsen, K., Aasland, A. & Diseth, T. H. (2018). Brief report: Agreement between parents and day-care professionals on early symptoms associated with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 48(4), 1063-1068. doi: 10.1007/s10803-017-3355-2
- *Lerner, M. D., De Los Reyes, A., Drabick, D. A., Gerber, A. H. & Gadow, K. D. (2017). Informant discrepancy defines discrete, clinically useful autism spectrum disorder subgroups. *Journal of Child Psychology and Psychiatry*, 58(7), 829-839. doi: 10.1111/jcpp.12730
- *Lopata, C., Donnelly, J. P., Jordan, A. K., Thomeer, M. L., McDonald, C. A. & Rodgers, J. D. (2016). Brief report: Parent-teacher discrepancies on the developmental social disorders scale (BASC-2) in the assessment of high-functioning children with ASD. *Journal of Autism and Developmental Disorders*, 46(9), 3183-3189. doi: 10.1007/s10803-016-2851-0
- *Macari, S. L., Wu, G. C., Powell, K. K., Fontenelle, S., Macris, D. M. & Chawarska, K. (2018). Do parents and clinicians agree on ratings of autism-related behaviors at 12 months of age? A study of infants at high and low risk for ASD. *Journal of Autism and Developmental Disorders*, 48(4), 1069-1080. doi: 10.1016/j.rasd.2014.01.015
- *Magiati, I., Chan, J. Y., Tan, W. L. J. & Poon, K. K. (2014). Do non-referred young people with autism spectrum disorders and their caregivers agree when reporting anxiety symptoms? A preliminary investigation using the Spence Children's Anxiety Scale. *Research in Autism Spectrum Disorders*, 8(5), 546-558. doi: 10.1016/j.rasd.2014.01.015
- Mattila, M. L., Jussila, K., Kuusikko, S., Kielinen, M., Linna, S. L., Ebeling, H., ... & Moilanen, I. (2009). When does the Autism Spectrum Screening Questionnaire (ASSQ) predict autism spectrum disorders in primary school-aged children? *European Child & Adolescent Psychiatry*, 18(8), 499-509. doi: 10.1007/s00787-009-0044-5
- *McDonald, C. A., Lopata, C., Donnelly, J. P., Thomeer, M. L., Rodgers, J. D. & Jordan, A. K. (2016). Informant discrepancies in externalizing and internalizing symptoms and adaptive skills of high-functioning children with autism spectrum disorder. *School Psychology Quarterly*, 31(4),

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467. doi: 10.1037/spq0000150
- *Möricke, E., Buitelaar, J. K. & Rommelse, N. N. (2016). Do we need multiple informants when assessing autistic traits? The degree of report bias on offspring, self, and spouse ratings. *Journal of Autism and Developmental Disorders*, 46(1), 164-175. doi: 10.1007/s10803-015-2562-y
- *Ooi, Y. P., Weng, S. J., Magiati, I., Ang, R. P., Goh, T. J., Fung, D. S. & Sung, M. (2016). Factors influencing agreement between parent and child reports of anxiety symptoms among children with high-functioning autism spectrum disorders. *Journal of Developmental and Physical Disabilities*, 28(3), 407-424. doi: 10.1007/s10882-016-9481-5
- *Ozonoff, S., Gangi, D., Hanzel, E. P., Hill, A., Hill, M. M., Miller, M., ... & Iosif, A. M. (2018). Onset patterns in autism: Variation across informants, methods, and timing. *Autism Research*, 11(5), 788-797. doi: 10.1002/aur.1943
- *Sacrey, L. A. R., Zwaigenbaum, L., Bryson, S., Brian, J., Smith, I. M., Roberts, W., ... & Garon, N. (2018). Parent and clinician agreement regarding early behavioral signs in 12- and 18-month old infants at risk of autism spectrum disorder. *Autism Research*, 11(3), 539-547. doi: 10.1007/s10803-017-3081-9
- *Stadnick, N., Chlebowski, C. & Brookman-Frazee, L. (2017). Caregiver-teacher concordance of challenging behaviors in children with autism spectrum disorder served in community mental health settings. *Journal of Autism and Developmental Disorders*, 47(6), 1780-1790. doi: 10.1007/s10803-017-3101-9
- Stratis, E. A. & Lecavalier, L. (2015). Informant agreement for youth with autism spectrum disorder or intellectual disability: A meta-analysis. *Journal of Autism and Developmental Disorders*, 45(4), 1026-1041. doi: 10.1007/s10803-014-2258-8.
- *Stratis, E. A. & Lecavalier, L. (2017). Predictors of parent-teacher agreement in youth with autism spectrum disorder and their typically developing siblings. *Journal of Autism and Developmental Disorders*, 47(8), 2575-2585. doi: 10.1007/s10803-017-3173-6
- *Teglasi, H., Ritzau, J., Sanders, C., Kim, M. J. & Scott, A. (2017). Explaining discrepancies in assessment protocols: Trait relevance and functional equivalence. *Psychological Assessment*, 29(12), 1517-1530. doi: 10.1037/pas0000447
- *Thompson, B. & Winsler, A. (2018). Parent-Teacher Agreement on Social Skills and Behavior Problems Among Ethnically Diverse Preschoolers with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 48(9), 3163-3175. doi: 10.1007/s10803-018-3570-5
- Thurm, A., Manwaring, S. S., Luckenbaugh, D. A., Lord, C. & Swedo, S. E. (2014). Patterns of skill attainment and loss in young children with autism. *Development and Psychopathology*, 26(1), 203-214. doi: 10.1017/S0954579413000874
- *Ung, D., Boone, D. M., McBride, N., Howie, F., Scalli, L. & Storch, E. A. (2017). Parent and teacher agreement of behavior problems in youth diagnosed with and without Autism Spectrum Disorders. *Journal of Child and Family Studies*, 26(2), 370-380. doi: 10.1007/s10826-016-0566-7