



Discrepancies between parents and teachers of students with autism spectrum disorder (ASD) in executive functioning according to the BRIEF

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Título: Discrepancias entre padres y maestros de estudiantes con trastorno de espectro autista (TEA) en funcionamiento ejecutivo según el BRIEF.

Resumen: Uno de los puntos críticos en la evaluación del trastorno del espectro autista es la manifestación del comportamiento en varios contextos del desarrollo, por lo que la valoración por parte de diferentes informantes es un aspecto clave. El objetivo de este estudio fue analizar la existencia de discrepancias entre padres y maestros en la evaluación del funcionamiento ejecutivo en una muestra de 43 niños con un trastorno del espectro autista de nivel de gravedad 2. Para ello se compararon las puntuaciones obtenidas en las subescalas del BRIEF entre padres y maestros, y se analizó la relación entre tales puntuaciones. Los resultados obtenidos indicaron, en primer lugar, diferencias estadísticamente significativas entre padres y maestros en todas las escalas, siendo los maestros quienes informaron de una mayor disfunción ejecutiva, y en segundo lugar, la ausencia de correlaciones estadísticamente significativas entre las puntuaciones otorgadas por ambos informantes en casi todas las escalas. Se puede concluir que existen diferencias en cuanto a la percepción que tienen padres y maestros con respecto a las funciones ejecutivas de los niños con TEA, lo que puede estar en consonancia con la relevancia o el papel que tienen estas funciones en el contexto en el que son evaluadas.

Palabras clave: Evaluación multi-informante. Funcionamiento ejecutivo. Maestros. Padres. Trastorno del espectro autista (TEA). Trastornos del neurodesarrollo.

Abstract: One of the critical issues in the assessment of autism spectrum disorder is the behavior exhibited in various developmental contexts, and so the assessment by different informants is important in understanding this disorder. The aim of this study was to analyze parent-teacher agreement on executive functioning assessment in a sample of 43 children with autism spectrum disorder with level 2 severity. For this purpose, scores given by parents and teachers on the BRIEF subscales were compared, and the relationship between these scores was analyzed. The results obtained indicated, first, statistically significant differences between parents and teachers on all the subscales, with teachers reporting greater executive dysfunction in all cases. Second, there were no statistically significant correlations between the scores given by the two informants on almost all the subscales. Overall, these results point to the different perceptions of parents and teachers regarding the executive functioning of children with ASD, which may reflect the relevance or role of these functions in the context where they are assessed.

Keywords: Autism spectrum disorder (ASD). Executive functioning. Multi-informant assessment. Neurodevelopmental disorders. Parents. Teachers.

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by the presence of persistent deficits in two fundamental aspects (DSM-5; APA, 2013): A) Communication and social interaction through multiple contexts, and B) Repetitive and restricted patterns of behaviors, activities, and interests. In addition to these two diagnostic criteria: C) The symptoms must be present in early stages of development, D) They must cause significant impairment in important areas of the person's functioning, and E) They must not be due to intellectual disability (although they may co-exist). The severity of the first two criteria (A and B) indicates the severity of the disorder, which is classified into three levels or grades, according to the support required by the person: 1 ("Requires support"), 2 ("Requires substantial support"), and 3 ("Requires very substantial support"). All these supports are aimed at providing the highest degree of autonomy in daily living activities (Gentil-Gutiérrez et al., 2021).

The severity of the disorder significantly conditions the

adaptation of the child with ASD in the different developmental contexts, being even greater the presence of other comorbid disorders such as attention deficit disorder in children with autism with a higher degree of severity (Ames & White, 2011), which affects negatively to the school, social and home context (Ashwood et al., 2015).

The use of multiple informant ratings is considered an interesting practice in childhood behavioral assessment, and it is justified by the attributions and previous experiences of the raters, as well as the complexity of childhood behavior. Evidence of this is provided by the fact that some instruments require the assessment of the child's behavior by the parents in the home context and by the teachers in the school context, with the observations of the two informants often differing (De los Reyes, 2011).

In the case of ASD, discrepancies between informants (parents and teachers) about the symptomatology of the disorder have been noted in different studies that have found moderate to low correlations between the scores obtained by the two informants (Jepsen et al., 2012; Kanne et al., 2009; Mattila et al., 2009). Differences have also been found between parents and teachers' assessments of sensory processing in children with ASD (Fernández-Andrés et al., 2015) and in emotional, behavioral, and social skill ratings problems in children with ASD (Stratis & Lecavalier, 2015; Tárraga-Mínguez & Sanz-Cervera, 2020).

An interesting research topic related to parent-teacher

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agreement about children with ASD is executive functioning assessment. Executive functions include a variety of interrelated cognitive processes for the correct coordination of thoughts, emotions, and behaviors that are set in motion before resolving new tasks or more complex problems (Corbett et al., 2009; Robinson et al., 2009). In the case of children with ASD, there is a deficit in executive functions, such as cognitive flexibility, planning, working memory, inhibitory control, and emotional regulation (Berenguer et al., 2018; Demetriou et al., 2018; Dubbelink & Geurts, 2017; Filipe et al., 2018; Hill, 2004; Ozonoff, 1997). In the case of the school context, deficits in executive functioning have been related to greater learning difficulties and academic performance (Baggetta & Alexander, 2016; Diamond, 2013), especially working memory (Reiter et al., 2005), metacognitive skills (Miranda-Casas et al., 2005) and cognitive flexibility (Blijd-Hoogewys et al., 2014; Brady et al., 2013; Campbell et al., 2017). Meltzer and Krishnan (2007) maintain that in the development of school tasks it is not only necessary to have automated processes such as reading, writing or calculation, but also to know how to apply a whole series of strategies associated with the executive functions' skills, such as flexibility or metacognitive skills.

Executive functions have been assessed by different informants in studies with children with typical development (Bausela-Herreras, 2018; Martoni et al., 2016; Soriano-Ferrer et al., 2014; Teglassi et al., 2017; Zorrilla, 2013), children with ADHD (Mares et al., 2007; Soriano-Ferrer et al. 2014), children with dyslexia (Morte-Soriano et al., 2020), children with ASD (Gentil-Gutiérrez et al., 2022) and even children who had survived a brain tumor (Wochos et al., 2014). When analyzing possible discrepancies between informants in the assessment of the executive functions, in studies with participants with a clinical condition, significant differences between parents and teachers have been obtained more often, with the teachers' assessment usually being lower (Mares et al., 2007; Morte-Soriano et al., 2020; Soriano-Ferrer et al., 2014; Wochos et al., 2014).

Discrepancies between informants could be due to factors related to the informants themselves, to the evaluator, and to the context where the behavior occurs; aspects that can be especially relevant in clinical cases. Thus, differences between the school environment, which is usually less flexible and the family environment, which is less structured and more tolerant (Achenbach, 2011; Mares et al., 2007), could become more evident in children with a clinical condition, as in the case of ASD.

The objective of the present study was to analyze the possible existence of discrepancies between parents and teachers in the evaluation of executive functioning through the BRIEF questionnaire in a sample of children with ASD. To do this, a combination of tests that evaluate differences between means and statistical correlations were used. While mean differences may reveal potential tendencies for different raters to rate a particular function lower or higher, corre-

lations provide an assessment of whether children are ranked consistently across raters (Lane et al., 2013).

The present study is justified by considering the relevant effect that the family or school context can have on executive functioning. In this sense, the demands related to school tasks, organization and planning, and the volume of information that the student has to attend to when successfully facing school tasks could lead to identifying a greater executive dysfunction in children with ASD by teachers versus parents. These differences between informants are relevant not only to identify specific demands between contexts, but also in the design of differential interventions that allow enhancing those executive functions related to these demands to a greater extent.

Method

Participants

Executive functioning was assessed in a total of 43 students (34 boys and 9 girls) with ASD severity level 2. The students were between 8 and 13 years old (mean age: 10 years and 8 months), and they had non-verbal IQ scores between 75 and 135 on the Raven's Progressive Matrices Test (Raven, 1996). The students had been diagnosed by the neuropediatric services of different hospitals in the national health system according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM-IV-TR) (APA, 2000). All of them fulfilled the diagnostic criteria for ASD level 2 on the DSM-5 (APA, 2013), confirmed with the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 2000), by specialized psychologists who had official accreditation for its use. In addition, all the children with ASD had an Autism Index (AI) score equal to or greater than 85 on the Gilliam Autism Rating Scale, Second Edition (GARS-2), indicating a high probability of having the disorder (Gilliam, 2006). Grade 2 of the disorder severity indicates that the person needs a notable or substantial level of support for his or her functioning and performance in the different contexts of his or her daily life, presenting important deficits in his or her communication skills and social interaction, as well as displaying inflexible, restricted, and repetitive behavior with notable difficulties in coping with changes.

The students were enrolled in communication and language classrooms in public schools in the province of Valencia (Spain). The assessment of executive functions, using the Behavior Rating Inventory of Executive Function (BRIEF) of Gioia et al. (2000), was carried out by the parents of the children with ASD and by the fifteen teachers in the special education classrooms. With regard to the parents, the mean age was 43.07 years ($SD = 3.26$). The mean age of the teachers was 39.07 years ($SD = 5.80$).

Procedure

After informing all the regular schools in the province of Valencia that had a communication and language classroom about the study, the school principals were invited to a meeting in order to explain the purpose of the study. Of the schools that voluntarily agreed to participate, children with ASD who attended this type of classroom and presented severity level 2 of the disorder were selected. Both the parents and teachers of these children participated in an interview with the school's psycho-educational guidance service to collect demographic data on the children and their families, as well as their informed consent and the completion of the BRIEF (Gioia et al., 2000). This study was approved by the Spanish State Research Agency and financed by this same agency and by the European Union through FEDER funds.

Measures

To assess executive functioning, the BRIEF (Gioia et al., 2000) was employed, using the forms for parents and teachers that assess executive functions in children between 5 and 18 years old. The test is composed of 86 items assessed on a Likert-type scale with three options: never, sometimes, and often. The items are distributed in eight clinical subscales and in two validity scales.

Inhibition: It allows evaluating impulse control problems and the child's ability to stop or adequately regulate his or her behavior considering the moment or the context.

Flexibility: It assesses the child's ability to change from one situation and activity to another when circumstances require it.

Emotional control: It evaluates the presence of problems when it comes to adequately regulate or modulate emotional responses according to situational demands.

Initiative: It evaluates the presence of problems when starting tasks or activities autonomously and independently, or when searching for new ideas or strategies to solve problems.

Working memory: It assesses the child's ability to hold information in memory in order to perform or respond appropriately to a task.

Planning/organization: It evaluates the presence of problems when anticipating future situations, ordering, and prioritizing information, as well as setting objectives and sequencing the necessary steps to achieve them. Organization refers to the ability to order information and extract main ideas or relevant concepts in order to study or communicate.

Organization of materials: It evaluates the existence of problems when it comes to keeping materials tidy and organized, as well as study and play areas, among others.

Supervision: This subscale allows to evaluate the use of habits checking and reviewing the work done, assessing the child himself if the execution has allowed him to achieve the objective related to the proposed task.

In addition, two compound scores can be obtained: the

Behavioral Regulation Index (BRI), which indicates the person's ability to change his or her affective state and modulate his or her emotions and behavior, and the Metacognition Index (MI), which assesses the ability to initiate, plan, organize and maintain future-oriented problem solutions in working memory, involving actively solving problems in different contexts. From these indexes, a global score is obtained: the Global Index of Executive Function (GEC).

The scores obtained can be transformed into T-scores, which have a mean of 50 and a standard deviation of 10. Thus, the higher the scores, the greater the problems in executive functioning, with T-scores of 65 or higher being considered clinically significant. In the original scale of Gioia et al. (2000) Cronbach's alpha was .80 for teachers and .98 for parents, while in the present study Cronbach's alpha was .89 for teachers and .91 for parents.

Data analysis

Statistical analyses were performed with the SPSS 25 statistical package for Windows. First, three multivariate repeated measures analyses of variance (MANOVAS) were performed to compare the parents and teachers' assessments of executive functioning. Wilks' lambda was used in these three analyses, with a significance level of $p < .05$. Partial eta-squared was used to determine the effect size. Using the values indicated in Cohen's study (1992), this effect was interpreted as low (.02), medium (.13), and high (.26). Second, Pearson correlation analyses were performed to determine whether there was a significant relationship between parents and teachers' ratings on each of the executive functioning subscales. We used correlation coefficients of .10, .30, and .50 as thresholds to determine small, medium, and large effect sizes, respectively, following Cohen's guidelines (1988).

Results

Differences between parents and teachers on the Global Executive Composite (GEC) of the BRIEF

The results of the MANOVA revealed the existence of statistically significant differences between parents and teachers on the GEC index [Wilks' lambda = 0.714; $F_{(1, 42)} = 16.820$; $p < .001$; $\eta^2_p = .286$]. The teachers perceived greater difficulties on the GEC ($M = 74.58$; $SD = 14.44$) than the parents did ($M = 63.53$; $SD = 12.39$).

Differences between parents and teachers on the Behavioral Regulation Index (BRI) and the Metacognition Index (MI) of the BRIEF

The results of the MANOVA revealed statistically significant differences between parents and teachers on the two composite scores [Wilks' lambda = 0.682; $F_{(2, 41)} = 9.552$; $p < .001$; $\eta^2_p = .318$]. The teachers perceived greater difficulties than the parents on both the Behavior Regulation Index

($F_{(1,42)} = 12.852, p = .001, \eta^2_p = .234$), with mean scores of 74.39 for teachers ($SD = 16.58$) and 63.23 for parents ($SD = 13.96$), and the Metacognition Index ($F_{(1, 42)} = 18.415, p < .001; \eta^2_p = .305$), with mean scores of 72.04 for teachers ($SD = 13.45$) and 63.09 for parents ($SD = 9.90$).

Differences between parents and teachers on the clinical subscales of the BRIEF

The results of the MANOVA revealed statistically significant differences between parents and teachers in their as-

essment of executive functioning on the clinical subscales [Wilks' lambda = 0.376; $F_{(8, 35)} = 16.820; p < .001; \eta^2_p = .624$]. As Table 1 shows, in all cases, the teachers perceived greater difficulties in the children's executive functioning than the parents did, if we consider the mean scores obtained on each subscale.

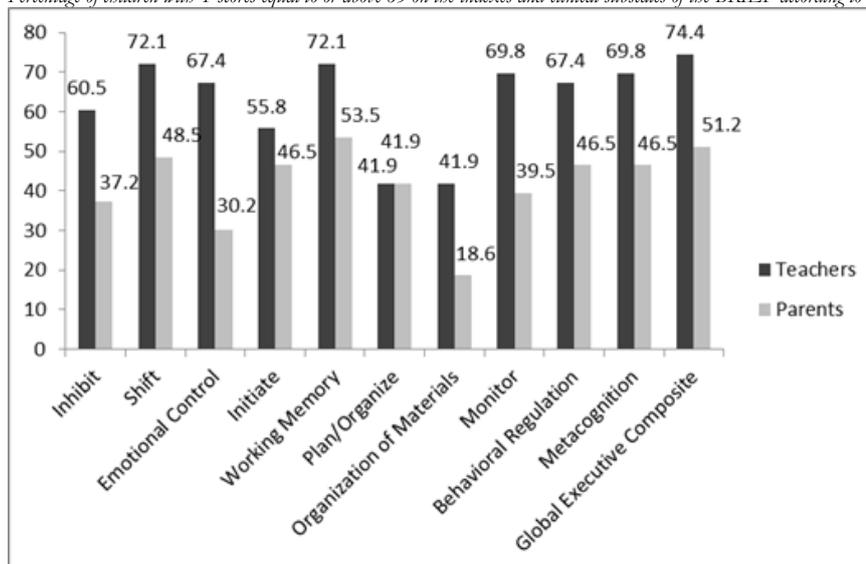
Table 1
Means, standard deviations, and F values of parents and teachers on the clinical subscales of the BRIEF.

	M Parents	SD	M Teachers	SD	$F_{(1,42)}$	p	η^2_p
Inhibition	61.58	13.92	70.16	15.93	9.011	.005	.177
Shift	64.34	13.24	72.37	16.51	7.007	.011	.143
Emotional control	58.93	13.28	73.11	17.18	18.699	.000	.308
Initiative	62.55	10.47	68.60	10.07	8.849	.005	.174
Working memory	64.09	11.35	74.72	15.22	25.531	.000	.378
Planning/Organization	61.13	9.22	65.04	11.64	4.195	.047	.091
Organization of materials	55.16	9.56	65.53	16.57	16.116	.000	.277
Supervision	62.69	10.04	72.23	13.30	19.347	.000	.315

When analyzing the percentage of children who obtained scores at or above the 65th percentile cut-off point, which would indicate the presence of clinically significant difficulties, Figure 1 shows that, on all the indexes and subscales of the BRIEF, the teachers placed a higher percentage of chil-

dren in the clinical range than the parents did, except in the case of the Planning/Organization subscale. The highest percentage of children with clinical significance, as rated by both the teachers and parents, was on the Shift and Working Memory subscales, as well as on the global GEC index.

Figure 1
Percentage of children with T scores equal to or above 65 on the indexes and clinical subscales of the BRIEF according to teachers and parents.



Agreement between parent and teacher ratings on the indexes and clinical subscales of the BRIEF

As Table 2 reveals, on most of the indexes and clinical subscales of the BRIEF, no statistically significant correla-

tions were obtained between teachers and parents' scores, except for the Working Memory subscale and the Metacognition Index, where statistically significant direct correlations were obtained, although with a medium or moderate effect size.

Table 2*Pearson correlations between informants on the indexes and clinical subscales of the BRIEF.*

	Inhibit.	Shift	Emot. Control	BRI	Initiat.	Work. Memory	Plan/Organ.	Org. Mat.	Monitor.	MI	GEC
Teachers-Parents <i>r</i>	.217	.121	.020	.115	.159	.493**	.300	.250	.283	.345*	.141

** $p < .01$; * $p < .05$ Note: Inhibit. (Inhibition); Emot. Control (Emotional control); BRI (Behavioral Regulation Index); Initiat. (Initiative); Work. Memory (Working Memory); Plan/Organ. (Planning/Organization); Org. Mat. (Organization of materials); Monitor. (Monitoring); MI (Metacognitive Index), GEC (Global Index of Executive Function).

Discussion

The results obtained in the present study report statistically significant differences in the assessment of the executive functions of children with ASD by their parents and teachers, with teachers reporting greater difficulties. This result is consistent with previous studies conducted with participants with a clinical condition (Mares et al., 2007; Morte-Soriano et al., 2020; Soriano-Ferrer et al., 2014; Wochos et al., 2014).

Previous studies indicate that fewer discrepancies were found between parents and teachers in the executive functioning assessment of children with typical development than in the assessment of participants with a clinical condition (Soriano-Ferrer et al., 2014; Teglassi et al., 2017). However, in studies with participants with a clinical condition, noteworthy discrepancies between informants have been found, in the same direction as in the present study. In other words, on most or all of the subscales assessed, teachers reported greater problems with children's executive functioning than parents did.

These results suggest that, in participants where the evidence points to the existence of executive dysfunctions (which would also be the case of children with ASD), the difficulties would be especially evident in the context where these skills are required more (the school context), which is also the context where informants have more opportunities to compare the performance of peers of the same age.

It should be kept in mind that the discrepancy obtained in the assessment of the same construct by two informants (who assess performance in two different contexts), does not mean that they are not reliable and valid sources for assessing children's executive functioning, but rather that these discrepancies would be related to the context where the behavior is assessed (De los Reyes et al., 2013). Therefore, it would be necessary to take into account the importance of the trait assessed in each context (Funder, 1995). Thus, the demands of the school context, where executive functions play a key role in carrying out academic tasks (Berenguer et al., 2016), require certain curricular skills and competencies to be acquired and develop (Purpura et al. 2017; Sikora et al., 2002; Swanson, 2006). This could explain the differences between the family and school contexts, with teachers giving scores that indicate clinically significant difficulties on most of the subscales (Mares et al., 2007). These discrepancies between parents and teachers highlight the importance of completing the autism diagnosis based on the assessments of different informants, in addition to the parents.

On the other hand, no significant relationships were found between parents' and teachers' ratings of children's

executive functioning (except on two subscales that moderate correlations were obtained). These results agree with those obtained in some studies, such as Mares et al. (2007) and Martoni et al. (2016), but not in others, such as Soriano-Ferrer et al. (2014), Morte-Soriano et al. (2020) or Zorrilla (2013), in which significant correlations between parent and teacher scores were obtained on most of the BRIEF subscales. Nonetheless, it should be taken into account that the samples in the last mentioned studies did not include participants with ASD.

The lack of agreement between the parent and teacher ratings on most of the indexes and clinical subscales of the BRIEF in the present study could be related to the intrinsic characteristics of the ASD population. Thus, contextual hyperselectivity, a unique and characteristic feature of ASD stemming from a detail focused processing style (Frith & Happé, 1994; Mottron & Burack, 2001), could lead to important differences in the behavior of the children with ASD in different developmental contexts, which would contribute to the lack of agreement between the informants.

Furthermore, the discrepancies and lack of agreement between informants about the executive functioning of children with ASD found in the present study can be added to differences found in other variables in children with this neurodevelopmental disorder, as noted in previous studies by Fernández-Andrés et al. (2015), Jepsen et al. (2012), Kanne et al. (2009), Mattila et al. (2009), Stratis and Lecavalier (2015), or Tárraga-Mínguez and Sanz-Cervera (2020). In sum, ASD might be a condition in which discrepancies and lack of agreement between informants on variables and aspects related to the child's behavior seem to be particularly evident, even more so than in other clinical conditions, making it extremely important to assess and diagnose this neurodevelopmental disorder in the different contexts of the child's development.

The main limitation of the present study is the sample size, and the results suggest that future research should use larger samples of participants with ASD. It would also be necessary to include different levels of severity subgroups and consider other variables such as IQ, age, or possible comorbid diagnoses, since they can act as moderating variables in the concordance between different informants, as suggested by Stratis and Lecavalier (2015). Another limitation of the study is not having considered the socioeconomic level of the parents, since this aspect is related to executive functioning as pointed out by Korzeniowski et al. (2017) or Fitzpatrick et al. (2014), among others.

Finally, the results of this study confirm, once again, the need to evaluate the behavior of children with ASD in mul-

multiple contexts, considering the specific characteristics associated with each environment.

Conflict of interest.- The authors of this article declare no conflict of interest.

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