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ARTICLE

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Case–contrast study about parent–infant interaction in a Brazilian sample of siblings of children with autism spectrum disorders

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ABSTRACT

Siblings of children with autism spectrum disorders (ASD) present greater susceptibility to developmental problems, in comparison with siblings of typically developing children. The greater prevalence of mental health disorders among parents of children with ASD increases younger siblings' vulnerability to emotional problems. The aim of this study is to compare the interaction between carers and babies aged 2 to 26 months ($M = 11.7$, $SD = 6.9$) who are siblings of children with ASD (ASD dyads) with the interaction of dyads of siblings of typically developing children (TD dyads). The protocol of *Clinical Indicators of Risk for Child Development* and the *Coding Interactive Behaviour* measures were used to evaluate interaction. ASD dyads presented higher scores of constriction in their interaction, $P = .024$, with babies presenting higher scores of withdrawal behavior, $P = .003$, and carers presenting higher scores of depressive mood, $P = .008$, when compared to TD dyads. The ASD dyads have interactive impairments more frequently than do the TD dyads.

KEYWORDS
autism, emotional development, parent–infant interaction, siblings

RESUMEN

Trasfondo: Los hermanos de niños con trastornos dentro de la gama del autismo (ASD) presentan una mayor susceptibilidad a problemas del desarrollo, en comparación con los hermanos de niños que se desarrollan de una manera típica. La mayor prevalencia de trastornos de salud mental entre padres de niños con ASD aumenta la vulnerabilidad de los hermanos más jóvenes a problemas emocionales. El objetivo de este estudio es comparar la interacción entre cuidadores y bebés de edad entre 2 y 26 meses (Media: 11.7 meses/ SD: 6.9) hermanos de niños con ASD (díadas ASD), con las interacción de díadas de hermanos de niños que se desarrollan típicamente (díadas TD). **Método**: Para evaluar la interacción se usó el protocolo de los *Indicadores Clínicos de Riesgo para el Desarrollo del Niño* y la *Codificación Interactiva de Conducta*. **Resultados**: Las díadas ASD presentaron puntuaciones más altas de constricción en su interacción ($p = 0.024$), con los bebés que presentaron más altas puntuaciones de conducta de despego ($p = 0.003$) y los cuidadores que presentaron más altas puntuaciones de

estados de ánimo depresivos (p = 0.008) cuando se les comparó con las díadas TD. **Conclusiones**: Las díadas ASD tienen impedimentos interactivos más frecuentemente que las díadas TD.

PALABRAS CLAVES
interacción progenitor-infante, autismo, hermanos, desarrollo emocional

RÉSUMÉ

Contexte: Les frères et sœurs d'enfants avec des troubles du spectre autistique (TSA) présentent une plus grande susceptibilité à des problèmes comportementaux, comparés aux frères et sœurs d'enfants se développant typiquement. La plus grande prévalence de troubles de santé mentale avec les parents d'enfants avec TSA augmente la vulnérabilité aux problèmes émotionnels des jeunes frères ou sœurs. Le but de cette étude est de comparer l'interaction entre les parents ou personnes prenant soin des enfants et les bébés âgés de 2 à 26 mois (Moyenne: 11, 7 mois/ DS: 6,9), frères et sœurs d'enfants avec des TSA (dyades-TSA), avec l'interaction de dyades de frères et sœurs d'enfants se développant typiquement (dyades-DT). **Méthode**: Le protocole d'*Indicateurs Cliniques de Risque pour le Développement de l'Enfant* et le *Codage des Comportements Interactifs* ont été utilisés pour évaluer l'interaction. **Résultats**: les dyades TSA ont présenté des scores plus élevés de constriction (p = 0,024) de leur interaction avec les bébés présentant des scores de comportement de retrait (p = 0,003) et les personnes prenant soin des enfants ont présenté des scores plus élevés d'humeur dépressive (p = 0,008) quand comparées aux dyades-DT. **Conclusions**: Les dyades-TSA ont des insuffisances interactives plus fréquemment que les dyades-DT.

MOTS CLÉS
interaction parent-bébé, autisme, frères et sœurs, développement émotionnel

ZUSAMMENFASSUNG

Hintergrund: Geschwister von Kindern mit Autismus-Spektrum-Störungen (ASD) weisen im Vergleich zu Geschwistern von sich typischerweise entwickelnden Kindern eine höhere Anfälligkeit für Entwicklungsprobleme auf. Die größere Prävalenz von psychischen Störungen bei Eltern von Kindern mit ASD erhöht die Anfälligkeit für emotionale Probleme bei jüngeren Geschwistern. Ziel dieser Studie ist es, die Interaktion zwischen Bezugspersonen und Babys im Alter von 2 bis 26 Monaten (Mittelwert: 11.7 Monate / SD: 6.9) für Geschwister von Kindern mit ASD (ASD-Dyaden) und Geschwister von typischerweise entwickelten Kindern (TD-Dyaden) zu vergleichen. **Methode**: Das Protokoll der „*Clinical Indicators of Risk for Child Development"* und das „*Coding Interactive Behaviour"* wurden zur Bewertung der Interaktion verwendet. **Ergebnisse**: ASD-Dyaden zeigten höhere Werte in ihren Einschränkungen der Interaktion (p = 0.024), die Babys zeigten höhere Werte im Rückzugsverhalten (p = 0.003) und die Bezugspersonen zeigten höhere Werte in der depressiven Stimmung (p = 0.008) im Vergleich zu den TD-Dyaden. **Schlussfolgerungen**: Die ASD-Dyaden haben häufiger interaktive Beeinträchtigungen als die TD-Dyaden.

STICHWÖRTER
Eltern-Kind Interaktion, Autismus, Geschwister, emotionale Entwicklung

抄録

背景:自閉症スペクトラム障害 (ASD)児のきょうだいは、定型発達児のきょうだいに比べて、発育上の問題により高い感受性を示している。ASD児の養育者の精神疾患の有病率の高さは、下のきょうだいの脆弱性が情緒的問題になることを増やしている。この研究の目的は、きょうだいにASD児がいる2ヶ月から26か月までの乳幼児(平均: 11.7ヶ月/ 標準偏差: 6.9)と養育者の相互交流 (ASD-dyads)と、定型発達児のきょうだいのいる乳幼

児と養育者の相互交流(TD-dyads)を比較することである。**方法**: 相互交流を評価するために、*子どもの発達リスク臨床的指標(Clinical Indicators of Risk for Child Development)*と *相互交流行動コーディング(Coding Interactive Behaviour)* が使われた。**結果**: TD-dyadsと比較して、ASD-dyadsの方が相互交流における窮屈さのスコアが高く、乳児において高い引きこもり行動のスコア(p = 0.003) と養育者において高い抑うつ気分のスコア(p = 0.008)が示された。**結論**: ASD-dyadsにおいては、TD-dyadsよりも、頻繁に相互交流が損なわれている。

キーワード
親–乳幼児相互交流, 自閉症, きょうだい, 情緒発達

摘要

背景:與典型發育兒童的兄弟姐妹相比, 自閉症譜系障礙 (ASD) 兒童的兄弟姐妹較易有發育問題。患有 ASD 兒童的父母患精神疾病的比例越高, 兄弟姐妹就越容易受到情緒問題的影響。這項研究的目的, 是比較自閉症譜系障礙 (ASD-dyads) 和典型發育兒童 (TD-dyads) 護理者和 2 至 26 個月大的兄弟姐妹 (平均年齡: 11.7 個月/ SD: 6.9) 的親子互動。方法: 採用兒童發育風險臨床指標和編碼交互行為評估互動。結果: 與TD-dyads相比, ASD-dyads在互動中呈現較高的狹隘分數 (p = 0.024) – 嬰兒有較高的戒斷行為評分 (p = 0.003) 和護理者有較高的抑鬱情緒評分 (p = 0.008) 。結論: ASD-dyads比TD-dyads較多有互動障礙。

關鍵詞
親子互動, 自閉症, 兄弟姐妹, 情緒發展

ملخص

الخلفية: أشقاء الأطفال المصابين باضطرابات طيف التوحد (ASD) يكونون عادة عرضة بشكل أكبر لمشاكل النمو ، مقارنه باشقاء الأطفال الطبيعيين. ويعتبر زيادة انتشار اضطرابات الصحة النفسية بين الآباء والأمهات للأطفال المصابين باضطراب طيف التوحد ASD من أسباب زيادة عرضة الاشقاء الأصغر سنا للمشاكل الانفعالية العاطفية. والهدف من هذه الدراسة هو مقارنه التفاعل بين مقدمي الرعاية والأطفال الذين تتراوح أعمارهم بين 2 إلى 26 شهرا (متوسط: 11.7 شهرا- SD=6.9) ويكونون أشقاء الأطفال المصابين باضطراب التوحد من خلال دراسة تفاعل ثنائياتهم (ASD-dyads) بالنسبة لتفاعلات ثنائيات أشقاء لأطفال طبيعيين ذوي النمو الطبيعي(TD-dyads) . **منهج البحث**: تم استخدم بروتوكول المؤشرات السريرية لمخاطر نمو الطفل ومقياس ترميز السلوك التفاعلي لتقييم التفاعل. **النتائج**: أظهرت ثنائيات (ASD) درجات أعلى من التقيد في انفعالاتها (p = 0.024) ، حيث أظهر الرضع مستويات أعلى من السلوك الانسحابي (p = 0.003) ومقدمي الرعاية أظهروا درجات أعلي من المزاج الاكتئابي (p = 0.008) بالمقارنة مع ثنائيات الأطفال الطبيعيين .**استنتاجات** : ثنائيات طيف التوحد (ASD-dyads) لديهم مظاهر قصور تفاعلي بشكل أكثر من ثنائيات النمو الطبيعي (TD-dyads).

الكلمات الرئيسي
تفاعل الوالدين والرضيع ؛ التوحد ؛ الأشقاء ؛ النمو العاطفي.

Autism spectrum disorders (ASD) are neurodevelopmental disorders of multifactorial etiology. There is strong evidence that genetic components perform a significant role in the susceptibility to these disorders (De Rubeis & Buxbaum, 2015; Hallmayer et al., 2011). The recurrence rate of ASD among siblings of children with this diagnosis has been estimated to be between 6.9 and 21% (Gronborg, Schendel, & Parner, 2013; Messinger et al., 2013; Ozonoff et al., 2011; Sandin et al., 2014; Sumi, Taniai, & Miyachi, 2006), considerably higher than the prevalence in the general population, estimated at 0.6% (Elsabbagh et al., 2012).

In the last 30 years, findings from experimental research have guided healthcare providers to better detect initial signs for developmental problems and undertake immediate interventions. It is known that when applied early in life, therapies have more effective results (Charman & Baird, 2002; Dawson et al., 2010). The plasticity of the cerebral anatamophysiological structure in the first years of life as well as the fundamental role of the early interactive experiences for the

functioning of the neuronal connections may explain why this is a sensitive and privileged moment for intervention.

Recently, some longitudinal studies following cohorts of younger siblings of children with ASD have analyzed differences between them and typical babies regarding a series of initial developmental aspects such as motor, cognitive, emotional, social, and language skills; the presence of repetitive behavior or abnormal movement patterns; visual attention; response to the child's own name and motherese (infant-directed speech); shared attention, and imitation (Newschaffer et al., 2012; Ozonoff et al., 2011).

The results of these studies have revealed that specific signs for ASD have become evident only at the end of the first year of life, and they are related to social and communicational competencies (Newschaffer et al., 2012; Rogers, 2009). These studies have reported that babies who developed ASD have greater difficulty in initiating an interaction, seeking eye contact with another person and sustaining it, responding when called by his or her own name, reacting, and imitating. However, motor delays and unusual visual interests were the only specific signs for ASD identified at the age of 6 months (Bryson et al., 2007).

The siblings of children with ASD also have a greater chance of presenting other developmental problems such as language delay, difficulties in sensorial integration, and regulation of emotions (Gamliel, Yirmiya, & Sigman, 2007). This can be explained by, among other reasons, the sharing of endophenotypes between autism and diverse developmental disorders (Cassel et al., 2007). Some siblings do not entirely meet the criteria for ASD but present subclinical conditions related to difficulties in social relations and communication as well as have restricted interests. Yirmiya et al. (2006) observed that at 4 months of age, the interactions undergone by the siblings of children with autism in free play with their carer presented weaker synchrony and more neutral affects in the still-face paradigm (Tronick, Als, Adamson, Wise, & Brazelton, 1978). At 14 months, they present inferior results on language and nonverbal communication scales, when compared to siblings of children with typical development.

In parallel, studies have proliferated providing evidence of the impact of care of a child with ASD in parental mental health, increasing the occurrence of symptoms of depressive mood, anxiety, and stress. Some authors have related these phenomena to cognitive and behavioral difficulties of the child with autism (Baker-Ericzen, Brookman-Frazee, & Stahmer, 2005; Benson, 2007; Montes & Halterman, 2007; Quintero & McIntyre, 2010). Moreover, studies have revealed that there is an association between parents' stress and the degree of difficulty in social interaction with the child with ASD (Hastings et al., 2005).

Avoidance of visual contact and the emotional expressions of others, great sensitivity to changes in contingencies, and restriction of interests are characteristics of children with ASD that affect the emotional state of their parents from an early age (Saint-Georges et al., 2011). Lerner (2011) found evidence that between the age of 1 and 1½ years, the condition of babies later diagnosed with autism triggers an intense defensive reaction of detachment on the part of their parents.

Slade (2009) described the paradoxal process involved in recognition and attribution of meaning by the parents of children with autism to their own mental states and those of their children. This is because their interaction bears scarce experiences of gratification and rewards related to reciprocity and affective attunement, although autistic children need parental investment of affective contact and mediation with the social world more than do typical children Besides, children with ASD may provoke frightening feelings in their parents that are insupportable to be processed within the relation itself, due to the lack of reciprocity and limitations of contact with the mental states of others.

These parental difficulties experienced in common relations with a child with ASD can have repercussions in the quality of the interaction with their new babies. It is possible that the parental capacity of communicating and interpreting as well as imparting their thoughts to their children will become adversely affected in view of the painful effects experienced in the encounter with the oldest child's difficulties.

These data point toward the importance of constructing a broader model for understanding the vulnerability of younger siblings of children with ASD which takes into account aspects of the baby and the environment, including the emotional state of their parents or carers.

Despite the growing international scientific production, public policies aimed at this specific population do not exist in Brazil. Attention to the siblings is still insignificant despite evidence of their vulnerability to developmental problems.

The objective of this study is to investigate the interaction of babies who are siblings of children with ASD with their carers, in a Brazilian sample of families who use public mental health services. More specifically, this study aims to compare the occurrence of initial signs of psychic risk and impairments in interactive behavior in ASD dyads with those of TD dyads, taking into account aspects of the carer and the baby. The study also compares the occurrence of symptoms of depression, anxiety, and mental disorders with somatic complaints referred by the caregiver between the two groups (TD dyads and ASD dyads).

1 | METHOD

1.1 | Participants

The study featured a case–contrast delineation, in which the interaction of 144 carer–baby dyads were evaluated; 69 of

which were younger siblings of children with autism (ASD dyad) and 75 younger siblings of children without autism (TD dyad). All the babies were 2 to 26 months old and were assessed in their interaction with the principal carer, the mother in 98.5% of the cases. One child was raised by his father and has been assessed in interaction with him. Hereafter, all of them will be called *carer*.

Due to the difficulty in locating cases with the profile sought, it was necessary to broaden the field of the research to four municipalities in São Paulo State, with similar characteristics according to the Human Development Index (PNUD, 2018), degree of urbanization, and schooling level of the population: São Paulo, Guarulhos, São Carlos, and Ribeirão Preto. Participants were selected by convenience. Families with adopted children were excluded from the study as were families whose children were not siblings on the mother's side or who already had some diagnosed syndrome.

The ASD dyads were recruited in public mental health services specializing in attending children and adolescents. The study project was approved by the Health Secretariats and their respective ethics committees. In the particular case of the São Paulo Municipality, it was submitted to the approval of the regional coordinating entities. All evaluations of the study were preceded by the reading and signature of a consent term on behalf of the baby.

Professionals of the services identified the eligible families. The diagnosis of autism in the older sibling was confirmed by means of the Childhood Autism Rating Scale (CARS), translated and validated for the Brazilian population (Pereira, Riesgo, & Wagner, 2008). Families whose oldest child was attributed a score of 30 or over remained in the case group.

Altogether, 90 ASD dyads, including expectant mothers, were indicated by the teams of professionals to participate in the study. Of this total, 4 of the pregnancies were interrupted, 1 subject presented a CARS result below 30, another 6 did not conclude the assessment of the baby, and 10 refused to participate right from the start as a result of disinterest or family difficulties.

The TD dyads were recruited in basic health units, public kindergartens, and the local community. The criterion for inclusion in this group was having at least one older sibling with a CARS score under 30, besides fulfilling the pairing with criteria of the other group: the baby's age and gender and the mother's educational level, all known to be associated to developmental problems.

1.2 | Procedure and measures

Evaluation of the families involved semistructured questions, filming, and observational situations. The interaction of the dyad was assessed using the protocol of Indicadores Clínicos de Risco para o Desenvolvimento Infantil (IRDI; Kupfer et al., 2010) and three scales of the Coding Interactive Behaviour (CIB, Feldman, 1998) measure: Parental, Baby, and Dyad. The occurrence of symptoms of depression, anxiety, and mental disorders with somatic complaints was assessed using the Self-Report Questionnaire (SRQ-20; Beusenberg, 1994).

1.2.1 | IRDI

The IRDI is an instrument composed of 31 items observed in the first 18 months of life that suggests favorable conditions for the developing baby. When two or more items are absent, it may indicate the occurrence of *psychic risk* with a predictive value for mental problems or for child developmental problems at 3 years of age (Kupfer et al., 2010). Increased suffering results assessed with the IRDI were significantly associated with the presence of early signs of autism assessed with the Modified-Checklist for Autism in Toddlers (Campana, Lerner, & David, 2015); the instrument has shown good sensitivity levels for autism in a study with children assessed by CARS (Machado, Lerner, Novaes, Palladino, & Cunha, 2014). Recent research has shown an association between children presenting early signs of psychological distress in the 0 to 18 months age range identified by the IRDI protocol and a lower quality of life from the psychosocial perspective at 6 years old (Paolo et al., 2015).

The IRDI has been widely used in Brazil and is indicated in the *Care Guidelines for the Rehabilitation of Persons with Autistic Spectrum Disorders* published by the Ministry of Health (2013).

The IRDI items were assessed during the encounter with the dyad via observation and enquiry. Training of the researchers was conducted by one of its authors.

1.2.2 | The CIB

The CIB scales comprise an overall measurement used to evaluate affective states and interaction styles between parents and children, based on the filming of an interaction with a duration time of 5 and 10 min. For babies under 10 months old, this interaction is free play; for the older ones, a box of previously selected toys is used (Feldman, 1998).

The filming is divided into 45 items, rated on Likert scales, with a variation from 1 (absent, rare) to 5 (very frequent). Twenty-two items comprise the parental scale; 16 are for the child scale, and 7 refer to the dyad. The scores are established for the separate items and subsequently grouped into eight composites that express aspects of carer–baby interaction; three being parental, three for the child, and two for the dyad, as proposed by Feldman (1998). This article will present the results of these eight composites in addition to the isolated item regarding the depressive mood of the carer, which was not contemplated in any composite.

Concerning the carer, the three composites and one isolated item (depression) are as follows: Parental *sensitivity* involves the capacity of the carer to recognisze the baby's signs in a social interaction, imitate them (throughout the first year), and elaborate them, which expands the level of complexity of the communication. Parental *intrusiveness*, in turn, is characterized by actions that interfere with and disorganize the child's behavior, redirecting his or her attention to another object/person or modifying his or her emotional or physical state. It includes actions that do not take into account the baby's initiative and signs of interest. *Limit setting* gathers together the parental behavior that guarantees fitting the child into the framework of the rules and conditions of the proposed interaction. *Depression* refers to the occurrence of hypomodulated affect, still face, monotonous vocalizations, and absence of response to the baby's signs.

In relation to the child, three dimensions are assessed: *Involvement* with the carer is investigated by means of the eye contact and affect directed to him or her or to a shared activity, besides his or her initiatives for joint activities, expressed by vocalizations or gestures. The capacity to develop symbolic games also is included when the child is 12 months or older. *Withdrawal*, on the other hand, refers to a process of distancing, in which the child avoids contact and presents a negative or labile affect in relation to the other; *compliance* of the child with his or her carer is an evaluation for children over 1 year of age and includes behavior of trust in the parental help, cooperation when faced with suggestions, or prohibitions and persistence in activities in which he or she is involved.

As for the dyad, there will be assessment of the *reciprocity*, one's capacity to adapt to the level of stimulation and involvement of the other, and *negative states*, constriction and poverty of coordination in the dyad.

Training of the team for codification of this scale took place in two stages: (a) a course with the creator, Ruth Feldman; and (b) remote training that was concluded once the examiners had correctly answered more than 90% of the questions.

The measurement bias was controlled in the codification by the condition of blindness of two of the evaluators. To minimize the occurrence of systematic bias in the data analysis, arising from partiality among the evaluators, a reliability study was conducted with the results of the codification of 10 dyads from the research. The agreement among the evaluators was calculated independently for the total number of evaluations, considering the 45 CIB variables of each dyad.

The Kendall correlation coefficient was used, and it proved to be significant for all analyses, Ps $< .0001$ in total, for the calculation of relative concordance, due to being an ordinal scale with two evaluators. Regardless of the child, the index was 0.845, varying among the 10 children from 0.708 to 0.974. The Kappa Index was calculated to verify the absolute concordance between the evaluators. Irrespective of the child, the index was 0.813, $P < .0001$. With the children separated, all concordances proved to be significant, Ps $< .0001$, for all 10 children). Furthermore, all the concordances can be classified as high or very high, varying in the range 0.705 to 0.924.

For the purpose of further minimizing possible bias, two evaluators independently codified the entire sample universe of the research, and they themselves compared their results. In cases of disagreement, the results were discussed, and a final value was agreed upon.

1.2.3 | The self-reporting questionnaire-20 (SRQ-20)

This screening instrument with 20 items is used to identify mental health problems in adults in the community, especially in developing countries as defined by the World Health Organization (WHO). The instrument is easy to apply and has validity and reliability for the Brazilian population (Mari & Williams, 1986). The current version, consisting of 20 yes/no questions, was developed to detect symptoms of depression, anxiety, and mental disorders with somatic complaints over the course of the previous 30 days. This instrument covers common/frequent mental disorders (Common Mental Disorder; CMD) found in the community and in primary care services. However, it is not equivalent to nor a substitute for a clinical diagnosis. The presence of eight or more symptoms ("yes" on any item of the instrument) was considered a case of a CMD. This cut point was established by Mari and Williams (1986) for the Brazilian population.

1.2.4 | Statistical analyses

Data entry took place by means of double digitalization, followed by checking the data consistency. The statistical treatment was performed using the programs STATA 8.0 and SPSS Version 18.

The descriptive analysis for characterization of the sample was conducted through calculation of central trend measurements (arithmetic M), standard deviation (SD) for the continuous variables, and frequency for the categorical variables. To verify possible differences between the distributions in the sample's groups of variables, t tests were made when the variable was continuous and Pearson chi-tests when they were categorical.

For comparison of the measurements obtained between the case and contrast groups, referring to the 45 CIB items and the number of items absent from the IRDI, the Mann–Whitney nonparametric test was performed due to being ordinal variables that did not represent symmetrical distributions. The significance level adopted for all tests was .05.

For the categorical variables, "psychic risk" and "Common Mental Disorders," a univariate logistical regression study was conducted, taking psychic risk (defined as two

TABLE 1 Distribution of the dyads between groups according to the baby's age and gender ($N = 144$)

	Under 12 months ($n = 79$)			12–26 months ($n = 65$)		
	Case group ($n = 38$)	Contrast group ($n = 41$)		Case ($n = 31$)	Contrast ($n = 34$)	
Variables	***M* (DP)**	***M* (DP)**	***t* test**	***M* (DP)**	***M* (DP)**	***t* test**
Baby's age (months)	6.1	6.5	0.520	18.5	18.1	0.718
	−2.7	−2.6		−4.1	−4.6	
	Case	**Contrast**		**Case**	**Contrast**	
Gender	***n* (%)**	***n* (%)**	χ^2	***n* (%)**	***n* (%)**	χ^2
Female	19 (50.0)	23 (56.1)	0.587	13 (41.94)	14 (41.2)	0.951
Male	19 (50.0)	18 (43.9)		18 (58.1)	20 (58.8)	

Note. DP = standard deviation.

or more indicators absent from the IRDI) and CMD as the outcome.

2 | RESULTS

2.1 | Descriptive analysis of the sample

Of the 144 babies assessed, 79 (54.86%) were under 12 months old (38 in the case group, 41 in the contrast group), and 65 (45.14%) were 12 months or over (31 in the case group, 34 in the contrast group). The mean age of the babies under 12 months is similar in both the case and the contrast groups, 6.1 months and 6.5 months old, respectively. For the babies over 12 months old, the mean age was 18.5 months in the case group and 18.1 months in the contrast group.

As expected, three pairing variables between the two groups—"baby's gender," "baby's age" (Table 1), and "mother's educational level" (Table 2)—did not present differences at 5% in the two age ranges studied.

Regarding occupation, it was observed that among the babies under 12 months old, the majority of their carers did not have an occupation outside the house, 60.5% in the case group and 56.1% in the contrast group. The percentage of carers who did go out to work was greater in the contrast group (36.6 %) than in the case group (34.2 %). The carers in the contrast group presented a mean salary (R$2,152.67) higher than that in the case group (R$1,264.2), although the *t* test did not indicate any difference at 5%.

Regarding the age range (over 12 months old), it was observed that 67.7% of the carers in the case group did not have an occupation outside the house versus 41.2% in the contrast group. Only 41.2% of those in the contrast group and 25.8% of those in the case group went out to work. The mean income of the contrast group was R$1,209.90, which was higher than that in the case group (R$614.39), without any difference at 5%.

The majority of the babies in the sample had the same father of the older sibling (72.2%) in both age groups. The babies under 12 months, from the case group, shared more frequently the same father with the older sibling (84.2%) than did the babies of the contrast group, $P = .061$. Among babies who were ≥12 months old, the difference between the two groups was not significant.

2.2 | Results in the CIB composites and the IRDI protocol

2.2.1 | Dyads with babies under12 months old

Table 3 presents the measurements obtained in the two groups for each variable and reveals that there was a relative similarity between the groups. However, tests showed that in the set of dyads with babies under 1 year old, there were differences at 5% between the case and contrast groups regarding the composites: withdrawal, negative states, and depressed mood.

The mean ranking (MR) of withdrawal in the case group, 47.63, was greater than that of the contrast group, 32.93, $P = .003$. The MR of the negative states also was higher in the case group, 45.61, than in the contrast group, 34.8, $P = .024$, indicating that the interaction of the ASD dyads was more constricted, with little reciprocity and coordination among the partners.

The higher scores of depressed mood, characterized by low affective modulation, still face, monotonous vocalization, and little sensitivity to the child's signs, were found among carers of the siblings of children with ASD up to 1 year old (MR = 44.47) as compared to those in the contrast group (MR = 35.85), and this difference was significant, $P = .008$.

No significant differences were found in the dyads with babies under 12 months old regarding the mean and median of the other CIB composites and the IRDI. However, attention is drawn to the fact that the results obtained in intrusiveness, sensitivity, establishment of limits, involvement, reciprocity (CIB), and presence of initial signs of emotional suffering (IRDI) were all more favorable in the contrast group

TABLE 2 Distribution of the dyads between groups according to the sociodemographic and reproductive variables ($N = 144$)

	Under 12 months ($n = 79$)			12–26 months ($n = 65$)		
	Case group ($n = 38$)	Contrast group ($n = 41$)		Case group ($n = 31$)	Contrast group ($n = 34$)	
Variables	***M* (DP)**	***M* (DP)**	***t* test**	***M* (DP)**	***M* (DP)**	
Ocupation						
Working	13 (34.2)	15 (36.6)	0.500	8 (25.8)	14 (41.2)	0.169
Unemployed	0 (0)	2 (4.9)		1 (3.2)	4 (11.8)	
Housewife	23 (60.5)	23 (56.1)		21 (67.7)	14 (41.2)	
Other	2 (5.3)	1 (2.4)		1 (3.2)	2 (5.9)	
Same Parents						
Yes	6 (15.8)	14 (34.1)	0.061	7 (22.6)	13 (38.2)	0.172
No	32 (84.2)	27 (65.9)		24 (77.4)	21 (61.8)	
Informant's educational level	**Case *n* (%)**	**Contrast *n* (%)**	**Mann–Whitney**	**Case *n* (%)**	**Contrast *n* (%)**	**Mann–Whitney**
Primary incomplete	4 (10.5)	4 (9.8)	0.705	1 (3.2)	2 (5.9)	0.163
Primary complete	3 (7.9)	3 (7.3)		1 (3.2)	4 (11.8)	
Secondary incomplete	6 (15.8)	11 (26.8)		6 (19.4)	8 (23.5)	
Secondary complete	17 (44.7)	14 (34.1)		14 (45.2)	13 (38.20)	
Advanced incomplete	1 (2.6)	1 (2.4)		2 (6.5)	2 (5.9)	
Advanced complete	7 (18.4)	8 (19.5)		7 (22.6)	5 (14.7)	

Note. DP = standard deviation.

TABLE 3 Case and contrast groups' scores on the CIB and the IRDI: Age range up to 12 months ($N = 79$)

	Case ($n = 38$)			Contrast ($n = 41$)			
	M			***M***			**Mann–Whitney**
CIB composites	**(DP)**	***Mdn***	***MR***	**(DP)**	***Mdn***	***MR***	***P*-value**[***]
Parental scales							
Intrusiveness	1.91 (0.45)	2	42.22	1.85 (0.41)	1.83	37.94	.406
Sensitivity	3.75 (0.63)	3.8	35.96	3.96 (0.52)	3.95	43.74	.132
limit setting	4.54 (0.61)	4.92	37.87	4.67 (0.45)	5	41.98	.381
Scales of the child							
Involvement	2.86 (0.68)	2.97	37.59	3.01 (0.56)	3.08	42.23	.369
Withdrawal	1.63 (0.58)	1.5	47.63	1.31 (0.53)	1	32.93	.003**
Scales of the dyad							
Reciprocity	3.53 (1.02)	3.5	36.09	3.85 (0.85)	4	43.62	.143
Negative states	1.66 (0.95)	1.25	45.61	1.35 (0.73)	1	34.8	.024*
Depressive mood	1.29 (0.61)	1	44.47	1.04 (0.17)	1	35.85	.008**
No. of absent IRDIs	0.8 (1.4)	0	44.17	0.3 (0.7)	0	36.13	.055

Note. CIB = Coding Interactive Behaviour; IRDI = Indicadores Clínicos de Risco para o Desenvolvimento Infantil; MR = mean ranking; DP = standard deviation.
*$P < .05$. **$P < .01$. ***Mann–Whitney nonparametric test.

TABLE 4 Distribution of signs of psychic risk (IRDI) divided in two age ranges ($N = 144$)

	Psychic risk *n* (%)	Without psychic risk *n* (%)	Total	χ^2	Sign	Odds ratio	CI 95%
<12 months							
Case group	7 (18.4)	31 (81.6)	38 (100)	0.019	0.045	9.032	1.055, 77.319
Contrast group	1 (2.4)	40 (97.6)	41 (100)			1	
>12 months							
Case group	9 (29.0)	22 (71.0)	31 (100)	0.614	0.615	1.330	0.439, 4.029
Contrast group	8 (23.6)	26 (76.4)	34 (100)			1	

Note. IRDI = Indicadores Clínicos de Risco para o Desenvolvimento Infantil.

than in the case group, the initial signs of *psychic risk* reaching *P*-value equal to .055 (Table 3).

Upon analysis of the babies regarding whether they presented signs of emotional suffering (assessed with the IRDI), it was observed that in the age range <12 months old, the case group had a greater proportion of children with such signs (18.4%) when compared with the contrast group (2.4%), $P = .025$. The logistical regression study revealed that in the latter group, it was around nine times more likely that a child would present initial signs of emotional suffering if he or she had an autistic sibling, CI = 1.055 to 77.319. The confidence interval, however, was broad, probably due to the relatively small number of children in this situation (see Table 4).

In this age range, there were no significant differences between the groups (case and contrast) regarding the presence of CMD in the carers.

2.2.2 | Dyads with babies between 12 and 26 months

In the set of dyads with children between 12 and 26 months of age, there was similarity between the groups for many variables and fewer differences verified than in the groups of younger babies (Table 5). The mean of *intrusiveness* in the ranking of the carers in the case group was greater (40.15) than that of the carers in the contrast group (26.49), and this difference was significant, $P = .003$.

The MR of *compliance* was lower in the case group (28.68) than in the contrast group (36.94), but this difference was not significant, $P = .077$. All other CIB parameters (except involvement) as well as the initial signs of suffering assessed by the IRDI presented better results in the contrast group.

To estimate the effect of the presence of a sibling with autism on the existence of signs of psychic risk, logistical regression was performed with the results of the IRDI as the outcome and the group (case or contrast) as the predictor. In the babies over 12 months old, the influence of the presence of the sibling with ASD at 5%, $P = .615$, was not verified as displayed in Table 4.

Among all ASD dyads, influence of the gender of older siblings on the CIB and the IRDI scores was tested. We found that the babies with an older sister with autism had a higher mean ranking of absent in the IRDI, MR = 45.96, than did the babies with older brothers, MR = 32.46, $P = ,018$. No other significant differences were found in the ASD dyads with respect to the gender of the older sibling and the measurements of the CIB composites (Table 6).

There were no significant differences between the groups (case and contrast) regarding the presence of CMD in the carers (Table 7).

3 | DISCUSSION

These findings corroborate the international literature about the emotional developmental difficulties experienced by younger siblings of children with ASD in the constitution of their intersubjective experiences since the first year of life (Ben-Yizhak et al., 2011; Newschaffer et al., 2012). This study is original, as it explored the behavior as well as emotional conditions of the carer and the baby during their interaction. Previously, the emotional and social difficulties of this population usually have been measured through the still-face paradigma (Tronick et al., 1978). It evaluates the capacity of the child to spontaneously initiate a social interaction and his or her conditions to modulate affect and attention (Ibanez, Haltigan, Acosta, & Buchman, 2008; Yirmiya et al., 2006). The dimensions of the free play interaction studied herein bring nuances of the experiences of interaction, articulating the characteristics of each party and their expression in the establishment of affective attunement. Regarding the carers, the study provides evidence of their sensitivity to the child's signs, their intrusive behavior, and their capacity to establish limits.

The results of this research show that in the group of family members of a child with ASD, the babies under 1 year old exhibit higher scores of emotional withdrawal. The carers of these children presented higher scores of depressed mood.

This study does not enable discrimination of which siblings from the ASD dyads also have ASD. What CIB

TABLE 5 Case and contrast group scores in CIB and IRDI: babies aged from 12 to 26 months

	Case group			Contrast group			
CIB composites	***M*** **(DP)**	***Mdn***	**MR**	***M*** **(DP)**	***Mdn***	**MR**	**Mann–Whitney Test *P*-value**
Parental scales							
Intrusiveness	1.6 (0.27)	1.58	40.15	1.43 (0.22)	1.42	26.49	.003*
Sensitivity	3.82 (0.54)	3.85	30.89	3.91 (0.52)	4.03	34.93	.389
Establishment of limits	4.55 (0.31)	4.5	30.58	4.59 (0.4)	4.67	35.21	.318
Scales of the child							
Involvement	3.19 (0.65)	3.33	34.35	3.14 (0.62)	3.06	31.76	.581
Withdrawal	1.2 (0.43)	1	33.44	1.1 (0.17)	1	32.6	.831
Cooperation	3.23 (0.69)	3.33	28.68	3.5 (0.69)	3.67	36.94	.077
Scales of the dyad							
Reciprocity	3.81 (0.87)	3.83	30.71	3.97 (0.86)	4.08	35.09	.349
Negative states	1.4 (0.71)	1	35.37	1.27 (0.58)	1	30.84	.269
Depressive mood	1.23 (0.56)	1	34.31	1.1 (0.38)	1	31.81	.351
No. of IRDIs Absent	1.1 (1.3)	1	35.81	0.8 (1)	0	30.44	.223

Note. CIB = Coding Interactive Behaviour; IRDI = Indicadores Clínicos de Risco para o Desenvolvimento Infantil; MR = mean ranking; DP = standard deviation.
*P <0,05.

characterizes as withdrawal is a description of a behavior of distancing and, as such, is not expected to be a nosographic condition or a diagnosis; that is, it is possible that this subscale of the CIB has statistical sensitivity for ASD (babies with ASD, although not only them being considered withdrawn by the CIB). One of objectives of this study was to demonstrate that siblings of ASD children always should be assessed for developmental impairments. The higher scores of withdrawal among the siblings of ASD children suggest that independently of the future diagnosis, the babies' siblings of children with ASD must be screened for withdrawal. Those considered as withdrawn might be suggested for further assessment, using tools specific for ASD screening, and for early intervention.

In the scientific literature, there is evidence that withdrawal may be the consequence of constitutional problems or the result of a chronic decrease in the attachment system. Withdrawal is associated with more negative relational patterns in terms of higher maternal intrusiveness, lower reciprocity, and lower child involvement, unpredictable child temperament, and lower sense of parental self-efficacy (Dollberg et al., 2006). Sustained withdrawal may serve as a risk indicator for early socioemotional disorders.

Another important question raised from the study is the contrasting findings related to the carers' self-report concerning mental health conditions and the carers' mental states observed by the researchers during parent–infant interactions. This study corroborates Toth, Dawson, Meltzoff, Greenson, and Fein's (2007) findings that have indicated no group differences involving parental self-reports relating to mental health symptoms. According to their report, emotional functioning of the parent does not differ in ASD families and TD families. However, in the assessments of parent–infant interactions, significant differences were found involving depressive mood. These contrasting results suggest that mental health states are complex conditions which are not entirely conscious to the person experiencing them and point out the importance of developing mental health strategies to screen carers of children with ASD for emotional suffering and impairments in their interaction with their new baby. Early identification of depression in carers might allow health professionals to provide specific assistance to them and prevent later difficulties in the mother–baby interactions.

The delineation of the study does not allow us to attribute a causal relation between maternal depressed mood and the baby's withdrawal state. However, some hypotheses about the

TABLE 6 Distribution of the scores on the CIB composites and number of absents in IRDI according to the gender of the ASD sibling, and test of the difference ($n = 66$)

Variable	Gender	*M*	*Mdn*	Minimum	*SD*	Maximum	MR**	*Z*	*P*-value
IRDI	Boy	0.8	0	0	1.2	7	32.46	−2,36	.018
	Girl	1.7	1	0	1.7	6	45.96		
Intrusiveness	Boy	1.7	1.7	1.1	0.4	3	33.48	−1,31	.191
	Girl	1.9	2	1.3	0.4	2.7	41.54		
Limit setting	Boy	4.6	4.7	2.8	0.5	5	35.23	−0,21	.838
	Girl	4.5	4.5	3.3	0.6	5	34		
Involvement	Boy	3.1	3.1	1.7	0.6	4.3	36.33	−1,14	.253
	Girl	2.7	2.8	1.1	0.9	3.7	29.27		
Withdrawal	Boy	1.4	1.2	1	0.5	3	34.44	−0,51	.612
	Girl	1.6	1.3	1	0.7	2.8	37.42		
Sentivitity	Boy	3.8	3.8	2.6	0.5	4.7	34.51	−0,42	.673
	Girl	3.8	3.8	1.6	0.8	4.6	37.12		
Compliance	Boy	1.5	0	0	1.7	4.3	35.08	−0,08	.94
	Girl	1.4	0	0	1.7	4	34.65		
Negative states	Boy	1.4	1.3	1	0.6	3	34.69	−0,28	.777
	Girl	2	1.3	1	1.6	5	36.35		
Reciprocity	Boy	3.8	3.8	1.7	0.8	5	36.36	−1,17	.241
	Girl	3.2	3.3	1	1.3	5	29.15		

Note. boys: $n = 53$, girls: $n = 13$. CIB = Coding Interactive Behaviour; IRDI = Indicadores Clínicos de Risco para o Desenvolvimento Infantil; ASD = autism spectrum disorders; MR = mean ranking.
**Mann–Whitney nonparametric test

TABLE 7 Comparison of the occurrence of Common Mental Disorders (CMD) in the case and contrast groups (N = 144)

		SRQ20-CMD			
Babies' age		Without CMD	With CMD	Total	χ^2 *P*-value
<12 months ($n = 79$)	Case	20 (52.6%)	18 (74.4%)	38 (100%)	.229
	Contrast	26 (63.4%)	15 (36.6%)	41 (1)	
	Total	46 (58.2%)	33 (41.8%)	79 (100%)	
>12 months ($n = 79$)	Case	14 (45.2%)	17 (54.8%)	31 (100%)	.269
	Contrast	19 (55.9%)	15 (44.1%)	34 (100%)	
	Total	33 (50.8%)	32 (49.2%)	65 (100%)	

SRQ20 = Self-Report Questionnaire.

interaction between these factors may be raised. In the age range of under 1 year, it is possible that the withdrawal state of the babies, characterized by negative affectivity and avoidance of contact, triggers in the carers a reaction of low affective modulation and a reduction in emotional investment. Note that the reciprocity in the interactions performs a fundamental role in the social development of the baby. During free interactions, it is normal to have cycles in which there is alternation of moments of attention and no attention, approximation and withdrawal, modified by action of one of the parties of the dyad who initiates contact and expects a response from the other (Brazelton, 1983). In the dyads in which the children do not respond to their parents' signs, it is common to see the parents adjusting their behavior, often decreasing their expectations of a response from the children (Lerner, 2011).

In turn, the affective difficulties of the carer with the depressed mood, his or her monotonous vocalizations, and still face may not favor the establishment of the protonarrative and sonorous envelope, and the baby's emotional integration experience (Stern, 1998). The protonarrative envelope received from the carer gives the baby the experience of continuity of existence and, consequently, of unity at the base of his or her preverbal psychic reality. In any one of these hypotheses, the effect is an interaction with little emotional coordination and affective attunement between the pairs of the dyad.

It was observed that in the age range of 12 to 26 months, carers in the case group presented higher scores of intrusive behavior as compared to carers in the contrast group. It is possible that babies who cooperate less with their parents trigger

in them behavior that is more intrusive. The parental intrusiveness can, in reverse, make children defend themselves, avoiding the contact.

Concerning the babies' behavior, it is possible that the instruments used in this study have not been sufficiently sensitive to capture differences between groups in the older age range.

The difficulties observed in the dyads of family members of children with ASD seem to have a feedback effect of the difficulties of each party. Carer and baby are mutually affected by the difficulties experienced by each other, which produces a cycle that places the development of the dyad at risk.

The results observed in the study contribute to the knowledge about the initial signs of emotional suffering among younger siblings of children with ASD. They underline the urgency to implement public programs and policies for early detection of such signs as well as the need to establish interventions at this time so that their effects are magnified.

CONFLICT OF INTEREST

The authors report no conflicts of interest.

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