

Validating the Preschool and Kindergarten Behavior Scales-2: Preschoolers with Autism Spectrum
Disorders

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Abstract

Social skills deficits and some behavior problems are a well-established issue in preschoolers with autism spectrum disorder (ASD). However, most of the studies available analyze social skills or behavior problems of children with ASD, but not both. The present study intends to compare the social skills and behavior problems of 32 preschoolers with ASD paired with 32 typically developing preschoolers, as evidence of validity of the Portuguese version of the Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2). Each child was rated independently by parents and teachers. Results showed a statistically significant difference in all PKBS-2 scores between the two groups, with the children with ASD rated with fewer social skills and more behavior problems by both informants. The discriminant functional analysis highlighted the three Social Skills, the Over-Activity/Lack of Attention and Social Withdrawal subscales as more accurate in differentiating between the two groups. The implications of using a single behavior rating scale that can be filled in by different informants (parents and teachers) to assess positive and negative behaviors are emphasized. Furthermore, the usefulness of the PKBS-2 as a screening assessment tool that could be used in clinical practice and intervention with preschoolers with ASD is discussed.

Keywords: Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2); preschoolers; autism spectrum disorders (ASD); social skills; behavior problems

What this paper adds?

This paper highlights the importance of having tools that are able to differentiate children at risk for developmental problems from typically-developing children, such as the Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2). The PKBS-2 has some positive features that deserve mention in this context: it has good psychometric properties, it

evaluates both positive and negative behaviors, and the same items can be answered by different informants. In this study, it proved to be a useful tool to evaluate the social and behavioral functioning of children with ASD that may be helpful in future research and practice. Further, the multi-rater approach used to assess social skills and behavior problems of children with ASD is a positive aspect of this paper, as it gives rise to a more complete profile of these children. The results also reinforce the evidence of validity of the Portuguese version of the PKBS-2. Finally, several statistical analyses were conducted in order to identify the scores that best discriminate both groups (functional discriminant analyses); and based on the importance of identifying specific behaviors that may be targeted for intervention, two sets of item analyses were carried out to highlight specific behaviors that characterize preschoolers with ASD.

Validating the Preschool and Kindergarten Behavior Scales-2: Preschoolers with Autism Spectrum Disorders

1. Introduction

The concept/diagnosis of autism was introduced for the first time by Kanner (1943), who described these individuals as having unusual social development (Volkmar, Chawarska, & Klin, 2005). This description has undergone several refinements over time, based on knowledge acquired through earlier and more reliable diagnosis, better clinical practices, stronger public awareness about this disorder (Boyd, Odom, Humphreys, & Sam, 2010; Ooi et al., 2011), and research applications such as epidemiological and longitudinal studies (Volkmar et al., 2005). According to the recently published fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5; APA, 2013), autistic disorder, Asperger's disorder, Rett's disorder, childhood disintegrative disorder and pervasive developmental disorder not otherwise specified are all grouped together under the single diagnosis of Autism Spectrum Disorders (ASD) (Anagnostou et al., 2014; APA, 2013; McGuinness & Johnson, 2013). Furthermore, the three major categories of impairment (social interaction, communication, and restrictive and repetitive behaviors) have now been reduced to two main areas: social communication and the behavioral domain. In DSM-5 age is not specified, with only the presence of symptoms early in childhood being mentioned (APA, 2013; McGuinness & Johnson, 2013). Therefore, the average age of diagnosis is around 4 years, with a prevalence of 4:1 for gender (boys: girls) (Anagnostou et al., 2014).

Currently, social skills deficits and certain behavior problems are well documented in the literature concerning ASD (Campbell, 2006; O'Donnell, Deitz, Kartin, Nalty, & Dawson, 2012; Park, Yelland, Taffe, & Gray, 2012; Volkmar et al., 2005). However, most of the studies analyze either social skills (e.g., Goldstein, Lackey, & Schneider, 2014; Wang, Sandall, Davis, & Thomas, 2011) or behavior problems of those children (e.g., Eisenhower,

Baker, & Blacher, 2005), but not both. The present study has the purpose of analyzing both social skills and behavior problems, in the same sample of preschoolers with ASD paired with a group of typically developing preschoolers, and from both parents and teachers' perspective.

1.1. Social Skills and Behavior Problems in Children with ASD

It is well known that children with developmental delay are at risk for developing social, emotional and behavioral problems (Baker et al., 2003; Brassard & Boehm, 2007; Dykens, 2000; Eisenhower et al., 2005; Merrell & Holland, 1997). As is the case with other neurodevelopmental disorders, included in the ASD behavioral phenotypes are several at risk behaviors which have effects on family and care providers (Dykens, 2000; Eisenhower et al., 2005). Simple daily life tasks are frequently a challenge for children with ASD and their families (O'Donnell et al., 2012), which justifies why most of the research concerning the comparison of children with ASD with typically developing children and children with developmental delays has been carried out based on parental reports (Volkmar et al., 2005). However, if parents are able to provide a detailed developmental history of the child, teachers may offer additional information more related to interaction with peers (Anagnostou et al., 2014). Further, the classroom is an important setting in which to work with children with ASD due to the classroom climate, activities and rewards, schedules and engagement with peers (Neitzel, 2010). Therefore, parents and teachers are essential informants in the process of assessment and diagnosis, since they are frequently the first ones to raise the "red flag" to signal social, behavioral, or emotional problems with the children (Anagnostou et al., 2014).

Children with ASD are at risk for difficulties in social development (Reszka, Odom, & Hume, 2012), due to their social and communication deficits/delay (APA, 2013; Kanne, Abbacchi, & Constantino, 2009; Neitzel, 2010). Deficits in social interaction and communication associated with ASD involve developmental skills that emerge typically

during childhood (Dockrell & Messer, 1999; Tager-Flusberg, 1999), such as starting conversations or integrating social activities, understanding the perspective of others and verbally expressing feelings (Bellini & Hopf, 2007). Challenges in these areas represent a major feature of the ASD disorder (Chung et al., 2007). These difficulties in ascertaining the perspective of others may lead these children to make inappropriate comments or dominate conversations with topics of personal interest, which ultimately limit positive social interaction (Bellini & Hopf, 2007; Tager-Flusberg, 1999).

Difficulties in joint attention, as well as in symbolic and interactive play are also evidenced (Lee & Hinojosa, 2010; Lord, Rutter, DiLavore, & Risi, 1999). In this field, six key domains have been identified in assessment/intervention with children with ASD: (a) motivation to interact, (b) self-awareness, (c) non-verbal and verbal social interaction skills, (d) understanding affects in self and others, (e) social intelligence and awareness, and (f) friendship and play (Rotheram-Fuller et al., 2013). Moreover, during the last 30 years, this evidence of social skills deficits has drawn attention to the need for early intervention in social skills in children with ASD (Goldstein et al., 2014), with identification/assessment emerging as the first step.

With regard to behavior problems, self-aggression behaviors and motor stereotypes are quite common in children with ASD (Campbell, 2006). Moreover, the repetitive (e.g., stereotyped movements, unusually centered interests) and challenging/disruptive (e.g., aggression, tantrums) behaviors that Neitzel (2010) identifies as “interfering behaviors” may provide them with fewer opportunities to learn and develop adequate social behaviors (Wang et al., 2011). Further, for children with ASD, behavior problems may have specific communicative functions, such as avoiding undesirable activities and social interaction, or allowing them to have access to objects or activities (Park et al., 2012). As for social skills, intervention in these behaviors is also clinically useful. Consequently, assessing behavior

problems should be a common practice (Park et al., 2012) taking into account their impact on the functioning of children with ASD (Kanne et al., 2009).

Based on this evidence, the availability of appropriate assessment instruments, such as a screening tool to assess social skills and behavior problems, is essential as a first step when seeking an intervention strategy for children with ASD (Wang et al., 2011). There has been a growing interest in developing assessment tools to evaluate preschoolers. Some of these, such as the Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2; Merrell, 2002), enable the identification of a large range of behavior problems, and are therefore potentially useful to differentiate children with ASD from other children (Ooi et al., 2011). Others are “autism-specific screeners” developed to identify specific behaviors associated with ASD (Anagnostou et al., 2014; Boyd et al., 2010; Volkmar et al., 2005). One example of the latter is the Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F; Robins, Fein, & Barton, 2009) that identifies children from 16 to 30 months with early signs of ASD. In addition, and more related to observation, the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 1999) is known as the gold standard for the diagnosis of ASD (Boyd et al., 2010). The urgent need for the early identification and assessment of social skills and behavior problems in ASD had led to a growing amount of literature, including studies comparing several groups of preschoolers with and without developmental delay, or specifically focused on ASD.

1.2. Social Skills Deficits and Behavior Problems: Evidence in Preschoolers with ASD

Although the social engagement of preschoolers with ASD has been less studied than their behavior problems or intellectual functioning (Reszka et al., 2012), there has recently been a growing number of studies focused on children with ASD social skills deficits. In this field, Murray, Ruble, Willi, and Molloy (2009) noted that the specific social behavior of children with ASD depends on the context, with parents reporting more problems with

initiating interactions, and teachers with responding and maintaining interactions. Based on parents' reports, the study of Park et al. (2012) indicated that receptive communication skills were positively associated with social skills of preschoolers with ASD and negatively associated with certain behavior problems (such as self-absorbed and social relating problems). These results emphasized the link between the communication issues in preschoolers with ASD and functional and behavioral outcomes (Park et al., 2012). More focused on behavior problems, Baker et al. (2003) found that children with developmental delay (including preschoolers with ASD) had significantly higher scores for internalizing and externalizing problems, as well as on the Attention Problems, Aggressiveness, Somatic Complaints and Withdrawn subscales of the CBCL/1.5-5. In addition, Eisenhower et al. (2005) noted that at age 3, children with autism and cerebral palsy have higher and more stable levels of behavioral problems than children with Down syndrome or typically-developing children. Furthermore, Sikora, Hall, Hartley, Gerrard-Morris, and Cagle (2008) pointed out that the Withdrawn subscale from the CBCL/1.5-5 better discriminates children with ASD from non-spectrum disorder children. In addition, Pandolfi, Magyar, and Dill (2009) found that children with ASD scored higher in all CBCL/1.5-5 subscales except for the Anxious/Depressed subscale, and that the Withdrawn and Attention Problems subscales better discriminate children with ASD. Moreover, in a multi-informant study, Kanne et al. (2009) noted that when compared to teachers (for the C-TRF), parents rated their children with ASD with more affective, anxiety, attention, conduct, opposition and somatic problems, with one-fourth of the sample presenting attention problems on the CBCL/1.5-5. More recently, Ooi et al. (2011) tried to identify children with ASD among four other groups of children (e.g., typically-developing children) based on CBCL scores. The Withdrawn/Depressed, Social Problems and Thought Problems syndromes were identified as significant predictors across four logistic regression analyses, each

comparing the ASD group to one of the other four groups. Furthermore, based on sensitivity and specificity values, children with ASD had higher scores on these significant syndromes whereas children contrasted with them had lower scores. Also, high scores on Attention Problems seemed to be part of the ASD profile (Ooi et al., 2011).

The PKBS have been used in several studies that highlight the sensitivity of these behavior rating scales in the identification/assessment of social skills impairment and behavior problems of young children with developmental delay. Merrell and Holland (1997) analyzed the social-emotional behaviors of two groups of preschoolers (developmental delay group and comparison group), as rated by parents and teachers. The functional discriminant analysis revealed that 71% of the children were correctly classified in their group according to the PKBS scores. As expected, children from the developmental delay group had lower social skills and more behavior problems, with the Social Interaction, Social Independence and Social Withdrawal scores being more discriminant between the two groups. Recently, the Social Skills scale of the PKBS-2 was used by Wang et al. (2011) with the purpose of analyzing its usefulness for the identification of children with ASD, according to teachers' ratings. Taking into account the adequate psychometric properties of the scales (e.g., $\alpha = .96$) and their demonstrated utility to assess children with ASD when rated by teachers, the authors recommended further studies to analyze the usefulness of the PKBS-2 to identify children with ASD, more specifically studies that allow practitioners to identify intervention goals based on this tool.

The present study aimed to analyze social skills and behavior problems of preschoolers with ASD, according to parents' and teacher's perspectives, and to compare them with those of typically-developing children. All the children were evaluated according to parents' and teachers' perspectives with a single behavior rating scale, the Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2; Merrell, 2002). Further, the

PKBS-2 scores were analyzed at different levels (total scores, scales, subscales) as well as at item-level, in order to identify specific behaviors that could be used in clinical practice and intervention with preschoolers with ASD. Another goal of this study was to reinforce the evidence of validity of the Portuguese version of the PKBS-2 and evaluate the utility of this Portuguese version as a screening tool to use with preschoolers with ASD.

2. Method

2.1. Participants

The sample for this study was composed of 32 preschoolers with an ASD diagnosis (ASD group; followed in a clinical context) paired with 32 typically-developing preschoolers (comparison group; from the Portuguese normative sample of the PKBS-2). All 64 children were between 3 and 6 years old, with the children with ASD being 36 to 78 months old ($M = 54.94$, $SD = 12.40$) and the comparison group 38 to 73 months old ($M = 56.06$, $SD = 12.24$). All the children were attending preschool. Each group was composed of 26 boys and 6 girls. Most of the children lived in the North of Portugal (72%), in an urban area close to the coast. The family social economic status (SES) of both groups, based on an index of three levels – low, middle, high – according to the parents' education and occupation, was mainly average (average SES = 41 and 47%, respectively for the ASD and comparison groups) (see Table 1).

2.2. Instrument

2.2.1. Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2)

The PKBS-2 (Merrell, 2002) is a behavior rating scale specifically designed to assess the social skills and behavior problems of children aged 3 to 6 years. The 76 items that compose the total scale are divided into two major scales: Social Skills with 34 items and Problem Behaviors with 42 items. Several exploratory and confirmatory analyses led to three Social Skills subscales (Social Cooperation, Social Interaction and Social Independence) and

two broadband Problem Behaviors subscales (Externalizing and Internalizing Problems). Three supplemental subscales for Externalizing Problem Behaviors were found in second order factor analyses (Self Centered/Explosive, Attention Problems/Overactive and Antisocial/Aggressive) as well as two for Internalizing Problem Behaviors (Social Withdrawal and Anxiety/Somatic Problems). Items are rated based on a four-point Likert scale (0 “*never*”, 1 “*rarely*”, 2 “*sometimes*” and 3 “*often*”). The PKBS-2 has the advantage of using the same set of items for informants from home (e.g., parents, grandparents) and school settings (e.g., teachers, classroom assistants). The manual includes several studies that document the good psychometric properties of the PKBS-2, with evidence of reliability (e.g. internal consistency, informant agreement) and validity (e.g., construct, convergent and divergent validity) (Merrell, 2002).

The process of translating/adapting the PKBS-2 to Portuguese started with a formal request to the author and to the publisher. Once permission was obtained, the translation and back-translation process took place. The PKBS-2 author accompanied the whole translation, adaptation and validation process. After a pilot study with 320 children, a nationally representative normative sample of 1,000 children was collected all over the country (each child rated by home and school informants). This process, as well as several reliability and validity studies, are documented elsewhere (Major, 2011; Major & Seabra-Santos, 2014). Results of internal consistency studies are very close to those obtained for the original version (e.g., α Social Skills scale and subscales = .76-.88 and .89-.95, for the parents’ and teachers’ sample, respectively; α Problem Behaviors scale = .78-.95 and .85-.97, for the parents’ and teachers’ sample, respectively). Exploratory and confirmatory analyses replicated the factor structure from the American version, with three Social Skills subscales (Cooperation/Social Adjustment, Social Interaction/Empathy and Social Independence/Assertiveness) and two Problem Behaviors subscales (Externalizing Problems and Internalizing Problems). Second

order factor analyses identified five supplemental subscales (three for the Externalizing Problem Behaviors: Anti-Social/Aggressive, Over-Activity/Lack of Attention and Opposition/Explosive; and two for the Internalizing Problem Behaviors: Social Withdrawal and Anxiety/Somatic Problems) (Major, 2011).

2.3. Procedure

Participants for the present study were recruited from two sources. The ASD group was referred after contacting several Portuguese associations of parents having a child with ASD (Association of the Friends of Autism, Association of Caregivers of Developmental Disorder and Autism). This group comprised 32 children who had a formal diagnosis of ASD as established in hospitals or other clinical centers. Inclusion criteria consisted of: a) having a formal diagnosis of ASD according to the DSM-IV-TR guidelines (when the sample was collected DSM-5 was not yet available); b) being between 3-6 years old (preschool age); c) having attended preschool for at least the previous 3 months (as requested in the PKBS-2 manual to ensure that teachers had time enough to know the children before completing the behavior rating scale); and d) not having cerebral palsy or other developmental or motor impairment.

After getting approval from the National Commission for Data Protection, the Portuguese office responsible for research permissions, all the associations were contacted and the research was presented and discussed with each director. Once the study was approved, the associations got in touch with the parents. Those who agreed to participate in the study, and allowed the association to give their phone number and e-mail address to the researchers, were then telephoned by the researchers who explained the purpose of the research in more detail, as well as its confidentiality and anonymous nature, and asked permission to request the child's teacher to complete the PKBS-2. Verbal informed consent was obtained during the first phone contact. Once they gave their consent and the inclusion

criteria were confirmed, a phone call was scheduled according to their availability in order to complete the PKBS-2. The procedure to complete the PKBS-2 by teachers was the same used with parents. All parents contacted agreed to participate as well as all the teachers.

These 32 children with ASD were paired with 32 typically-developing children from the normative sample of the Portuguese PKBS-2 version (Major, 2011; Major & Seabra-Santos, 2014). As shown in Table 1, the pairing process for selection of the comparison group resulted in an almost perfect equivalence between groups regarding age, gender, geographic region, geographic zone, residence area and SES (t and χ^2 non-significant differences).

Insert Table 1

2.4. Data analyses

Data analyses were performed using the IBM SPSS Statistics 20 package. To analyze the internal consistency of the PKBS-2 items, Cronbach's alpha coefficient was calculated for the total scales, for both samples (ASD and comparison) and both rating settings (home and school). Several independent sample t tests were carried out in order to compare the groups' means in all PKBS-2 scores (scales, subscales and supplemental subscales), both for parents and teachers' ratings. Effect size d were calculated based on the statistical formula: $[(M_{ASD} - M_{Comparison})/SD]$ and classified as small if $d = .20$, moderate = $.50$ and large = $.80$ (Cohen, 1988). Additionally, in order to determine the accuracy of parents' and teachers' ratings to classify children in their respective groups (ASD group and comparison group) a linear discriminant functional analysis was performed using the results of 10 subscales of the PKBS-2 (three for the social skills and seven for the problem behaviors) as predictor variables and the membership group as the grouping variable. Based on this analysis, the percentages of children correctly included in the respective group were calculated, and the subscales that better contributed to discriminating between groups were determined. Finally, two kinds of item analyses were conducted in order to identify the specific behaviors that best

differentiate preschoolers with ASD from typically-developing peers. The first study analyzed items with a mean difference between groups higher than 1.50 raw score points for the social skills and 1.00 point for the behavior problems (the larger value for social skills is due to the fact that, as expected, too many items would be included if a 1.00-point threshold was considered). Based on the results from the first study (specifically concerning social skills items that appeared highly distinctive between the groups), the second study focused only on the ASD group and identified the social skills items that showed more impairment, i.e., those rated by more than 60% of both informants (parents and teachers) with the two lower ratings, “*never*” or “*rarely*”. This high percentage was chosen in order to circumscribe the most important social skills items.

3. Results

3.1. Internal Consistency

The Cronbach alpha coefficients obtained for the PKBS-2 total scale for parents’ and teachers’ ratings from both groups ranged from .85 to .96 for the Social Skills scale. For the Problem Behaviors scale the coefficient values were slightly higher, from .92 to .96 (see Table 2). For both groups the coefficients were higher for teachers than for parents; and for the ASD group the values were higher for the Social Skills than for the Problem Behaviors scale, while the opposite was true for the comparison group.

Insert Table 2

3.2. Parents’ and Teachers’ Ratings

Results from Table 3 show that, when the PKBS-2 were rated by parents, the ASD group displayed lower results than the comparison group for all indicators of social skills and all these differences attained statistical significance. In contrast, the ASD group presented significantly higher values for all the results related to behavior problems, with the exception of the Antisocial/Aggressive and Anxiety/Somatic Problems supplemental subscales. The

calculation of the effect size revealed large effects for all Social Skills scores and for most of the Problem Behaviors scores (with the exception of Antisocial/Aggressive, Anxiety/Somatic Problems and Opposition/Explosive supplemental subscales, for which low to moderate effect sizes were observed).

Insert Table 3

When the PKBS-2 were filled in by teachers, the pattern of results (displayed in Table 4) was very similar, with the ASD group showing significantly lower scores in all social skills indicators than the comparison group. As for parents, the ASD group had significantly higher scores in all the behavioral problems. The effect sizes were large for all the PKBS-2 scores studied, with the exception of the Antisocial/Aggressive and Anxiety/Somatic Problems supplemental subscales which were associated with a moderate effect size.

Insert Table 4

3.3. Functional Discriminant Analysis

Results from the linear discriminant functional analysis indicated that parents' ratings on the PKBS-2 significantly predicted ($Wilks'\lambda = .24, \chi^2(8) = 82.46, p < .001$) group membership (ASD or comparison group), with 94% of all children correctly included in the respective group, more specifically, 88% in the ASD group (28 of the 32 children) and 100% (32 children) in the comparison group. As presented in Table 5, the structure matrix from the discriminant analysis indicated that the three Social Skills subscales differentiated the two groups more accurately: Social Interaction/Empathy ($r = .75$), Social Independence/Assertiveness ($r = .60$) and Cooperation/Social Adjustment ($r = .46$). For the behavior problems, the supplemental subscales for Social Withdrawal and Over-Activity/Lack of Attention were the two most discriminant ($r = -.42$ and $-.41$, respectively).

Insert Table 5

Table 5 also includes results for the accuracy of teachers' ratings in the classification of children based on PKBS-2 scores. These ratings also significantly predicted ($Wilks'\lambda = .31$, $\chi^2(8) = 67.25$, $p < .001$) group membership (ASD or comparison group), with 92% of all children correctly included in the respective group, more specifically, 91% in the ASD group (29 of the 32 children) and 94% in the comparison group (30 of the 32 children). As for the parents' ratings, the analysis of the structure matrix indicated that the three Social Skills subscales differentiated the two groups more accurately: Social Interaction/Empathy ($r = .83$), Cooperation/Social Adjustment ($r = .66$) and Social Independence/Assertiveness ($r = .62$). For the Problem Behaviors scores, as for the parents' ratings, the supplemental subscales for Over-Activity/Lack of Attention, Social Withdrawal and Opposition/Explosive best discriminated between the two groups ($r = -.52$, $-.51$ and $-.47$, respectively).

3.4. Item Analysis

In the first analysis each of the PKBS-2 items was compared between groups separately considering parents' and teachers' ratings. The ASD group showed lower scores for all Social Skills items, with the exception of items 22 (ASD group "cleans up his/her messes when asked," according to parents' ratings) and 6 (exactly the same mean for both groups for "being accepted/liked by others," for teachers' ratings). Furthermore, from the Social Skills items that presented mean differences between groups equal or higher than 1.50 raw score points, there were five that were common to both informants, mostly related to the Social Interaction/Empathy subscale. Item 33 ("sensitive to others") also displayed such a difference between groups but only for the parents' ratings, as did items 20 (comforts others), 21 (invites to play), 27 (apologizes), and 28 (compromises), but only for the teachers' ratings.

For the Problem Behaviors scale, although the ASD group presented higher scores, the differences were not statistically significant for 18 and 16 items, for parents and teachers' ratings, respectively. Most of the Problem Behaviors items with a mean difference equal or

higher than 1.00 raw score point between both groups reflected externalizing problems, mostly from the Over-Activity/Lack of Attention supplemental subscale (items 15, 39 and 52). Informants also highlighted some internalizing problems related to the Social Withdrawal supplemental subscale (items 12, 17, 28). Four items with a mean difference higher than 1.00 are common across settings: items 12 (avoids playing), 15 (difficulty to stay on task), 17 (problems in making friends), and 52 (hard to change behavior). Some items were scored significantly more highly by one of the informants but not by the other: item 31 (unpredictable behavior) was scored more highly by parents and items 7 (tantrums), 13 (yells/screams), 28 (withdraws from company), 39 (disturbs activities), and 46 (wants everything immediately) by teachers.

Since the Social Skills scales seemed to be appropriate to differentiate the groups (based on functional discriminant analyses and the first analysis of items performed), a second analysis was carried out. The sample of children included in the ASD group was analyzed in order to identify which Social Skills items were scored with the lowest ratings (the sum of the two lower levels, "*never*" and "*rarely*," make up 60% or more of the ratings). As shown in Table 6, there was an overlap with the Social Skills items identified in the previous study. Furthermore, a remarkable agreement between informants with regard to the items that satisfied the defined condition was found, with 10 of the 11 items being identified for both informants. The four items most frequently marked with lower scores by parents (items 14, 17, 20 and 35) and teachers (items 5, 14, 17 and 20) are included in the Social Interaction/ Empathy subscale.

Insert Table 6

4. Discussion

The present study aimed to analyze the usefulness of the Portuguese version of the PKBS-2, as rated by parents and teachers, in the identification and characterization of

preschoolers with ASD. The distribution of the sample for gender (26 boys and 6 girls) is in agreement with the prevalence rate of ASD (4:1). More than 70 years after the first description of autism made by Kanner (1943), the social and behavioral pattern of children with ASD still attracts the attention of researchers, as well as that of clinical and educational professionals. Impairment in social skills is a defining characteristic of ASD with implications in other areas such as communication (Volkmar et al., 2005), and associated behavioral problems manifesting themselves early (age 3 or even earlier) (Eisenhower et al., 2005). These issues highlight the importance of early screening and identification, and the value of having assessment instruments that are able to contribute to these goals.

This study demonstrated that the PKBS-2 displays high levels of internal consistency (from .92 to .96) when used to evaluate children with ASD. These results are similar to those found for the North American version (Merrell, 2002), and reinforce the reliability of the Portuguese PKBS-2 when used with preschoolers with ASD. These values, all above .90, are considered excellent according to Kline's (1998) classification and adequate for situations where an assessment instrument is required for decision taking in individual cases (Anastasi & Urbina, 1997). Further, the Cronbach alpha coefficient obtained for the Social Skills scale based on teachers' ratings was exactly the same (.96) as that obtained by Wang et al. (2011) from a sample of young children with autism.

We have tried to ascertain the usefulness of the PKBS-2 to identify preschoolers with ASD. Given the fact that impairment in social interaction is one of the diagnostic criteria for ASD, it would be expected that children in this group would have impaired social skills, when compared with the sample of children with typical development. Indeed, the results confirm this expectation by revealing that the social functioning of the ASD group is clearly distinct from the comparison group of children with normal development (APA, 2000/2002; Chung et al, 2007; Dockrell & Messer, 1999; Tager-Flusberg, 1999). In agreement with

literature (Merrell & Holland, 1997), both parents and teachers of these children evaluate them as having social skills deficits and all the differences between the two groups (without exception) attained statistical significance, and are associated with large effect sizes. The major discrepancy between the two groups is in the Social Interaction/Empathy subscale, where the ASD group scores lower (as shown by the studies of discriminant function analysis), highlighting the difficulties these children have in performing positive social interactions (Bellini & Hopf, 2007). This result also emphasizes the usefulness of this subscale in the early identification of ASD.

Furthermore, the poorer functioning of children with ASD is not limited to social skills. These children tend to have more behavioral problems, both externalizing and internalizing (Baker et al., 2003), compared with their peers with normal development (Eisenhower et al., 2005; Merrell & Holland, 1997; Pantolfi et al., 2009). Again, this conclusion is evident from this study, where both parents and teachers tend to rate more behavior problems for the ASD group, with all the differences between the groups attaining statistical significance (with the exception of the supplemental subscales Antisocial/Aggressive and Anxiety/Somatic Problems for the parents' ratings). In agreement with Pandolfi et al. (2009), the subscale that best helps to differentiate the two groups is Social Withdrawal. This result is consistent with the low score in the Social Interaction subscale, related to social skills.

We tried to identify which scales/subscales better discriminate children with ASD from their typically-developing peers. Results for the discriminant analysis (for both informants) are consistent with previous research (Merrell & Holland, 1997) by identifying the subscales of Social Interaction, Social Independence and Social Cooperation as the three most discriminant ones between the two groups. Moreover, the results of this study reinforce the sensitivity of the Portuguese PKBS-2 to identify children with and without ASD, as more than 90% of children were correctly included in the respective group, based on the PKBS-2

scores (a higher percentage than the 71% obtained by Merrell and Holland, 1997). These data depict poor functioning in the social sphere, established as a critical criterion for the diagnosis of ASD. The sensitivity of the PKBS-2 is also evident in comparison with other specific ASD checklists. For example, the total score of the Modified Checklist for Autism in Toddlers (M-CHAT) showed a sensitivity of .87 and a specificity of .99 regarding a group of children diagnosed with Autism/Pervasive Developmental Disorders and a group of children without such diagnosis (Robins, Fein, Barton, & Green, 2001). Another example concerned the Gilliam Autism Rating Scale (GARS; Gilliam, 1995), that obtained a sensitivity of 48% in a sample of 119 children aged 3-10 years with a DSM-IV diagnosis of Autistic Disorder (South et al., 2002). What is more, Sikora et al. (2008) obtained similar values in groups of autistic and non-autistic children, aged 36-71 months, with a sensitivity of .53 and a specificity of .54.

In addition to the social skills scores, there were two behavior problem scores that merit discussion. The Over-Activity/Lack of Attention score is the externalizing score that best discriminates between both groups, which confirms the existing research emphasizing that attention problems may be part of the ASD profile (Ooi et al., 2011; Pandolfi et al., 2009). For the internalizing problems, the Social Withdrawal subscale is the one that best discriminates between the two groups (Merrell & Holland, 1997; Ooi et al., 2011; Pandolfi et al., 2009; Sikora et al., 2008).

Based on the importance of identifying specific behaviors that may be targeted for intervention (Matson & Wilkins, 2009), two sets of item analyses were carried out to highlight specific behaviors that characterize preschoolers with ASD. The first analysis underlined that children with ASD have lower ratings for almost all social skills items according to both informants. The items that meet the established criterion of 1.50-point mean difference between groups belong to the Social Interaction subscale, which is in

agreement with the difficulties of preschoolers with ASD in starting/integrating social activities, as well as understanding the perspective of others (Bellini & Hopf, 2007). The pattern of items identified for the Problem Behaviors scale was quite diverse, with some of these related to attention problems. However, it is important to note that there is a considerable number of items (18 and 16 for parents and teachers, respectively) for which the difference between groups did not reach the threshold for statistical significance.

The analyses of the ASD group that specifically focused on social skills items that were frequently scored at low levels by parents and teachers show that these items belong to the Social Interaction/Empathy subscale. Moreover, there is a remarkable overlap between the items identified in both item analyses (10 of the 11 items), which reinforces the usefulness of the PKBS-2 to identify the specific behaviors related to social interaction impairment that characterize children with ASD. These results highlight behaviors that should deserve more attention from adults who work with these children, such as interaction with peers. The crucial role played by teachers in children's social and emotional development is also emphasized, since these prosocial behaviors could be improved in the classroom (Friedman-Krauss, Raver, Neuspiel, & Kinsel, 2014). The results from item analyses can be summarized in three main areas: reduced sensitivity to others, play impairments and rigidity. The main difficulties related to the Social Interaction subscale and the ASD diagnostic criteria are evident in the difficulties in trying to understand others (item 5), comforting others (items 20), apologizing (item 27), being sensitive to others (item 33), and offering help (item 35). Further, play impairments are identified by the scores in item 21 (inviting children to play), and a connection can be established with the results obtained for the Social Withdrawal supplemental subscale, on items such as avoiding playing (item 12) or difficulties making friends (item 17). Finally, the rigidity on the social profile of the children with ASD is also evident in the higher score for item 52 (hard to change behavior).

Another important contribution of this item analysis is that it highlights some social skills in which children with ASD do not differ from normally developing children. This result may give practitioners some initial clues about social skills that can be used as strengths in intervention programs. For example, it is interesting to note that ASD preschoolers seemed to be more compliant when it comes to following instructions (item 7) than their peers, which is an important skill for classroom activities such as games. This compliance can also be beneficial for social play, which is a key domain in assessment/intervention with children with ASD (Rotheram-Fuller et al., 2013), since it has been noticed that the improvement of play skills has a growing effect on social interaction skills and reducing behavior problems (Jung & Sainato, 2013).

5. Conclusions and future directions

The present study highlights the importance of having tools that are able to differentiate children at risk for developmental problems from typically-developing children (Ooi et al., 2011), so that after the early identification of problems a more specific assessment is carried out for the establishment of an intervention plan. Indeed, broadband behavioral checklists that assess social symptoms of ASD as well as other behavioral and emotional problems may be very efficient in screening for this condition (Ooi et al., 2011). The fact that the same rating scale can also screen other conditions that co-occur with ASD (e.g., attention problems) is also an advantage. The assessment of children for an ASD diagnosis requires time and specialized training. Therefore, a single multidimensional behavioral rating scale, such as the PKBS-2 that according to the present study correctly identifies 88% (for parent ratings) and 91% (for teacher ratings) of children with ASD could be a cost-effective screening tool. Moreover, a multidimensional rating scale like the PKBS-2 has been shown to be as valid as specific ASD checklists in differentiating children with and without ASD.

The PKBS-2 has other positive features that deserve mention. It has good psychometric properties (Major & Seabra-Santos, 2014; Merrell, 2002), it assesses children who are 3 to 6, years of age, thus covering the median age of ASD diagnosis (4 years of age, according to Anagnostou et al., 2014), it addresses preschool settings where children interact with peers and developmental concerns such as core ASD symptoms may first appear or become more salient, it evaluates both positive and negative behavior and the same items can be answered by different informants. In this study it proved to be a useful tool to evaluate the social and behavioral functioning of children with ASD that may be helpful in future research and practice. Although more similarities than differences were found between informants, the multi-rater approach used to assess social skills and behavior problems of children with ASD is a positive aspect of this study, as it gives rise to a more complete profile of the children under study (Murray et al., 2009).

Despite its contributions, the present study has also some limitations. In addition to the small sample size (32 children with ASD), another limitation of this study also related to the sample used is the matching process, based on the chronological age of the children rather than on their mental age. Although this is a common procedure in studies of this nature (e.g., Goldstein et al., 2014), the fact that the mental age was not controlled in this study may raise the issue of the differences found being due to the intellectual functioning of the children with ASD and not to the autistic disorder itself. These issues related to sampling recommend that caution should be taken in the interpretation and generalization of results. Another limitation is related to the data collection procedure: as the rating scale was completed by phone, parents and teachers might have felt pressured to answer more quickly. Furthermore, despite the utility of the PKBS-2 in the identification of ASD-specific social skills and behavior problems, the set of items included allow for the assessment of disruptive but not repetitive behaviors, which are also a core component of the ASD diagnostic criteria.

Bearing this in mind, future studies could complement parents' and teachers' indirect reports obtained with rating scales or interviews, with home video tapes and direct observation, in order to have a more direct assessment of the child's behaviors in the settings where he/she spends most of the time (home and school). Furthermore, future studies could use the same instrument with larger samples of children matched by mental age. Since there is a lack of assessment tools adapted and validated for the Portuguese language, the now available Portuguese version of the PKBS-2 could be used as a screening tool, complemented subsequently with a more specific ASD tool (such as the ADOS).

Declaration of interest

The authors report no declarations of interest. The authors alone are responsible for the content and writing of this article.

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Table 1.

Participant Demographics

Variable	ASD Group		Comparison Group		t/χ^2
	$n = 32$	%	$n = 32$	%	
Age					
3	11	34	11	34	
4	7	22	7	22	
5	11	34	11	34	1.00
6	3	10	3	10	
	$M = 54.94$	$SD = 12.40$	$M = 56.06$	$SD = 12.24$	0.87
Geographic Region					
North	23	72	23	72	
Center	1	3	1	3	1.00
Lisbon	4	13	4	13	
Algarve	4	13	4	13	
Geographic Zone					
Coast	30	94	28	88	0.74
Interior	2	6	4	12	
Residence Area					
Urban	27	84	29	91	
Moderately urban	4	13	3	9	1.21
Rural	1	3	-	-	
SES					
Low	6	19	8	25	0.12

Middle	13	40	15	47
High	5	16	5	16
Missing data	8	25	4	12

Note. All differences are statistically non-significant. Mean and standard deviation values presented for age were calculated in months.

Table 2.

Cronbach's Alpha Coefficient: Social Skills and Problem Behavior Scales

Scale	ASD Group (<i>n</i> = 32)	Comparison Group (<i>n</i> = 32)
Social Skills		
Parents' Ratings	.94	.85
Teachers' Ratings	.96	.92
Problem Behaviors		
Parents' Ratings	.92	.94
Teachers' Ratings	.93	.96

Table 3.

PKBS-2 Results ASD and Comparison Group: Descriptive Statistics, t test and Effect Size (Parents' Rating)

PKBS-2 Scores	ASD		Comparison		<i>t</i> (62)	<i>p</i>	<i>d</i>
	Group		Group				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Social Skills Scale							
Cooperation/ Social Adjustment	18.50	5.57	26.01	3.58	-6.42**	.001	1.64
Social Interaction/ Empathy	11.53	7.57	26.38	2.49	-10.54**	.001	2.95
Social Independence/ Assertiveness	24.66	5.79	34.49	3.35	-8.32**	.001	2.15
Total Social Skills	54.69	17.26	86.88	7.21	-9.74**	.001	2.63
Problem Behaviors Scale							
Externalizing Problems	39.13	11.64	27.80	14.26	3.48**	.001	0.87
Internalizing Problems	19.44	7.94	11.81	5.61	4.44**	.001	1.13
Total Problem Behaviors	58.56	18.05	39.61	17.85	4.22**	.001	1.06
PB Supplemental Subscales							
Anti-Social/ Aggressive	7.84	4.43	6.68	5.28	0.96	.342	0.24
Over-Activity/ Lack of Attention	15.50	4.42	9.25	4.33	5.71**	.001	1.43
Opposition/ Explosive	15.78	4.76	11.88	6.02	2.88**	.005	0.72
Social Withdrawal	9.00	4.79	3.22	2.87	5.85**	.001	1.51
Anxiety/ Somatic Problems	10.44	4.73	8.59	3.70	1.74	.087	0.44

Note. PB Supplemental Subscales = Problem Behaviors Supplemental Subscales.

** $p < .01$.

Table 4.

PKBS-2 Results ASD and Comparison Group: Descriptive Statistics, t test and Effect Size (Teachers Rating)

PKBS-2 Scores	ASD		Comparison		<i>t</i> (62)	<i>p</i>	<i>d</i>
	Group		Group				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Social Skills Scale							
Cooperation/ Social Adjustment	18.00	6.94	28.69	3.69	-7.70**	.001	2.01
Social Interaction/ Empathy	9.88	8.36	25.72	3.97	-9.68**	.001	2.57
Social Independence/ Assertiveness	23.19	7.85	34.63	4.20	-7.27**	.001	1.90
Total Social Skills	51.06	21.91	89.03	10.07	-8.91**	.001	2.37
Problem Behaviors Scale							
Externalizing Problems	33.53	13.69	15.78	13.77	5.17**	.001	1.29
Internalizing Problems	18.28	7.81	9.56	7.62	4.52**	.001	1.13
Total Problem Behaviors	51.00	19.09	25.06	19.23	5.42**	.001	1.35
PB Supplemental Subscales							
Anti-Social/ Aggressive	7.03	5.12	4.31	4.98	2.15*	.035	0.54
Over-Activity/ Lack of Attention	13.84	5.52	6.13	4.71	6.02**	.001	1.51
Opposition/ Explosive	12.66	5.62	5.34	5.04	5.48**	.001	1.37
Social Withdrawal	9.00	4.71	3.09	3.14	5.90**	.001	1.50
Anxiety/ Somatic Problems	9.28	4.50	6.47	4.87	2.40*	.019	0.60

Note. PB Supplemental Subscales = Problem Behaviors Supplemental Subscales.

* $p < .05$ ** $p < .01$

Table 5.

Structure Matrix: Pooled Within-Groups Correlations for Parents and Teachers Data

PKBS-2 Score	Function	Function
	Parents' Data	Teachers' Data
Social Skills Scale		
Cooperation/ Social Adjustment	.46	.66
Social Interaction/ Empathy	.75	.83
Social Independence/ Assertiveness	.60	.62
Problem Behaviors Scale		
Externalizing Problems	-.25	-.44
Internalizing Problems	-.32	-.39
Problem Behaviors Supplemental Subscales		
Anti-Social/ Aggressive	-.07	-.19
Over-Activity/ Lack of Attention	-.41	-.52
Opposition/ Explosive	-.21	-.47
Social Withdrawal	-.42	-.51
Anxiety/ Somatic Problems	-.12	-.21

Table 6.

Social Skills Items Rated by More than 60% of both⁽¹⁾ Informants with “Never” or “Rarely”:

Parents and Teachers’ Rating of Children with ASD

Social Skills Item	% Parents’ Ratings	% Teachers’ Ratings
17. ... other children’ rights	84	78
35. Offers help ...	75	72
14. Participes in discussions ...	72	84
20. Comforts other children ...	72	78
21. Invites other children ...	72	69
26. ... his or her rights ...	72	69
5. Tries to understand ...	69	81
27. Apologizes ...	69	75
28. Gives in or compromises ...	66	69
33. ... sensitive to adult ...	66	69
32. Responds appropriately ...	63	59

Note. Items are in descending order according to parents’ ratings.

⁽¹⁾ Item 32 did not reach the 60% criterion for teachers’ ratings.