




Social Responsibility Scale (SRS-2): Validity Evidence Based on Internal Structure

Lisandra Borges^{1,*} , Fernanda Otoni¹ ,
Thatiana H. de Lima² , Patrícia Waltz Schelini³ 

¹University of São Francisco, Bragança Paulista, SP, Brazil

²Federal University of Bahia, Salvador, BA, Brazil

³University of São Carlos, São Carlos, SP, Brazil

ABSTRACT – This study aimed to provide evidence of validity for the Social Responsiveness Scale (SRS-2) based on its internal structure. The results of 1,001 participants, aged between two and 73 years, indicated through *Path Analysis* that Social Perception predicts 56%, while Social Cognition predicts 79% of social responsiveness, Social Communication 92%, Social Motivation 70%, finally The Social Communication and Social Interaction subscale can predict 96% of social responsiveness. The subscales have a strong correlation magnitude and evidence the contribution of the SRS-2 to assess social responsiveness, in addition to being promising to predict the diagnosis of ASD at the national level.

KEYWORDS: social cognition, autism spectrum disorder, psychological assessment

Escala de Responsabilidade Social (SRS-2): Evidências de Validade com Base na Estrutura Interna

RESUMO – Neste estudo, objetivou-se conferir evidências de validade para a Escala de Responsividade Social (SRS-2) com base em sua estrutura interna. Os resultados de 1.001 participantes, com idades entre dois e 73 anos, indicaram por meio da *Path Analysis* que a Percepção Social prediz 56%, enquanto Cognição Social prediz 79% de responsividade social, Comunicação Social 92%, Motivação Social 70%, finalmente a subescala Comunicação Social e Interação Social pode predizer 96% de responsividade social. As subescalas apresentam forte magnitude de correlação e evidenciam a contribuição da SRS-2 para avaliar a responsividade social, além de ser promissora para predizer o diagnóstico de TEA em âmbito nacional.

PALAVRAS-CHAVE: cognição social, transtorno do espectro autista, avaliação psicológica

Social Cognition (SC) is a complex cognitive construct and spans several interpersonal domains, including perception, attitudes, and behavior in relation to social situations (Mazza et al., 2014). Social Cognition is a term used to refer to the mental processes necessary for social interactions, which include perceiving, interpreting and responding to the intentions, dispositions and behaviors of others (Brothers, 1990; Fiske & Taylor, 1991). It has been understood as a set of mental operations that underlie social interactions, characterized by social processes, which ensure the way in which inferences about beliefs and intentions

in relation to others are constructed, and how the different social situational factors are equated when such inferences are made (Green et al., 2005).

The Social Cognition construct is an umbrella term, composed of different domains or components (Penn et al., 2008; Pinkhan et al., 2014), however, there is a certain convergence in the literature about four of them: perception of emotions, Social Perception, attribution style and theory of mind. The perception of emotions refers to the ability to perceive emotions from facial and non-facial expressions (Mayer et al., 2001); Social Perception is related to the ability

* E-mail: lisandra.borges@usf.edu.br

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to pick up cues from the environment (Constantino & Gruber, 2012), which involves decoding, interpreting social cues, as well as understanding the social context (Penn et al., 2002); the Theory of Mind (ToM) is the ability to understand that others may have beliefs and intentions different from our own (Mazza et al., 2014; Happé, 1994). Finally, attributional style is understood as the causal statements people make about the events or behaviors of others (Green et al., 2008).

Studies on Social Cognition generally focus on the Theory of Mind. Ziv et al. (2014) showed the existence between ToM and social behavior: a greater understanding of other people's mental states is related to higher levels of efficiency in processing social information. Broadly, the processing of social information involves Social Perception, Social Cognition, Social Communication and Social Motivation, constructs measured by the SRS-2.

Scientific literature has pointed out that people with ASD have difficulties in understanding other people's mental states. Thus, such difficulties can compromise the development of adequate social behavior in adult life (Happé, 1994). Deficits in Social Communication and Social Interaction behaviors are hallmarks of people with ASD and an essential part of the diagnostic criteria for the disorder.

With regard to socio-cognitive functioning, difficulties in theory of mind (ToM) and in emotion recognition have been widely replicated in individuals with ASD (Baron-Cohen et al., 2001; Happé, 1994; Kleinman et al., 2001; Kuusikko et al., 2009). Sasson et al. (2012) demonstrated that impairments in skills associated with Social Cognition (recognition of emotions), for example, significantly contribute to the low social competence of individuals with ASD.

In Brazil, tests that reliably assess ASD symptoms are still scarce. One measure that has been widely used in different countries is the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005). The SRS is a questionnaire answered by parents or teachers, containing 65 items. Like the original SRS, the SRS-2 (SRS-2; Constantino & Gruber, 2012) comprises five subscales based on diagnostic criteria for the ASD: Social Perception, Social Cognition, Social Motivation, Social Communication and Restricted Interests and Repetitive Behaviors. Total scores can be converted to T-scores to give an indication of an individual's symptom severity. T-scores in the mild, moderate or severe range suggest clinically significant symptoms with varying degrees of impact on everyday social interactions. The SRS-2 dimensions were found to match the DSM-5 criteria domains for Autistic Spectrum Disorder and the total scores discriminate those with ASD from those with typical development.

Social functioning is assessed through the five subscales: Social Perception, (understood as the ability to recognize social cues, for example, item 7, "I'm usually aware of how others are feeling"), Social Cognition (interpreting social behavior, for example, item 48, "I have a good sense of humor and understand jokes"), Social Communication

(reciprocal communication in social situations, for example, item 16, "I avoid eye contact or I am told I have unusual eye contact"), Social Motivation (motivation to participate in social interactions, for example, item 6, "I would rather be alone than with other people"), and Restrictive Interests And Repetitive Behavior (circumscribed interests and stereotypy, for example, item 24, "I have more difficulty than others with changes in my routine"). Respondents indicate their agreement with each item on a four-point Likert scale, evaluating their behavior over the past 6 months. The sum of all items is calculated to give a total score (max. 195). T-scores are interpreted as: ≤ 59 T, within normal limits; 60–65 T, light; 66–75 T, moderate; ≥ 76 T severe range.

Some studies have sought to investigate the social skills of people with ASD. Thinking about the symptomatic heterogeneity of autism, Maranhão e Pires (2017) analyzed the social functioning of children diagnosed with ASD through the results of neuropsychological assessments. The results showed that all participants in the clinical group performed well below expectations, while the control group was within the average in social skills and Social Perception.

Uchitel et al. (2020) used the SRS-2 to assess the presence and severity of social impairments, and determine factors associated with social impairments in a sample of patients with hemiplegia. The sample consisted of 34 patients, with a mean age of 9 years. The abilities of people with hemiplegia are often impaired and comorbidity with ASD is not uncommon. The results showed that the SRS-2 scores, indicating the level of social commitment, were higher than the averages for the general population. Of the 34, 27 scored high on the subscale domains, including Social Perception, Social Cognition, Social Communication, and Social Motivation. Very high scores on the SRS-2 were associated with the presence of Autism Spectrum Disorder, and individuals who achieved such a score were later diagnosed with ASD after comprehensive evaluation. The authors concluded that the SRS-2 is a valuable tool to identify impairments in social responsiveness, being a useful measure in screening for ASD in patients with hemiplegia.

Uljarevic et al. (2020) developed a study that, among the objectives, investigated the derivation of estimates of the social constructs of the Social Responsiveness Scale (SRS-2). According to the authors, the SRS-2 has been widely used and recommended by the National Institute of Mental Health (NIMH) to assess social skills, as it represents the social dimensions proposed by the Research Domain Criteria (RDoC) (<https://www.nimh.nih.gov/>). For the research, they used a database with 27,953 participants, 69.6% male and average age of 9.55. The results showed that the social constructs captured by the SRS-2 showed a distinct pattern of associations with age and sex. The findings were consistent with the literature, suggesting that both social interaction skills and the ability to perceive and interpret social cues become progressively more advanced and sophisticated

over time. In general, the SRS-2 was sensitive to measures of social constructs, however, Uljarevic et al. (2020) claim that specificity is related to the dimensionality of the scale. For the study, a better fit was found for a 4-factor measure, which differed from studies of standardization of the scale, which opted for the parsimony of one-dimensionality (Borges & Hauck, 2020). Previous research has supported the existence of an underlying unitary factor structure of features of autism measured by the SRS-2 (Constantino, Przybeck, Friesen, & Todd, 2000; Constantino et al., 2003). Work conducted through clinical samples and the general population was followed by attempts to re-examine the factor structure of autism diagnostic instruments (Constantino et al., 2007; Gotham, Risis, Pickles, and Lord, 2007). Along with other subsequent evidence studies, the results of these

surveys were important for the proposal to bring together the criteria of social impairment and communication impairment in a single domain of Communication and Social Interaction (CIS). Such a domain forms the basis for one of the two sets of criteria proposed for a DSM-5 diagnosis of Autism Spectrum Disorder, rather than the three sets of criteria in the DSM-IV.

The SRS-2 has been a screening measure for symptoms of Autism Spectrum Disorder, however, according to the literature and the studies presented, impairments in Social Communication and Social Interaction are crucial for the diagnosis, in addition to the mannerisms found in disorder. Thinking about that, this study aimed to provide validity evidence for the Social Responsiveness Scale (SRS-2) based on its internal structure.

METHOD

Participants

1,001 people participated in the research, with ages ranging from 2 to 73 years (Mean = 15 years and S.D. = 12.15). Of the total number of participants, 403 (40.3%) were male and 590 (58.9%) female, from the following states: São Paulo - 270 (27%), Minas Gerais - 269 (26.9%), Piauí - 145 (14.5%) and Rio Grande do Sul - 54 (5.4%). It is noteworthy that 270 (27%) participants answered the questionnaire through self-report and 156 (15.6%) had the questionnaire answered by hetero-report (such as parents, guardians, teachers, among others), for being minors.

Instrument

Social Responsiveness Scale - 2 (SRS-2; The Social Responsiveness Scale (SRS-2), developed by Constantino and Gruber (2005) and adapted for the Brazilian population by Borges (2020), aims to assess symptoms related to Autism Spectrum Disorder (ASD) as well as classifying them into mild, moderate or severe levels. Its assessment is made globally and specifically, through six subcategories of symptoms, namely, Social Perception, Social Cognition, Social Communication, Social Motivation, Restrictive and Repetitive Patterns, and Social Communication and Interaction. The Communication and Social Interaction domain is an A criterion for the diagnosis of Autism Spectrum Disorder (APA, 2014) and in the SRS-2 it is the sum of the domains perception, cognition, communication and social motivation. The evaluation of this scale is distributed in 65 Likert-type items, whose answer key varies between 1 and 4, where 1 refers to not true and 4 is almost always true. The initial studies of this scale showed psychometric properties with internal consistency values that varied between $\alpha = 0,95$ e $\alpha = 0,97$ (Borges & Hauck, 2020).

Data collection procedure

Initially, a letter of authorization was requested from the schools for data collection. After approval by the Research Ethics Committee (CEP; CAAE: 53188716.5.0000.5514), the collection involved two different resources: application in paper and pencil and, computerized, through Google Forms. In both collections, the participants signed a Free and Informed Consent Term (TALE), declaring their acceptance of participation. The parents of participants under 18 years of age signed a Free and Informed Consent Form (ICF), who answered the scale using pencil and paper at the parents' meeting, scheduled by the school. The older participants answered the scale online. Both applications took approximately thirty minutes.

Data analysis procedure

Initially, through the Statistical Package for the Social Sciences v. 25 – SPSS (IBM, 2012) a descriptive analysis was performed in order to characterize the sample and identify the means of the total scores in each of the symptom subcategories that compose the Social Responsiveness Scale - 2. To verify whether there would be an association between each of the symptom subcategories with the total SRS-2 score, a Pearson correlation was performed (Dancey & Reidy, 2006). Then, the Mplus v.7 (Muthén & Muthén, 2012) program was used in which the *Path Analysis* technique allowed testing a saturated model in which Social Perception, Social Cognition, Social Communication, Social Motivation, Restrictive and Repetitive Patterns, and Social Communication and Interaction (independent variables) were predictors of the total score in SRS-2 (dependent variable). To test this model, the maximum robust likelihood (MRL) estimator was used (Brown, 2015).

RESULTS

The analyzes and descriptions of the results followed the order of the objectives of the present study. Thus, first, descriptive statistics of the scores obtained in the instrument will be presented, namely, minimum and maximum scores, mean and standard deviation.

It can be seen that, with the results in Table 1, in the sample studied here, only one of the symptom subcategories, namely, Communication and Social Interaction, obtained a minimum score different from 0, being 3. The subcategory of symptoms that had the lowest mean was Social Perception. The highest mean was for the symptoms subcategory Communication and Social Interaction, showing a low capacity in the relationship between the abilities to recognize and interpret social signs with the motivation ability for expressive social interpersonal contact. It is important to highlight that in SRS-2, the higher the score, the greater the severity. According to Uljarevic et al. (2020), several items in the SRS-2 require the individual to demonstrate a certain level of verbal ability. In this sense, it is understood that scores may change due to the variable use of language. Next, in Table 2, data on the correlations between the instrument's symptom subcategories and the total score will be presented.

According to the results presented in Table 2, it appears that all correlations were statistically significant, positive and of strong magnitude, whose coefficients varied between $r=0.75$ and $r=0.99$. These results suggest that the subcategories of symptoms encompassed by social responsiveness tend to contribute to understanding the level of adjustment and adaptive functioning of people who respond to SRS-2. In order to verify to what extent each of the symptom subcategories that compose the scale are able to predict its score, the *path analysis* technique was performed. It is

noteworthy that this analysis is not intended to present a cause-and-effect relationship, but rather to test an empirical basis for the relationship of these constructs. The results of this model can be seen in Figure 1.

The saturated *path analysis* model was tested in which all symptom subcategories were found to be significant in predicting the total score on the SRS-2 (Figure 1). The standardized coefficients are shown in Figure 1. The results indicated that effect size (R^2) of Social Perception predicts at 56%, while Social Cognition predicts 79%, Social Communication 92%, Social Motivation 70%, Restrictive and Repetitive Patterns, in turn, predict in 65% and, finally, Communication and Social Interaction are able to predict 96% of Social Responsiveness.

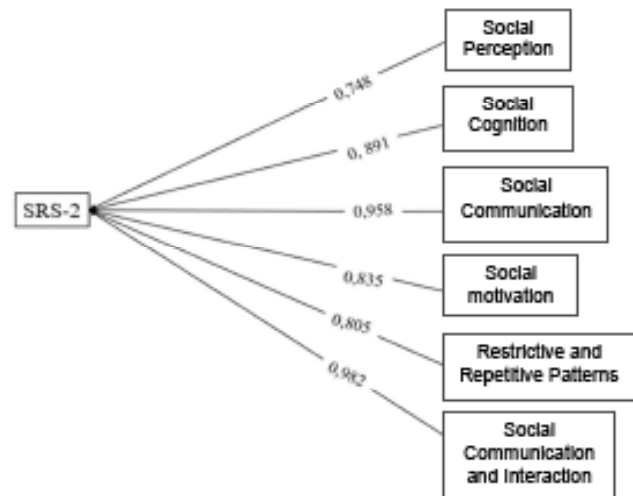


Figure 1. Path analysis saturated model

Table 1
Descriptive statistics of the scores obtained in the SRS-2.

Constructs	Social Perception	Social Cognition	Social communication	Social motivation	Restrictive and Repetitive Patterns	Social Communication and Interaction
Mean	6.79	9.45	15.52	8.85	7.24	40.62
Standard Deviation	3.65	6.09	10.61	5.54	6.64	23.36
Minimum	0	0	0	0	0	3
Maximum	24	36	60	30	34	146

** $p < 0.001$; * $p < 0.005$.

Table 2
Correlations between the total value in the SRS-2 with the other subcategories of symptoms presented in the scale.

Constructs	Social Perception	Social Cognition	Social communication	Social motivation	Restrictive and Repetitive Patterns	Social Communication and Interaction
SRS-2 Total	0.75**	0.89**	0.96**	0.86**	0.89**	0.99**

** $p < 0.001$; * $p < 0.005$.

DISCUSSION

The objective of the article was to seek evidence of validity for the SRS-2 based on the internal structure, in order to understand how the subscales predict the instrument's total score. Such a scale is an important tool to be used in the clinical diagnosis of ASD, as higher scores on these subscales can predict a possible impairment in social responsiveness and, consequently, point to the diagnosis of autism. In this regard, when verifying the strong correlations of magnitude between the results of the subscales and the total score of the SRS-2, it is understood that the items that compose it are favorable and accurate for tracking the symptoms indicated in the diagnostic manuals (APA, 2014). This result corroborates the study by Maranhão and Pires (2017), which pointed to losses in the social components of people with ASD. In addition, subscales can also provide additional information about different social skills, such as theory of mind, as it has the ability to assess social perception and cognition (Gökçen et al., 2016; Uchitel et al., 2020). In this case, it favors its use in the clinic so that differential diagnoses are made regarding autism and oppositional defiant disorder.

Strong magnitude correlations were also demonstrated between the total score and the Restricted Patterns and Repetitive Interests domain, demonstrating that the instrument fulfills the objective of tracking the two diagnostic criteria for ASD. As for the predictive capacity of the domains of social functioning, it is understood that Perception, Cognition, Communication and Social Motivation are part of criterion A for the diagnosis of ASD.

In clinical practice, these results contribute to better targeted individual intervention strategies, since it enables the level of damage in each of these areas (APA, 2014). Still on the ability of SRS-2 to predict social responsiveness, the results of the path analysis were corroborated by different authors who suggest that impairments in Social Communication and Social Interaction behaviors are central features in the diagnosis of Autism Spectrum Disorder (Baron-Cohen et al., 2001; Happé, 1994; Kleinman et al., 2001; Kuisikko et al., 2009).

In summary, the results found in this study indicate that the associations between the scales and the ability to predict the total score of the SRS-2 are promising evidence for the scale to be used in the diagnostic process of ASD at the national level. It is understood that the subscale scores provide valuable information about the areas covered by social responsiveness. Enabling an individualized treatment approach, for example, social skills training can be helpful for someone who shows difficulties in mastering Social Cognition. Group social skills interventions are effective in improving communication, social anxiety, and social functioning in adults with ASD (Spain & Blainey, 2015; Spain et al., 2016). It is understood that new studies should contribute to the present. Limitations were the characterization of the sample, which was surveyed in general, without exploration by sex, age or type of SRS-2 form. In this sense, new studies should be proposed, analyzing the variables type of form and group of people with and without a diagnosis of ASD.

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