Original Article

https://www.revistardp.org.br doi https://doi.org/10.25118/2763-9037.2022.v12.436

Applicability of the Brazilian version of Multidimensional Scale for Pervasive Developmental Disorder (MSPA-BR): exploring the overlap of ASD and ADHD

Aplicabilidade da versão brasileira da Multidimensional Scale for Invasive Developmental Disorder (MSPA-BR): explorando a sobreposição de TEA e TDAH

Aplicabilidad de la versión brasileña de la Escala Multidimensional para el trastorno generalizado del desarrollo (MSPA-BR): explorando la superposición de TEA y TDAH

Juliana Nassau Fernandes - ORCID - Lattes

Jonas Jardim de Paula - ORCID - Lattes

Lucas Araújo Lima Géo - ORCID - Lattes

Admilson Lemos da Costa Filho – ORCID - Lattes

Maicon Rodrigues Albuquerque - ORCID - Lattes

Yasuko Funabiki - ORCID

Debora Marques de Miranda - ORCID – Lattes

Leandro Fernandes Malloy-Diniz - ORCID - Lattes

ABSTRACT:

Introduction: The assessment of symptoms of autism spectrum disorders and attention deficit hyperactivity disorders in children is often a clinical challenge, especially now when both diagnoses can be made in the same patient. Structured scales and interviews might improve clinical assessment in those cases. **Objective:** To provide the Brazilian version of Multidimensional Scale for Pervasive Developmental Disorder and Attention Deficit/Hyperactivity Disorder (MSPA). **Methods:** We performed a cross-cultural adaptation, and analysis of degree of agreement. A sample of 216 children either with ADHD, Autism Spectrum Disorder or typical development had their parents scoring MSPA-BR. Reliability and validity

were analyzed. **Results:** Correspondence between versions was significant and strong agreed. Three factors fitted the variables and criterion validity yielded significant associations between MSPA factors and correspondent measures. Reliability was adequate. **Conclusion:** Psychometrics suggests that MSPA was adequately translated and cross-culturally adapted to Brazilian children population. This study provides MSPA's validity and reliability and offers to Brazilian community an instrument of fast administration for pediatric mental health.

Keywords: autism spectrum disorder, ASD, attention deficit-hyperactivity disorder, ADHD, psychometrics, comorbidity, MSPA.

RESUMO:
Introdução: A avaliação de sintomas de transtornos do espectro autista e transtornos de déficit de atenção e hiperatividade em crianças é muitas vezes um desafio clínico, especialmente agora quando ambos os diagnósticos podem ser feitos no mesmo paciente. Escalas estruturadas e entrevistas podem melhorar a avaliação clínica nesses casos. **Objetivo:** Fornecer a versão brasileira da *Multidimensional Scale for Pervasive Developmental Disorder and Attention Deficit/Hyperactivity Disorder* (MSPA). **Métodos:** Foram feitas adaptação transcultural e análise do grau de concordância. Uma amostra de 216 crianças com TDAH, Transtorno do Espectro Autista ou desenvolvimento típico foram avaliadas a partir da MSPA-BR preenchida pelos pais. A confiabilidade e a validade foram analisadas. **Resultados:** A correspondência entre as versões foi significativa e fortemente concordante. Três fatores se ajustaram às variáveis e a validade de critério produziu associações significativas entre os fatores MSPA e as medidas correspondentes. A confiabilidade foi adequada. **Conclusão:** A psicometria sugere que a MSPA foi adequadamente traduzida transculturalmente adaptada para a população infantil brasileira. Este estudo fornece validade e confiabilidade da MSPA e oferece à comunidade brasileira um instrumento de fácil aplicação à saúde mental pediátrica.

Palavras-chave: transtorno do espectro autista, TEA, transtorno de déficit de atenção-hiperatividade, TDAH, psicometria, comorbidade, MSPA.

RESUMEN:
Introducción: La evaluación de los síntomas de los trastornos del espectro autista y los trastornos por déficit de atención con hiperactividad en niños suele ser un desafío clínico, especialmente ahora que ambos

diagnósticos se pueden realizar en el mismo paciente. Las escalas estructuradas y las entrevistas podrían mejorar la evaluación clínica en esos casos. **Objetivo:** Proporcionar la versión brasileña de la Escala Multidimensional para el Trastorno Generalizado del Desarrollo y el Trastorno por Déficit de Atención e Hiperactividad (MSPA). **Métodos:** Se realizó una adaptación transcultural y análisis del grado de concordancia. En una muestra de 216 niños con TDAH, trastorno del espectro autista o desarrollo típico, sus padres obtuvieron puntajes MSPA-BR. Se analizó la confiabilidad y la validez. **Resultados:** La correspondencia entre versiones fue significativa y de fuerte acuerdo. Tres factores se ajustaron a las variables y la validez de criterio arrojó asociaciones significativas entre los factores MSPA y las medidas correspondientes. La fiabilidad era adecuada. **Conclusión:** La psicometría sugiere que la MSPA fue adecuadamente traducida y adaptada transculturalmente a la población infantil brasileña. Este estudio proporciona la validez y confiabilidad de la MSPA y ofrece a la comunidad brasileña un instrumento de rápida administración para la salud mental pediátrica.

Palabras clave: trastorno del espectro autista, TEA, desorden hiperactivo y deficit de atencion, DHDA, psicometria, comorbilidad, MSPA.

How to cite: Fernandes JN, Paula JJ, Géo LAL, Costa Filho AL, Albuquerque MR, Funabiki Y, Miranda DM, Malloy-Diniz LF. Applicability of the Brazilian version of Multidimensional Scale for Pervasive Developmental Disorder (MSPA-BR): exploring the overlap of ASD and ADHD. Debates em Psiquiatria. Rio de Janeiro. 2022;12:1-24. https://doi.org/10.25118/2763-9037.2022.v12.436

Disclosure of potential conflicts of interest: none

Funding: Coordination for the Improvement of Higher Education Personnel (CAPES) – Without Process.

Approval Research Ethics Committee (REC): CAAE UFMG – 93992318.3.0000.5149 – Document: 2.810.310

Received on: 07/11/2022

Accepted on: 10/11/2022

Published on: 24/11/2022

Introduction

Recent studies have been pointing out a high comorbidity rate involving ASD and ADHD, where averagely 28-44% of individuals diagnosed with the former also meet criteria for the latter [1]. Autism Spectrum Disorder (ASD) is characterized by persistent impairments in social communication and interaction along with restricted, repetitive patterns of behaviors, interests or activities. Attention Deficit Hyperactivity Disorder (ADHD), on its turn, regards functional difficulties involving impulsivity, hyperactivity, and inattention [2].

Early identification of both disorders can lead to earlier treatment interventions, and thus it is fundamental for clinicians to count on reliable measures. Apart from measures assessing children development in general, there are several scales designed specifically to ASD or to ADHD assessment [3, 4].

However, if both disorders are combined into measurement scales, there will be gains involving administration time and availability of clinical information concerning features often present in children suspecting of having either ADHD or ASD. This is especially relevant to Brazilian public services where health appointments have short duration time and where most Brazilians are assisted.

Therefore, assessment scales across the core features of ASD and ADHD are needed. This is particularly relevant since the publication of Diagnostic and Statistical Manual of Mental Disorders - Fifth edition (DSM-5) where the comorbidity was officially recognized [2]. To our knowledge, no scale with such aim is available in Brazil.

In this context, MSPA was developed as a semi-structured interview aiming to individually characterize the range and level of clinical demand among children with ASD or ADHD.

Clinical and behavioral features are projected onto a radar-chart, which eases understanding of the disorders both by patients as by those in their surroundings. It covers the main clinical features of these disorders, as well as Developmental Coordination Disorder (DCD) features and other disturbances often present in this individuals [5].

The present study aims to translate and cross-culturally adapt, and validate MSPA to Brazilian context.

https://doi.org/10.25118/2763-9037.2022.v12.436

For this, we aim to test MSPA – Brazilian version (MSPA-BR)'s criterion and construct validity, inter-rater and test-retest reliability, as well as internal consistency. Therefore, we aim to provide a new assessment tool ready-to-use for the Brazilian population.

Methods

Participants

The local Research Ethics Committee approved our study. (CAAE UFMG, 93992318.3.0000.5149, Parecer: 2.810.310). All participants and their parents/guardians provided informed consent before enrolling. This study is part of a major one that investigates impulsivity and inattention among children.

For reliability and validity analyses, 216 children ranging in age from three to 15 years old (mean = 9, sd = 2.57) either with ADHD, ASD or typical development were recruited at specialized health care centers.

Participants held a primary psychiatric diagnosis of ASD, ADHD or both or had their clinical status classified through standardized interviews, as detailed below.

Typical controls (TC) were included if not showing clinical scores according to Child Behavior Checklist 6-18 [6]. Sociodemographic details of the sample are detailed in Table 1.

Assessment

Multi-Dimensional Scale for PDD and ADHD – Brazilian version (MSPA-BR):

MSPA-BR is a semi-structured interview comprising 15 items rated on a 9-point quantitative scale.

Anchor-points throughout the domains are as follows: 1: no sign; 2: somewhat but no need of support; 3: special needs by supervisors in groups; 4: special needs by everyone in groups; 5: still difficult even with full support in groups, and special needs in individual life. Clinical threshold is set at 2.5.

The 15 items are distributed according to the categories ASD, ADHD, and DCD. Five items refer to ASD (former PDD) usually impaired traits: 1)

communication, 2) social adaptation, 3) empathy, 4) restricted interests and behaviors, 5) stereotyped and repetitive motion.

Three other items investigate ADHD core traits of 6) hyperactivity, 7) inattention, and 8) impulsivity. Due to the high rate of co-occurring impairments, two items represent DCD features, such as 9) gross and 10) fine motor skills.

Four items investigate disturbances in 11) sensory processing, 12) sleep cycle, 13) learning, and 14) language development. An extra item rates potential 15) isolated special skills, often present in individuals with ASD.

Additional behavioral observation is needed for assessing communication and hyperactivity domains. Scoring increases according to the level of support needed and to the magnitude of related disturbances [5].

Conner's Continuous Performance Test II (CPT–II):
The CPT-II refers to a computerized paradigm that assesses sustained attention and response inhibition. It is one of the top 10 attention tests used by neuropsychologists and is the most frequently used version of CPT7. Analyzed measures included Hit RT, Hit RT (SE), omission errors, commission errors, d', and β. For each measure, participants total scores were used.

Swanson, Nolan, and Pelham – Multimodality Treatment Study version, IV (MTA-SNAP-IV):
A questionnaire of ADHD symptoms for children and is based on the fourth version of the DSM. Parents and teachers-rating versions contain 18 items of inattention, hyperactivity and impulsivity behaviors, along with 8 items screening for Oppositional Defiant Disorder. The Brazilian version has appropriate psychometric properties and has been broadly used for screening purposes [8].

Childhood Behavior Checklist for ages 6-18 (CBCL/6-18):
A 113-item screening scale for children and adolescents filled by parents regarding their behavioral and emotional problems. CBCL/6-18 informs whether the subject falls into normal, borderline or clinical range for anxious/depressed, withdrawn, somatic problems, social problems, thought problems, attention problems, delinquent behavior and aggressive behavior [6].

https://doi.org/10.25118/2763-9037.2022.v12.436

In the present study, social interaction, school performance, ADHD, and autism indexes were considered for analyses. The latter was computed according to previous study [9].

Childhood Autism Rating Scale (CARS):
CARS is a 15-item scale designed for assisting diagnosis of children above two years old with ASD and distinguishing it from other developmental impairments [10].

Kiddie – Schedule for Affective Disorders and Schizophrenia for School-aged children (K-SADS-PL) Version 1.0:
A semi-structured interview designed to score symptoms severity and to assess current and lifetime present psychiatric disorders among children and adolescents from 6 to 18 years old. It is based on DSM-IV diagnostic criteria and covers the 33 most common psychiatric disorders for the age group [11].

Five Digit Test (FDT):
The FDT is a stroop-like paradigm involving figures and numbers from one to five [12, 13]. The third trial measures inhibition, while the fourth cognitive flexibility.

Cross-cultural adaptation
This process followed standard steps recommended in the specialized literature, as follows [14, 15].
Step 1: Forward translation. Two independent translators (T1 and T2) with Brazilian Portuguese as native tongue developed two Portuguese versions of MSPA.
Step 2: Reconciliation. Two bilingual judges (J1 and J2) reconciled forward translations into a single version. Both J1 and J2 are specialists in the field.
Step 3: Back translation. The reconciled version was back-translated into separate English versions by two bilingual translators (T3 and T4) blind about the first step.
Step 4: Harmonization. Other two bilingual and specialist judges (J3 and J4) reconciled the back translations into a single back-translated version of MSPA. MSPA's English version was compared with the back-translated version by J1, J2, J3 and J4. MSPA's original developer made final comparisons. Afterward, a synthesized version was taken to the next steps.

Step 5: Cognitive debriefing. A convenience sample of 46 Psychology and Psychiatry students was recruited to collect final observations on comprehensibility and cognitive equivalence of the syntax Portuguese version of MSPA.
Step 6: Review of cognitive debriefing results and conclusion. All judges involved made minor corrections and settled the final version of MSPA-BR. Correspondence of MSPA and MSPA-BR items was tested among 17 typically developing (TD) adults from different parts of Brazil and fluent in both source and translated languages. With one-week interval, they responded online to the English and final Portuguese versions. Association and degree of agreement between the two versions were verified.

Idiomatic adequacy: A subsample of 53 ADHD parents responded to a Visual Analogue Scale (VAS) inquiring about the understanding of MSPA-BR's interview. They were asked to indicate a number between 1 and 10 on a continuous scale, where lower scores indicate easy understanding and higher scores indicate difficult understanding.

Psychometric analysis
Participants underwent assessment with the described instruments while parents responded to scales and interviews. Participants' parents/guardians responded about their children's behavior and development through MSPA-BR, CARS, and K-SADS-PL interviews. Subjects were requested to give examples of behaviors related to inquired symptoms and to report any unclearness about MSPA-BR items. The whole assessment session lasted for about one hour and a half.

In order to explore common underlying factors within MSPA-BR variables, an Exploratory Factor Analysis was run. First, item Isolated special skill was score-reversed in order to be homogeneous to other item's measurement format. Second, item Learning was removed, since its scoring only applies for school-aged children, and missing values could compromise analysis. Principal Axis Factor and direct oblimin rotation were adopted in the procedure.

Construct validity was also investigated through associations among MSPA-BR domains and correspondent behavioral measures (e.g. FDT's flexibility and Restricted interests/behaviors). FDT and CPT-II were used for this purpose.

We also tested are associations among MSPA-BR domains and scales measuring correspondent constructs (criterion-related validity). Measures were chosen for being "gold standard" (e.g. CARS, K-SADS) or for their trustful and broad use for screening (e.g. CBCL/6-18, MTA-SNAP-IV).

Subsamples varied according to criterion measure. Variables were summed up to compose scores representing ASD and ADHD symptoms according to EFA allocation.

To test MSPA-BR's internal consistency was tested after isolated special skill was reversed and learning was removed. Since the latter is scored only for school-aged children, the high number of missing values would impair analyses.

To evaluate inter-rater reliability, two trained psychologies experienced with ASD and ADHD rated 11 cases independent and simultaneously. The two-way random intra-class correlation coefficient (ICC) for each domain was run. Since some variables did not meet the assumptions of ICC statistical model, we also reported absolute agreement rate for 1) the exact score and 2) coincident grouping of clinical and non-clinical (threshold set at 2.5).

Aiming to investigate test-retest reliability, parents of 11 children were interviewed with MSPA-BR by the same rater twice within 6-12 weeks period (mean = 9.00, sd = 1.88). A two-way random ICC analysis for each domain was run. Since some variables did not meet the assumptions of ICC statistical model, we also reported absolute agreement rate for 1) the exact score and 2) coincident grouping of clinical and non-clinical (threshold set at 2.5 between 1 and 5).

Results

As a result of the cross-cultural adaptation, a final version of MSPA-BR was established. The relationship between the English and translated items of MSPA was analyzed through Spearman's rho, since data distribution was non-parametric. There were weak and non-significant correlations among the Portuguese and English versions for two items (13.3%); moderate and significant correlations for seven items (46.7%); and strong and significant correlations for the last six ones (40%).

Moderate or strong effect sizes measured through rho2 were found for all moderate or strong correlations. See Table 2 for details.

A Bland-Altman analysis was run to verify the degree of agreement concerning the two versions. In order to check the assumption that differences between responses to both versions would be next to zero, a t-test was run with test value = 0.

Apart from the Inattention item, every other one indicated an appropriate degree of agreement, since 95% of the differences fell between 2 standard deviations. Among the ADHD sample, 78.6% of respondents marked up to two on a 10-points VAS measure regarding difficulty in understanding the questions. Four was the highest score chosen by participants.

Factor analysis suggested a three-factor resolution, accounting for 51.74% of the variance. All factors were retained. Factor loadings, which are coefficients of correlations between variables and factors, are displayed in Table 3. The first factor (F1) explained 35.07% and was substantially loaded by most items involving ASD related symptoms.

Language development and sensory input that were attributed to the general category by the original authors also loaded under ASD factor. The second factor (F2) explained 11.81% of total variance and was mainly loaded by ADHD related symptoms along with sleep cycle. The third factor (F3) explained 4.86% of total variance and was loaded by two variables involving motor skills (DCD).

All three factors were weakly correlated between each other (F1 and F2: r = .225; F2 and F3: r = .223; F1 and F3: r = .344). All variables loaded as expected according to the initial categories proposed by MSPA developers. Most variables that were not included in any particular category did load in one of them, as displayed in Table 3. Isolated special skill did not load in any factor.

MSPA-BR's items related to ADHD and ASD had their association to FDT and CPT-II investigated. Results are displayed in Table 4.

When taken together, MSPA-BR factors for ASD and ADHD had moderate and strong relationships with parent-reported measures such as CARS, CBCL/6-18 and MTA-SNAP-IV. These results are shown in Table 5.

Analysis of reliability by internal structure were computed for MSPA-BR's full scale and EFA's factors according to Table 2. The results suggest adequate reliability for all measures, higher in Full scale (α = .83) and ASD (α = .91) than in ADHD (α = .72) and (α = .70).

Inter-rater reliabilities for rater one (R1) and rater two (R2) are shown in Table 5 for each domain. Mean ICC across valid variables was .90 (sd = .14). Among valid reliability indexes, major part of them had coefficients above .90, therefore excellent reliability indicators (cut-off criteria = .70; Field, 2009).

SPSS could not calculate Inattention's ICC since variance violated model assumptions of variability. For this reason, we then calculated the absolute agreement between raters. Since the 9-point scale has a clinical threshold at 2.5, scores agreeing under clinical and not-clinical categories were also reported.

Test-retest ICC and relative agreement between time one (T1) and time two (T2) are displayed in Table 5. Mean ICC across valid variables was .74 (sd = .30). Sensory, hyperactivity and language development items did not show adequate ICCs. Seven items (social adaptation, empathy, restricted interests/behaviors, stereotyped/repetitive motion, sleep cycle and learning) lacked variability either in T1, T2, or both for proper ICC analysis. For further description, absolute and clinical/non-clinical status agreement were reported. Table 6.

Discussion

This study aimed to translate and adapt MSPA, as well as validate MSPA-BR for Brazilian population by investigating its criterion and construct validity, and reliability through inter-rater's, test-retest's, and internal consistency. MSPA-BR is the result of a standardized translation and adaptation process.

We found moderate and strong correlations as well as strong agreement for most items between MSPA's English and Portuguese versions.

Even though the items Restricted interests and behaviors and Language development did not show a significant correlation between versions, they showed an adequate degree of agreement.

Conversely, the Inattention item did not show an adequate degree of agreement, though had significant and strong correlation regarding both MSPA versions. Restricted interests and behaviors and Inattention might have been taken as traits, which vary in daily life and between test-retest period.

Language development might require parental information that may not be available when responding the scale. Correspondence between MSPA's both versions suggests adequate translation and adaptation for use in the Brazilian population. Overall, MSPA-BR measures the same set of features as the English version.

In this study, EFA assembled MSPA-BR items among three factors, just as initially expected. The three-factor solution here suggested did explain 51.74% of variance, and variables loadings were assembled according to the initially proposed factors. Altogether, suggested criteria for choosing the number of factors to extract meet the same solution and generally matched the structure proposed by the original authors of MSPA.

Sleep cycle loaded under ADHD and not under ASD factor, which was quite surprising. Studies have been consistently reporting sleep problems among ASD children. In comparison to typical controls, ASD children's prevalence of chronic insomnia is more than ten times higher15 and is substantiated by sleep questionnaires and polysomnography [16].

Likewise, language development and sensory loaded strongly under ASD factor, which is in accordance to current literature. Even though mild delays in language development often occur in ADHD, those are a main component of social communication and interaction, central criteria for ASD diagnosis [2].

Therefore, it is expected a higher association of language development delays and ASD symptoms. Similarly, sensory modulation symptoms have been associated to ASD from the time autism has been defined as a diagnosis [17].

Sensory symptoms are often evaluated in the diagnosis of autism and are scored in gold-standard autism measures. Findings from questionnaires show that 45-95% of individuals with ASD present high frequency of sensory behaviors that vary more than 1 sd from norms [18, 19].

With regards to ADHD, both conceptual and empirical evidence highlight the inability to systematically modulate physiological, sensory, and affective responses [20]. We argue that sensory symptoms might be more frequent and distinguishable among ASD subjects, reason why sensory clustered to this factor. This assertion is based not only in available literature, but also clinical practice.

Construct validity was also verified though correlation of MSPA-BR domains and factors and available behavioral measures such as FDT and CPT-II. Correlations with behavioral measures were significant apart from those involving FDT, CPT-II commission errors and d'. The former refers to erroneous responses to non-targets and indicate inattention or impulsivity, while the latter provides information on how well the examinee discriminates between targets and non-targets. Previous research investigating the association between attentional scales and tasks found weak relationship for focused attention, but not for shifting. Likewise, CPT-II research indicates only moderate correlations with rating scales measuring similar constructs [21].

ASD related variables showed adequate criterion validity. Social interaction, though similar to social adaptation, does not measure precisely the same behaviors as the latter and resulted in a significant weak correlation. However, when summed up, the 7 ASD related variables showed moderate relationship with CBCL/6-18's autism index and strong relationship with CARS' total score. This indicates that the lack of variability of single-score analyses might have negatively impacted the associations, since we had better results when full factorial scales were compared. Overall, results were satisfactory when ASD items were taken together and compared with an external criterion of ASD assessment.

Regarding ADHD variables, correlation coefficients showed either moderate or strong associations. Overall, all correlations were significant and results for ADHD and ASD variables and factors corroborate the factorial structure and the validation process. Finally, since learning was excluded from other analyses, we investigated its criterion validity alone and results were also positive.

Internal consistency for MSPA-BR full scale and its separate factors was adequate. Altogether, ASD factor was the most reliable. Regarding inter-

rater reliability, the great majority of items showed good or excellent parameters despite the small sample size.

Lower values of reliability were seen in the test-reteste method, but were according to international parameters. Therefore, inter-rater and test-retest analyses do show adequate reliability, though increasing sample size would improve data analyses.

Despite MSPA-BR's good results for reliability, comprehensibility, validity and equivalence to the English version, the present study had some limitations. Correspondence of MSPA English and Brazilian versions could have been investigated through face-to-face interview in English.

Furthermore, this study comprised only childhood symptoms of participants of Minas Gerais State and does not allow conclusions of adequacy for other Brazilian regions.

Future studies could further explore construct validity by making use of confirmatory factor analysis.

Content validity was not assessed in this study, and would be useful for reasoning about item's relevance and assuring that MSPA-BR and its manual lead clinicians through the same clinical criteria.

It might also be useful for clinical practice and research to develop a weighted total score of MSPA-BR. In order to provide better reliability coefficients, a higher sample size should be sought.

This study adds to the literature by filling a gap of MSPA's construct and criterion validity, as well as inter-rater and test-retest reliability. Taken together, MSPA-BR psychometrics suggest it does measure clinical features of ASD and ADHD, as well as side features usually found.

Further, we show evidence that MSPA-BR does so in a consistently manner over time and across interviewers and items.
This study also offers to Brazilian community a unique instrument of fast administration by specialized professionals especially useful for pediatric mental health.

https://doi.org/10.25118/2763-9037.2022.v12.436

Acknowledgments
This work was made possible through financial support provided by the Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Council for Scientific and Technological Development (CNPq) of Brazil.

The authors are thankful for the partnership with the Clinics Hospital of Federal University of Minas Gerais, where data were collected.

Referências

1. Anckarsäter H, Stahlberg O, Larson T, Hakansson C, Jutblad SB, Niklasson L, Nydén A, Wentz E, Westergren S, Cloninger CR, Gillberg C, Rastam M. The impact of ADHD and autism spectrum disorders on temperament, character, and personality development. Am J Psychiatry. 2006;163(7):1239-44. https://doi.org/10.1176/ajp.2006.163.7.1239 - PMid:16816230

2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). Whashington, DC: American Psychiatric Publishing; 2013. https://doi.org/10.1176/appi.books.9780890425596

3. Chang LY, Wang MY, Tsai PS. Diagnostic accuracy of rating scales for attention-deficit/hyperactivity disorder: a meta-analysis. Pediatrics. 2016;137(3):e20152749. https://doi.org/10.1542/peds.2015-2749 - PMid:26928969

4. Norris M, Lecavalier L. Screening accuracy of level 2 autism spectrum disorder rating scales: a review of selected instruments. Autism. 2010;14(4):263-84. https://doi.org/10.1177/1362361309348071 - PMid:20591956

5. Funabiki Y, Kawagishi H, Uwatoko T, Yoshimura S, Murai T. Development of a multi-dimensional scale for PDD and ADHD. Research in Developmental Disabilities. 2011;32(3):995-1003. https://doi.org/10.1016/j.ridd.2011.01.052 - PMid:21353761

6. Achenbach TM, Ruffle TM. The Child behavior checklist and related forms for assessing behavioral/emotional problems and competencies. Pediatrics in Review. 2000;21(8):265-71. https://doi.org/10.1542/pir.21.8.265 - PMid:10922023

7. Conners CK, Staff MH. Continuous Performance Test II (CPT-II) computer programs for Windows technical guide and software manual. Noth Tonawada, New York: Multi-Health Systems. 2000.

8. Costa DS, Paula JJ, Malloy-Diniz LF, Romano-Silva MA, Miranda DM. Parent SNAP-IV rating of attention-deficit/hyperactivity disorder: accuracy in a clinical sample of ADHD, validity, and

reliability in a Brazilian sample. J Pediatr (Rio J). 2018 pii:S0021-7557(18):30471-6. https://doi.org/10.1016/j.jped.2018.06.014 PMid:30236592

9. So P, Greaves-Lord K, van der Ende J, Verhulst FC, Rescorla L, Nijs PF. Using the child behavior checklist and the teacher's report form for identification of children with autism spectrum disorders. Autism. 2013;17(5):595-607. https://doi.org/10.1177/1362361312448855 - PMid:22914776

10. Saemundsen E, Magnússon P, Smári J, Sigurdardóttir S. Autism diagnostic interview-revised and the childhood autism rating scale: convergence and discrepancy in diagnosing autism. Journal of Autism and Developmental Disorders. 2003;33(3):319-28. https://doi.org/10.1023/A:1024410702242 - PMid:12908834

11. Brasil HH, Bordin IA. Convergent validity of K-SADS-PL by comparison with CBCL in a Portuguese speaking outpatient population. BMC Psychiatry. 2010;10:83. https://doi.org/10.1186/1471-244X-10-83 - PMid:20955616 PMCid:PMC2984471

12. Paiva GC, Fialho MB, Costa DS, Paula JJ. Ecological validity of the five digit test and the oral trails test. Arquivos de Neuro-Psiquiatria. 2016;74(1):29-34. https://doi.org/10.1590/0004-282X20150184 - PMid:26602200

13. Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. J Eval Clin Pract. 2011;17(2):268-74. https://doi.org/10.1111/j.1365-2753.2010.01434.x - PMid:20874835

14. Wild D, Grove A, Martin M, Eremenco S, McElroy S, Verjee-Lorenz A, Erikson P. Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: report of the ISPOR Task Force for Translation and Cultural Adaptation. Value in Health. 2005;8(2):94-104. https://doi.org/10.1111/j.1524-4733.2005.04054.x - PMid:15804318

15. Sivertsen B, Posserud MB, Gillberg C, Lundervold AJ, Hysing M. Sleep problems in children with autism spectrum problems: a longitudinal population-based study. Autism. 2012;16(2):139-50. https://doi.org/10.1177/1362361311404255 - PMid:21478225

16. Malow BA, Marzec ML, McGrew SG, Wang L, Henderson LM, Stone WL. Characterizing sleep in children with autism spectrum disorders: a multidimensional approach. Sleep. 2006;29(12):1563-71. https://doi.org/10.1093/sleep/29.12.1563 - PMid:17252887

17. Kanner L. Autistic disturbances of affective contact. Nervous Child. 1943;2(3):217-50. https://neurodiversity.com/library_kanner_1943.pdf

18. Baker AE, Lane A, Angley MT, Young RL. The relationship between sensory processing patterns and behavioural responsiveness in autistic disorder: a pilot study. Journal of Autism and Developmental Disorders. 2008;38(5):867-75. https://doi.org/10.1007/s10803-007-0459-0 - PMid:17899349

19. Tomchek SD, Dunn W. Sensory processing in children with and without autism: a comparative study using the short sensory profile. American Journal of Occupational Therapy. 2007;61(2):190-200. https://doi.org/10.5014/ajot.61.2.190 - PMid:17436841

20. Lugo-Candelas C, Flegenheimer C, McDermott JM, Harvey E. Emotional understanding, reactivity, and regulation in young children with ADHD symptoms. Journal of Abnormal Child Psychology. 2017;45(7):1297-310. https://doi.org/10.1007/s10802-016-0244-7 - PMid:27957717

21. Riccio CA, Reynolds CR, Lowe PA. Clinical applications of continuous performance tests: measuring attention and impulsive responding in children and adults. Hoboken, New Jersey: John Wiley & Sons Inc; 2001.

Tabela 1. Estatística descritiva dos dados sociodemográficos e clínicos da amostra

	TDAH	TEA	TDAH+TEA	CT
N (%)	105 (48,6)	26 (12,0)	12 (5,6)	73 (33,8)
Meses de idade – média (dp)	117 (33,0)	111 (29,9)	104 (29,6)	115 (31,6)
Anos de educação – média (dp)	3 (2,2)	3 (1,9)	3 (2,3)	4 (2,2)
Homens (%)	87 (82,9)	11 (91,6)	7 (58,3)	45 (61,6)
SSE médio (US$)	1.356,50	1.356,50	1.356,50	2.665,09
K-SADS-PL – N (%)				
Desatenção	30 (28)	0 (0)	2 (16)	–
Hiperatividade	13 (12)	0 (0)	2 (16)	–
Combinado	62 (59)	0 (0)	8 (67)	–
Ansiedade	34 (32)	0 (0)	4 (33)	–
Depressão	4 (3)	0 (0)	0 (0)	–
Mania	2 (2)	0 (0)	0 (0)	–
Tique	2 (2)	0 (0)	0 (0)	–
Opositor-desafiador	60 (57)	1 (8)	0 (0)	–
Conduta	4 (3)	0 (0)	0 (0)	–
Enurese	7 (6)	1 (8)	0 (0)	–
Encoprese	3 (2)	1 (8)	0 (0)	–
CBCL/6-18 – N (%)				
Externalização	–	–	–	0 (0)
Internalização	–	–	–	0 (0)

TDAH: Transtorno de Déficit de Atenção e Hiperatividade, **TEA:** Transtorno do Espectro do Autismo, **CT:** Controles Típicos, **SSE:** Status Socioeconômico, **K-SADS-PL:** Kiddie – Programação para Transtornos Afetivos e Esquizofrenia para Crianças em Idade Escolar, **CBCL/6-18:** Infância Lista de verificação de comportamento para idades de 6 a 18 anos

https://doi.org/10.25118/2763-9037.2022.v12.436

Tabela 2. Correlações e diferenças médias entre as versões original e traduzida do MSPA

Itens da MSPA	Correlação de Spearman			Teste *t* de uma amostra MSPA-MSPA-BR *vs* 0	
	rho	*rho* ²	*p*	*t*	*p*
Comunicação	0,54	**0,29**	0,01*	-1,69	0,11
Adaptação social	0,83	**0,69**	0,01*	-0,29	0,77
Empatia	0,71	**0,50**	0,01*	-1,83	0,09
Interesses e comportamentos restritos	0,18	0,03	0,25	-1,19	0,25
Sensorial	0,65	**0,42**	0,01*	-0,72	0,48
Movimento estereotipado e repetitivo	0,56	**0,31**	0,01*	0,00	1,00
Motor grosso	0,54	**0,29**	0,01*	0,27	0,79
Motor fino	0,64	**0,41**	0,01*	0,00	1,00
Desatenção	0,75	**0,56**	0,00*	-2,68	0,02*
Hiperatividade	0,69	**0,48**	0,01*	-1,32	0,21
Impulsividade	0,82	**0,67**	0,01*	-1,85	0,08
Ciclo do sono	0,79	**0,62**	0,01*	0,29	0,77
Aprendizagem	0,63	**0,40**	0,01*	-1,77	0,10
Desenvolvimento da linguagem	0,34	0,12	0,09	0,00	1,00
Habilidade especial isolada	0,82	**0,67**	0,01*	0,00	1,00

MSPA: Multidimensional Scale for PDD and ADHD, **MSPA-BR:** Multidimensional Scale for PDD and ADHD - versão brasileira, *p < 0,05, negrito rho ² indica tamanho de efeito moderado ou forte

https://doi.org/10.25118/2763-9037.2022.v12.436

Tabela 3. Cargas fatoriais para Análise Fatorial Exploratória com Rotação Oblimin dos itens MSPA-BR

Variáveis	TEA	TDAH	DCD
1. Comunicação	**0,91**		
14. Desenvolvimento da linguagem	**0,76**		
2. Adaptação social	**0,76**		
5. Sensorial	**0,72**		
4. Interesses/comportamentos restritos	**0,70**		
6. Movimento estereotipado/repetitivo	**0,59**		
3. Empatia	**0,57**		
15. Habilidade especial isolada			
11. Impulsividade		**0,94**	
10. Hiperatividade		**0,72**	
9. Desatenção		**0,52**	
12. Ciclo do sono		0,39	
7. Motor grosso			**0,84**
8. Motor fino			**0,49**

TEA: Transtorno do Espectro Autista, **TDAH:** Transtorno de Déficit de Atenção e Hiperatividade, **TDC:** Transtorno do Desenvolvimento da Coordenação. **Carga** < .30 são omitidos e aqueles > .40 estão em negrito.

https://doi.org/10.25118/2763-9037.2022.v12.436

Tabela 4. Correlações entre os domínios do MSPA-BR e medidas comportamentais

Domínios MSPA-BR	Teste	Medida	*N*	*rho*	*p*
Variáveis relacionadas ao TEA					
Interesses/comportamentos restritos	FDT	Escore de flexibilidade	79	0,20	0,09
Variáveis relacionadas ao TDAH					
Desatenção	CPT	Erros de comissão	52	0,04	0,77
		d '	52	-0,18	0,20
		β	52	**0,27**	0,05
Hiperatividade	CPT	Erros de comissão	52	0,00	0,99
		Média do hit RT (SE)	52	**0,48**	0,00
		d '	52	-0,26	0,06
Impulsividade	FDT	Escore de inibição	79	**0,23**	0,05
	CPT	Erros de comissão	52	0,11	0,44
		d '	52	-0,30	0,03
		Média do hit RT (SE)	52	**0,28**	0,05
Soma de variáveis de TDAH	CPT	Erros de omissão	52	**0,49**	0,00
		Erros de comissão	52	0,06	0,67
		Média do hit RT	52	**0,38**	0,00
		Média do hit RT (SE)	52	**0,45**	0,00
		d '	52	**-0,31**	0,03
		β	52	**0,30**	0,03

TEA: Transtorno do Espectro Autista, **TDAH:** Transtorno de Déficit de Atenção e Hiperatividade, **FDT:** Teste de Cinco Dígitos, **CPT:** Teste de Desempenho Contínuo

https://doi.org/10.25118/2763-9037.2022.v12.436

Tabela 5. Critérios externos para análise de validade dos critérios do MSPA-BR

Domínios MSPA-BR	Teste/escala	Medida	*N*	*rho*	*p*
Variáveis relacionadas ao TEA					
Adaptação social	CBCL	Soma de interação social	160	**-0,37**	0,00
Soma das variáveis de TEA	CBCL	Índice de autismo	160	**0,48**	0,00
	CARS	Pontuação total	71	**0,78**	0,00
Variáveis relacionadas ao TDAH					
Desatenção	MTA-SNAP-IV	Soma de desatenção	180	**0,59**	0,00
Hiperatividade	MTA-SNAP-IV	Soma de hiperatividade	180	**0,67**	0,00
Soma de variáveis de TDAH	CBCL	Pontuação total de TDAH	160	**0,68**	0,00
	MTA-SNAP-IV	Soma de desatenção e hiperatividade	180	**0,71**	0,00
Categoria geral					
Aprendizado	CBCL	Soma do desempenho escolar	160	**-0,47**	0,00

TDAH: Transtorno de Déficit de Atenção e Hiperatividade, **TEA:** Transtorno do Espectro do Autismo, **CT:** Controles Típicos, **SSE:** Status Socioeconômico, **CARS:** Escala de Classificação de Autismo Infantil, **CBCL/6-18:** Checklist de Comportamento Infantil para idades de 6 a 18 anos. As associações significativas estão em negrito ($p < 0,05$).

https://doi.org/10.25118/2763-9037.2022.v12.436

Tabela 6. Resultados da confiabilidade interexaminador e teste-reteste do MPSA-BR

	Interexaminador						Teste-reteste					
Domínio	**R1 média (*dp*)**	**R2 média (*sd*)**	**Concordância absoluta**	**Concordância clínica**	**CCI**	***p***	**T1 média (*sd*)**	**T2 média (*sd*)**	**Concordância absoluta**	**Concordância clínica**	**CCI**	***p***
Comunicação	1,18 (0,40)	1,09 (0,30)	90,9%	100%	**0,78**	0,01	1,18 (0,41)	1,18 (0,41)	100,0%	100,0%	**1,00**	–
Adaptação social	1,18 (0,60)	1,32 (0,75)	72,7%	100%	**0,97**	0,00	1,14 (0,45)	1,18 (0,60)	81,8%	81,8%	–	–
Empatia	1,00 (.00)	1,00 (.00)	100,0%	100%	**1,00**	–	1,27 (0,41)	1,00 (.00)	63,6%	100,0%	–	–
Interesses/comportamentos restritos	1,14 (0,32)	1,09 (0,20)	90,9%	100%	**0,92**	0,00	1,05 (0,15)	1,14 (0,32)	72,7%	100,0%	–	–
Sensorial	1,32 (0,40)	1,18 (0,40)	72,7%	100%	**0,91**	0,00	1,27 (0,26)	1,32 (0,41)	45,5%	100,0%	0,07	0,45
Movimento estereotipado/repetitivo	1,00 (.00)	1,00 (.00)	100,0%	100%	**1,00**	–	1,50 (0,50)	1,00 (.00)	45,5%	100,0%	–	–
Motor grosso	1,14 (0,32)	1,09 (0,30)	90,9%	100%	**0,94**	0,00	1,18 (0,46)	1,14 (0,32)	90,9%	90,9%	**0,96**	0,00
Motor fino	1,23 (0,41)	1,14 (0,32)	90,9%	100%	**0,80**	0,01	1,14 (0,23)	1,23 (0,41)	81,8%	100,0%	**0,90**	0,00
Desatenção	1,27 (0,41)	1,09 (0,20)	63,6%	100%	–	–	1,14 (0,32)	1,27 (0,41)	81,8%	100,0%	**0,76**	0,02
Hiperatividade	1,55 (1,01)	1,27 (0,65)	63,6%	90,9%	**0,94**	0,00	1,41 (0,58)	1,55 (1,01)	45,5%	90,9%	0,68	0,04
Impulsividade	1,41 (0,58)	1,32 (0,64)	72,7%	100%	**0,90**	0,00	1,18 (0,34)	1,41 (0,58)	63,6%	90,9%	**0,85**	0,00
Ciclo do sono	1,09 (0,30)	1,09 (0,30)	100,0%	100%	**1,00**	–	1,18 (0,41)	1,09 (0,30)	72,7%	100,0%	–	–
Aprendizagem	1,00 (.00)	1,00 (.00)	100,0%	100%	**1,00**	–	1,05 (0,15)	1,00 (.00)	88,8%	100,0%	–	–
Desenvolvimento da linguagem	1,27 (0,61)	1,23 (0,41)	72,7%	81,8%	**0,93**	0,00	1,23 (0,52)	1,27 (0,61)	81,8%	90,9%	0,66	0,05
Habilidade especial isolada	1,55 (0,65)	1,45 (0,91)	54,5%	–	0,49	0,15	1,46 (0,91)	1,41 (0,58)	45,5%	81,8%	–	–

CCI ≥ .70 está destacado

https://doi.org/10.25118/2763-9037.2022.v12.436