

Psychometric Validation of the ASC-ASD Anxiety Scale in Children with Autism Spectrum Disorder

Elsa M. Castañeda Mikrukova (PGDip)

Autonomous University of Barcelona

PhD. Manuel Ojea Rúa

University of Vigo

Summary: The knowledge, diagnosis and treatment of clinical anxiety in people considered within the autism spectrum is a challenge since most of the instruments are designed based on research variables for people outside the autism spectrum. A total of 91 parents of children between 6 and 18 years of age, diagnosed with ASD in Metropolitan Lima participated in this study. In this sense, the general objective of this study is the validation of the anxiety scale: ANXIETY SCALE FOR CHILDREN WITH ASD (ASC ASD-P) in relation to anxious behaviors in people with ASD. The results show a significant validity of the Scale content; however, there are discrepancies in the allocation of reagents to the corresponding dimensions. The Exploratory Factor Analysis and the Alpha Values of Anxiety present the following data: 1) Anxiety due to Uncertainty (McDonald's: .86 and Cronbach's Alpha: .85); 2) Performance Anxiety (McDonald's: .81 and Cronbach's Alpha: .81); 3) Anxious Arousal (0.86 McDonald's: .86 and Cronbach's Alpha: .8). Separation anxiety is excluded from the analysis due to its low factor value. These data allow us to affirm that the scale to evaluate the presence of ASC-ASD clinical anxiety, parent version, has adequate psychometric properties for the predictive measurement of anxiety in people with Autism Spectrum Disorder (ASD).

Keywords: Autism Spectrum Disorder, Clinical Anxiety, Anxiety Scale Validation.

Introduction

In recent years, the presence of anxiety in people with autism has been researched, and it is known that there is an average prevalence rate between 20% and 50% (Samadi, McConkey, & Rodgers, 2020; Lecavalier, Amman, & Halladay, 2013) as a consequence of the (social or environmental) barriers they experience in their process of adapting to the environment (INS, 2019), by a differentiated neurological architecture that eventually makes them more vulnerable to states of stress and difficulties in the regulation of emotions (Gara *et al.*, 2020; Paula, & Artigas-Pallares, 2016; Ruggieri, 2014) or, in other cases, due to clinical anxiety, which aggravates the presentation of autism characteristics (Kerns *et al.*, 2016).

As for the relationship of both circumstances, autism and anxiety, it is suggested that some behaviors and emotional responses associated with clinical anxiety can be understood as part of the clinical criteria of the spectrum leading to a “masking” of anxiety or, on the contrary, some behaviors of the condition can be understood as a psychiatric pathology generating an overdiagnosis (Paula 2015; Kerns *et al.*, 2016). However, due to the specific and heterogeneous characteristics of the autism spectrum, such as repetitions, social avoidance, desire for invariance and a predictable environment, people eventually become more vulnerable to the presence of alterations in emotional regulation or possible clinical conditions and/or disorders such as anxiety or depression (Prizant, 2015; Kerns *et al.*, 2016; Hervas, 2017).

The knowledge, diagnosis and treatment of clinical anxiety in people considered within the autism spectrum is a challenge since most of the instruments are designed based on research variables for people outside the autism spectrum, and considering that this population presents a singular cognitive style (Cohen, 2008; Prizant 2015) the diagnostic instruments and care protocols should be adapted to these characteristics ensuring a differential diagnosis of emotional disorders with the characteristics of autism (Kerns *et al.*, 2016).

There are some scales such as the Anxiety Disorders Interview Schedule – ADIS, its autism appendix (Kerns *et al.*, 2016) or The Pediatric Anxiety Rating Scale – PARS (Maddox *et al.*, 2020), Spence Children's Anxiety Scale – SCAS (Magiati *et al.*, 2017), as well as other non-specific scales for people within the spectrum considered as instruments for assessing anxiety in children within the autism spectrum, such as Child and Adolescent Symptom Inventory-4 – CASI (Lei *et al.*, 2017), The Multidimensional Anxiety Scale for Children – MASC, The Revised Child Anxiety and Depression Scale – RCADS, The Screen for Child Anxiety Related Disorders – SCARED (Lecavalier *et al.*, 2014).

Indeed, the comorbidity associated with the nuclear disorder of autism is a widely demonstrated recurring issue, anxiety is an important associated factor, but the presence of social phobias, severe anguish, motor

rigidity, problems related to oral and non-oral social communication, but, above all, schizotypal traits and other major depressive components (Carmo, Duarte, Souza, Pinho & Filipe, 2017).

Comorbidity affects so much the nuclear disorder that can sometimes confuse wrongly to diagnosis processing, for this reason, it is essential to clearly delimit the diagnosis of ASD, duly complemented with measurement scales that indicate the percentile of presence of the associated comorbidity, which is very fundamental for the symptomatological consideration of autism. But, even within the specific parameters included in DSM-5 International Classification, as the face-to-face structure of stereotyped behaviors, measured along all diagnostic tests about, many times, these were derived from associations of cognitive rigidity. structure that corresponds to the nuclear disorder of ASD, de forma que the presence of symptoms related to stereotyped behaviors varies greatly depending on the level of diagnosis of ASD, while global motor rigidity is a basic predictor par excellence, collected in this study, and should therefore be incorporated into the explanatory hypotheses of the disorder measures, that, possibly, it is owing to different genotypic genetic groups indicate the presence of very specific endophenotypic types that delimit high correlations of ASD with multiple associated symptomatic groups, with greater or lesser prevalence and/or correlational intensity as indicated below (Gotham et al., 2018; Keenan et al., 2018; Siegle et al., 2015).

Considering this basic example, the anxiety factor, especially social anxiety, forms a fundamental associated comorbid element; however, said factor level may be so highly that could lead to diagnostic errors, for which reason it is always necessary use scales and complementary parametric tests to delimit this aspect with most possible precision (Thomas, Davis, Karmiloff-Smith, Knowland & Charman, 2016).

For this reason, this research has deepened into complementary analysis of the anxiety factors level in students with ASD to respond to the following general aims.

Research Aims

The goal of this research is to validate the version of the ASC-ASD Anxiety Scale for parents of children within the autism spectrum of Metropolitan Lima developed by Rodgers (2016), which was translated into Spanish by Beneytez (2019) and used in other researches (Ali, McConkey & Rodgers, 2020; Soh, Goh, Magiati & Sung, 2020; Adams, Clark & Keen, 2019). It is a reformulated self-report questionnaire of the Revised Child Anxiety and Depression Scale (RCADS) (Chorpita, Moffit & Gray, 2005; Mandy et al., 2022) originally composed of 37 reagents for the anxiety variable, excluding 10 for the depression variable. This review concludes with 24 reagents organized into 4 dimensions: Anxiety due to Uncertainty (8 reagents), Performance Anxiety (5 reagents), Separation Anxiety (5 reagents), and Anxious Arousal (6 reagents), scoring on a Likert scale of 3 points (0 never to 3 always), in which anxiety is considered to be present from a score of 20. It has good psychometric properties (Rodgers et al. 2016; Soh, Goh, Magiati & Sung, 2020; Ali, MacConkery & Rodgers, 2020) and was translated by Beneytez (2019) into Spanish and applied to a sample of 71 Spanish children between 6 and 18 years old.

Method

Research Design

The content validity of a specific scale for measuring anxiety is carried out using the criteria of judges (Hernandez, Fernandez & Baptista, 2014), which conforms to the observations, and it is then entered through *Google Forms*. The scale was applied virtually in a period of four weeks, obtaining the results through Excel, and carrying out the Exploratory Factor Analysis through the Statical Package for Social Sciences – SPSS and Jamovi programs.

Participants

This cross-sectional study had 108 participants. However, due to exclusion criterion (parents of children between 6 and 18 years of age diagnosed by a neuropediatrician), the sample was composed of 91 parents of children between 6 and 18 years of age diagnosed with ASD, volunteers, with informed consent, from the metropolitan area of Lima (Peru).

Instrument

The instrument to assess statistical comorbid anxiety in people with ASD has been adapted from the Supplemental Document Spanish Adapted Version: Anxiety Assessment Scale for Students with Autism Spectrum Disorder. Parent Version (ASC-ASD-P), adapted by Li. Elsa M. Castañeda Mikrukova for Metropolitan Lima people (see Annex), based on the original source developed by Rodgers, Wigham, McConahie, Freeston, Honey & Parr (2016).

Data Analysis

The data were obtained through the *KMO and Barlett's* factor analysis statistical test for all the variables of the applied scale. Likewise, the Cronbach's Alpha (α) index of the Scale as a whole was calculated.

Results

In fact, the data found allow us to observe the empirical validity of the Scale in connection to the measurement of anxiety levels related to people with ASD, which, in general, conforms to significant critical values in relation to the research objectives.

The fundamental analysis of the validation process was found through the factorial analysis of the correlations between the elements or items of the Scale and the corresponding factors. First, there is the Kaiser-Meyer-Olkin measurement and the Bartlett's sphericity test (see Table 1).

Table 1: KMO and Bartlett's test.

Kaiser-Meyer-Olkin measurement of sampling adequacy		0.79
Bartlett's Sphericity Test	Approx. Chi ² Gl. Sig.	537.24 91 .00

Note: KMO: .79 and Barlett's Sphericity Value: .00.

As noted, the Kaiser measure indicates a significantly-high explanatory variance ratio (.79), which indicates the importance of the underlying explanatory values of the scale validation. This score points out that factor analysis can be very useful to concretize the data found, which, predictably, indicate critical levels of significance.

On the other hand, Barlett's test contrasts a small significant value (sig: .00) that allows to contrast the correlation matrix of the explanatory elements that validate the Scale within the factor analysis, so that the correlation matrix is clearly contrasted as an identity matrix, in such a way that, according to the critical value indicated (for gl: 91) it corroborates a high-sample adequacy for the factor analysis of the predictor factors of the Scale.

All reagents are then processed and it is observed that the AFE recommends various settings. The first one is related to the elimination of the Separation Anxiety dimension and the adjustment in reagents 1, 8, and 12 of Anxious Arousal and 14 and 23 of Anxiety due to Uncertainty. All the remaining reagents show values above 0.40, those of Anxiety owing to Uncertainty being the ones with the highest factorial weight.

Since the AFE was carried out, the reliability value was determined for each dimension reporting good values in each of the three dimensions. At the same time, the reagents with greater factorial weight are those of Anxiety due to uncertainty (see Table 2).

Table 2: Factorial loads matrix.

Anxiety due to uncertainty		Performance anxiety	Anxious arousal
item 9	.942		
item 10	.795		
item 6	.663		
item 5	.640		
item 16	.526		
item 21	.487		
item 15		.778	
item 7		.749	
item 4		.658	
item 17		.646	
item 2		.605	
item 22			.798

item 13			.694
item 3			.473

Note: The reagents show values higher than 0.40, but the reagents of the dimension with greater factorial load are those related to Anxiety due to uncertainty.

As can be seen, the factorial loads in the Table above have been grouped according to the following factors: Anxiety due to uncertainty, Performance Anxiety to Anxious Arousal. The commonality or part of the variability of each variable explained by the three factors must be significantly high before and after the corresponding extraction. Within the variability of the statistical adjustments, it can be seen that all data are above .04, which indicates that there are high factorial loads according to the items indicated in absolute values of a determined variable with its explanatory factor within the validated Scale of this study.

Finally, the Scale was designed to determine the presence of anxiety in children within the autism spectrum. However, it did not consider whether this was clinical or adaptive according to each dimension. For this reason, the determination of the percentiles is then analyzed, the score scales are established considering the analysis of interrelational reliability between variables and factors using the Cronbach's Alpha (α) test and the Omega Alpha test (see Table 3).

Table 3: Reliability analysis by dimension

<i>Anxiety due to uncertainty</i>			<i>Performance anxiety</i>			<i>Anxious arousal</i>		
	α	Omega		α	Omega		α	Omega
A5	0.83	0.84	A2	0.79	0.80	A3	0.72	0.73
A6	0.82	0.83	A4	0.78	0.78	A13	0.46	0.51
A9	0.81	0.81	A7	0.76	0.76	A22	0.60	0.61
A10	0.83	0.83	A15	0.74	0.74			
A16	0.84	0.84	A17	0.79	0.80			
A21	0.857	0.85						

Note: A: Item or Reagent, Alpha C.: Cronbach's Alpha and Omega: McDonalson's Alpha.

In fact, Cronbach's Alpha levels are generally at significantly high and significant levels that indicate a high reliability, which implies that the proportion of explanatory variance of the observed items presents a significant correlation between the variables and the factors studied. Likewise, the Omega coefficient, the significant estimating data of which are indicated as from .70, shows that the analyzed elements are above this score, except for A13 (.51) and A22 (.61). Nevertheless, they are very close to the minimum values considered, since, circumstantially, Omega values above .65 could be assumed.

Conclusion

In summary, the reliability indexes of this study are significantly high, so it can be concluded that the commonalities found between the variables and the explanatory factors of the Anxiety Scale, the validation target, shows significantly high correlations, so that it forms a specific Scale that is highly predictive of anxious behaviors in people with ASD. Therefore, the ASC- ASD Scale becomes an essential instrument for the diagnosis and predictive analysis of anxiety analyzes and obsessive-compulsive processes in people with ASD, whose comorbidity presents at significantly high levels, increased with the entry into the period of adolescence and adulthood.

Discussion

With regard to the objective of this study, the scale shows good psychometric properties carrying out the adjustments to the reagents and dimension of Separation Anxiety, results similar to those found in the study in Iran (Ali, MacConkery & Rodgers, 2020), concluded on a scale of 14 reagents, unlike the present study.

As a result of the content validation process through judges' criteria, the following was obtained from the review of the 24 reagents: 11 coincidences of the three judges and 13 discrepancies, with two judges agreeing on 11 of these and two reagents without consensus, 2 and 19. Although these discrepancies were presented, the first obtained good reliability value of α : 0.80, but it is advisable to remove the second as a result of the AFE. As noted, there are discrepancies in the jury, but there is statistical reliability, in particular for those dimensions that, resulting from the judging process, did not coincide: AE, (α : 0.81 and AI (α : 0.86), which is related to the

characterization of autism. A similar finding was obtained in Spain, with Performance Anxiety being the dimension of greater factor weight (Beneytez, 2019) in the study on the relationship of emotional regulation with autism and anxiety concluding that the characterization of autism, DSM V Criterion 1 such as variations in the understanding of social signals or Criterion 2, such as desire for invariance or poor flexibility, affect emotional regulation and thus the presence of anxiety (Conner, White, Schahill & Mazefsky, 2020). This could be related to Paula (2015), Prizant (2015) and Cohen (2008), where they state that the symptoms of autism make it difficult to identify and evaluate anxiety by masking some behaviors inherent to the condition with the symptoms of anxiety or, in turn, the symptoms of anxiety could eventually affect the presentation of the characteristics of autism. Finally, this study also highlighted a controversial issue, which is the mental health of people within the autism spectrum and the masking of anxiety with the characterization of autism, observed during the validation process using judges' criteria similar to what Paula (2015) or Prizant (2015, *ob. cit.*) indicated versus the determination of there being a comorbid condition such as anxiety or depression. Therefore, the scales and instruments that allow to assess possible emotional alterations should consider that some concerns could be natural in people within the spectrum as part of their cognitive style and, on the other hand, others would be indicators of some difficulty at the emotional level.

Another important aspect reported by the study is that the scale eventually adjusts better to people within the autism spectrum who require a lower level of support, such as those formerly called Asperger's, or High Functioning and currently called Grade-1, since, on the one hand, out of 91 participations, of which 63 have been of people within the three previous characterizations, only 19 of Grade 2, and 9 of Grade 3. This is the result of the fact that during the administration of the scale some parents stated that some circumstances (described in the reagents) were difficult to respond, whereas, on the one hand, they were unsure of their child's emotional response to this circumstance, associated with the level of support required, or the lack of communication and pragmatic skills (Lecavalier, Aman & Halliday, 2013).

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