BMC Psychology

RESEARCH

Open Access

Validation of the Spanish version of the Adjustment Disorder New Module-20 (ADNM-20) in a non-clinical sample

Soledad Quero[1,2*], Sara Fernández-Buendía[1], Jesús Privado[3], Jorge Grimaldos[1] and Pim Cuijpers[4]

Abstract

Background There is a lack of self-report measures specifically designed for Adjustment disorder. One of the most widely used instruments is the Adjustment Disorder New Module (ADNM), which has already been validated in different countries. The aim of this study was to validate the Spanish version of the ADNM-20 with a non-clinical sample, including a comparison with a high-risk sample.

Method 203 participants of the general population (mean age = 33.84) completed an online survey which included the Spanish version of the ADNM, the anxiety and depression measures GAD-7 and PHQ-9, and an assesment of coping strategies using the Brief-COPE.

Results The analysis of the scale's internal structure revealed that a hierarchical model could best fit the data, as well as a bifactorial structure. The scale showed high internal consistency and an adequate differential validity, as differences were observed when comparing the high-risk and non-clinical groups. Positive correlations were also identified between ADNM and depression and anxiety, as well as different correlations with coping strategies.

Conclusion This study presents the first validation of the ADNM-20 in Spanish showing good reliability and validity results. In addition, a comparison with a high-risk sample and norms are offered to help future evaluators.

Keywords Adjustment disorders, Measurement, Adaptation, Test validity, Test reliability

Background

Adjustment disorder (AjD) is one of the most commonly used diagnosis in clinical practice by psychologists and psychiatrists worldwide [1, 2]. Prevalence rates estimated for the general population are high, with figures reaching 30% and the risk of AjD suggested to be higher in women compared to men [3].

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) of the American Psychiatric Asocciation [4] and the International Classification of Diseases (ICD-11) of the World Health Organization [5] agree that the diagnosis of AjD requires the presence of one or more identifiable psychosocial stressors. Both propose that symptoms cause significant distress and interference and

*Correspondence:
Soledad Quero
squero@uji.es
[1]Department of Basic, Clinical Psychology and Psychobiology, Universitat Jaume I, Av. Vicente Sos Baynat s/n, Castellón 12006, Spain
[2]CIBER de Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Madrid, Spain
[3]Faculty of Health Sciences, International University of Valencia, Valencia, Spain
[4]Department of Clinical, Neuro and Developmental Psychology, Amsterdam Public Health Research Institute, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

Table 1 Psychometric properties of previous validations of ADNM

Authors	Country	Sample	*n*	Mean age (SD)	% females	Factorial structure	Correlations with other measures	Reliability
Einsle et al. (2010)[1]	Germany	Clinical sample of patients with disrhythmia (sample 1) and psychosomatic outpatients (sample 2)	687 + 86	68.25 (11.20) + 46.6 (14.97)	29% + 62%	Three postulated factors (intrusion, avoidance and failure to adapt)	Positive correlations with general anxiety and depression as well as PTSD, emotion-oriented coping and proactive coping	Internal consistency: α = 0.74–0.91. Test-rest: 0.61–0.84
Glaesmer et al. (2015)	Germany	General population	2512	49.6 (17.9)	55.8%	Six factor model (preoccupation, failure to adapt, avoidance, anxiety, depression, and impulsivity)		
Bachem et al. (2016) [1]	Switzerland	Clinical sample of patients with a DSM-IV diagnosis of AjD	190	39.57 (12.29)	72.6%		Positive correlations with anxiety symptoms, functional impairment, and depression	
Zelviene et al. (2017)	Lithuania	General population	649	39.98 (17.84)	60.4%	Two core factor model of the AjD with two core symptoms (preoccupation and failure to adapt)		
Lorenz et al. (2016)	Switzerland	High-risk sample (burglary victims)	80	48 (15.3)	83%			
Lorenz et al. (2018a)	Switzerland	High-risk sample (involuntary job loss)	333	43.8 (10.7)	48.9%	Bifactor model with one dominant general AjD factor and 5 correlated group factors (preoccupation, failure to adapt, avoidance, affective reaction, and impulsivity)	Positive associations with general psychological distress and impairments in social functioning Negative associations with occupational self-efficacy and sense of coherence	
Lorenz et al. (2018b)	Israel	General population	1003	40.6 (14.5)	51.7%	Unidimensional fist-order model	Negative correlation with psychological well-being	
Sarafraz et al. (2018) 44	Iran	NR	150	NA	58%		Positive correlations with PTSD, symptoms check, depression, anxiety, stress, and perceived stress. Negative correlations with vitality	
Lorenz et al. (2019)	China	University students	433	20.16 (1.67)	58.9%	Unidimensional first- order structure	Positive correlations with depression and anxiety	Composite reliability of the 1-factor model: CR = 0.96. ICC for the overall scale: 0.74
Tang et al. (2020)	China	Clinical sample of breast cancer patients	354	47.2 (10.2)	100%	Core symptoms: two-factor solution (failure to adapt and preoccupation). Symptom subscale: four factors (depression, anxiety, impulsivity and avoidance)		Internal consistency: α = 0.93. Split-half reliability: 0.87. Test-retest: 0.74

Table 1 (continued)

Authors	Country	Sample	*n*	Mean age (SD)	% females	Factorial structure	Correlations with other measures	Reliability
Liang et al. (2021)	China	General population (for factorial structure) and high-risk (for validity and reliability)	201	22.94 (5.13)	81.59%	Bifactor model structure	Positive correlations with posttraumatic, anxiety and depressive sypmtoms. Negative correlations with psychological well-being, life satisfaction, and positive emotions	Internal consistency: α = 0.97. Moderate correlations between baseline and follow-up scores.
Vancappel et al. (2021)	France	High-risk sample (general population during COVID-19)	1010	34.79 (13.6)	83.17%	Six factors (preoccupation, failure to adapt, avoidance, anxiety, depression, and impulsivity) + one general factor (AjD), including the correlation between item 9 and 12's error	Positive correlations with anxiety, depression and posttraumatic symptoms. Multiple associations with coping strategies	Internal consistency: ω = 0.918
Almaghrebi et al. (2023)	Arabia	Clinical sample of cancer patients	146	NR	74.7%			

1 ADNM–29

Note: SD: Standard Deviation; PTSD: Post Traumatic Stress Disorder; ICC: Intraclass Correlation Coefficient

usually resolve within 6 months, unless the stressor(s) or its consequences persist. Whereas the DSM-5 does not clearly specify the distress symptomatology, the new ICD-11 definition represents a step forward in the conceptualisation of this disorder and specifies the presence of symptoms of preoccupation with the stressor(s) or its consequences and a failure to adapt.

Regarding the assessment of AjD, the availability of self-report measures is limited. To the best of our knowledge, there are only two questionnaires that assess the symptomatology of this disorder. One of them is the recently published International Adjustment Disorder Questionnaire (IADQ) [6]. This questionnaire is based on ICD-11 criteria, shows good reliability (α=0.94) and has a two-dimensional structure consisting of the factors of preoccupation and failure to adapt [6]. It includes a list of 9 stressors and assesses core symptoms of AjD using 6 items. It also adds a yes/no question on whether symptoms started in the month following the stressor and assesses functional impairment with 3 additional items.

The second questionnaire is the Adjustment Disorder New Module (ADNM) [7]. This was developed first and was used during the validation of the new symptom structure proposed in the ICD-11 for AjD [8, 9]. The original version of the ADNM included 29 items (ADNM-29) [7] that were shortened to 20 (ADNM-20) [8]. Although other reduced versions with good psychometric properties are available, such as the ADNM-8 [10] or the ADNM-4 [11], the ADNM-20 is the most widely used.

The ADNM-20 contains a list of 18 acute and persistent stressful events that may have occurred to the individual in the last 2 years. After identifying which is currently the most stressful event, items are presented that assess the frequency and duration of 6 symptom areas. This includes both the core symptoms of the disorder (preoccupation and failure to adapt), and secondary symptoms (avoidance, anxiety, depressed mood, and impulsive disturbance).

One of the advantages of the ADNM-20 is that it allows the assessment of the duration of each symptom separately, whereas the IADQ only includes a general question regarding whether the symptomatology has started within the last month since the stressor. The psychometric properties of ADNM-20 have been analysed in several previous studies showing good results [8, 12, 13]. In addition, this questionnaire has been translated into different languages, such as German [8], Lithuanian [13], Swiss [14], French [15], Chinese [3] or Arabic [16]. A review of previous validations and their psychometric properties can be found in Table 1.

Regarding the factor structure of ADNM, a 6-factor model was initially suggested (e.g., 8). However, in an attempt to overcome its limitations, researchers have proposed different structures to provide a better fit.

These include a unifactorial structure (3, 8), a two-factor structure with a dominant general AjD factor and 5 correlated factors [14], and a bifactorial structure corresponding to the main symptoms of AjD (preoccupation and failure to adapt) [13].

Previous validations also tested the convergent and discriminant validity of the ADNM showing strong relationships with different constructs. Positive correlations were found between ADNM and anxiety and depression measures [3, 7, 15, 17], post-traumatic symptomatology [7, 15], general psychological distress, and functional impairment [14, 17]. Measures such as occupational self-efficacy, the sense of coherence, or psychological well-being, correlated negatively with the ADNM score [14, 18].

Another construct that has been frequently associated with AjD symptomatology is coping strategies. In the original validation of the ADNM, Einsle et al. [7] found a correlation between the AjD symptoms and the use of emotion-focused coping and somewhat proactive coping. In a more recent study conducted by Vancappel et al. [15], it was noted that people who use instrumental support, emotional support, denial, blame, religion, substance use, and behavioral disengagement as coping strategies tend to experience more AjD symptoms. Meanwhile, people who use strategies such as planning, positive reframing, acceptance, and humor show lower scores on the ADNM.

The ADNM-20 has been used both in the general population [3, 8] and in clinical or at-risk samples exposed to a stressor [12, 19]. The differences found between these groups in terms of AjD prevalence [20], as well as the sex differences reported in previous studies mentioned above, raise the importance of including different population groups in ADNM validations.

Briefly, the efforts made in recent years have led to the development and validation of specific instruments for AjD that are consistent with the new ICD-11 definition. However, there are currently none that have been validated in Spanish.

The general aim of this study was to validate the Spanish adaptation of the ADNM-20 with a non-clinical sample, compare the results with a high-risk sample, and to set the basis for its use in Spain. Specifically, the objectives were: (1) Analyze the internal structure of the 20-item test to determine how many dimensions it comprises and whether they are grouped: a first-order factor, six first-order correlated factors, a bifactorial model consisting of six specific correlated factors and one general factor, and a hierarchical model consisting of six first-order factors and one second-order factor that explains the previous ones. Given the diversity of results previously found, no specific hypotheses were made about the factor structure. (2) Calculate the internal consistency of each of the factors obtained. It was expected that the scale would present adequate reliability at the level of each of the factors obtained. (3) Obtain evidence of convergent and discriminant validity by relating the ADNM-20 to other measures: anxiety, depression and coping strategies. Following the above literature, we expected AjD to be positively related to anxious and depressive symptomatology and the use of cognitive coping strategies, as well as a negative relationship between AjD symptoms and the use of avoidance coping. (4) Study the evidence of differential validity based on sex and whether individuals belong to a high-risk group or not. Based on the previous literature, we hypothesized that women and individuals belonging to a high-risk group would show greater AjD symptomatology. (5) Calculate the normative data of the scale and establish a cut-off point.

Method

Design and setting

This study consists of the psychometric validation of the ADNM-20 in Spanish. The research was carried out at the Universitat Jaume I of Castellón (Spain), although the participants were people residing anywhere in Spain.

Participants

Non-clinical sample

The sample consisted of the general population who responded to a cross-sectional study of AjD. A total of 203 participants completed the survey. The mean age was 33.84 years (SD = 11.18), range 18 to 61 years. 83.3% were female. Their marital status was: 57.6% married or with a partner, 39.4% single or separated and 1% widowed. Their educational level was: 76.8% university, 14.8% secondary education and 4.9% primary education. Their employment status was: 23.2% students, 60.1% working, 9.09% unemployed and 1.5% retirees.

High-risk sample

This sample consisted of 46 participants exposed to some stressful event. These participants were recruited among patients seeking psychological treatment for AjD at the Emotional Disorders Clinic at Universitat Jaume I and unemployed people who were referred from the employment programmes of the Red Cross association in Spain. The mean age was 39.0 years (SD = 11.60), range 21–67 years. 80.4% were female. Their marital status was: 54.3% married or with a partner, 55.7% single or separated. Their education level was: 56.5% university, 26.1% secondary education and 8.7% primary education. Their employment status was: 8.7% students, 45.7% working and 34.8% unemployed.

Measures

Adjustment Disorder New Module-20 (ADNM-20)

The ADNM-20 consists of two parts [7]. First, participants are presented with a list of 18 possible stressful events that may have happened to them in the last 2 years and that may be causing interference in the last 6 months. The frequency of symptoms is assessed responding to 20 items on a scale from 1 (never) to 4 (frequently) and their duration is recorded (<1 month, 1–6 months or >6 months). The maximum score in this questionnaire is 80.

Patient health questionnaire-9 (PHQ-9)

This instrument was used to assess depressive symptomatology in the last two weeks [21]. It includes 9 items using a response scale from 0 (not at all) to 3 (nearly every day). The maximum score that can be obtained is 27. The Spanish version of PHQ-9 has been validated and has shown good psychometric properties in previous studies [22].

General anxiety disorder-7 (GAD-7)

The GAD-7 [23] was used to assess anxiety symptoms in the previous 2 weeks. This self-report includes 7 items with a response scale from 0 (not at all) to 3 (nearly every day), with 21 being the maximum score that can be obtained. The validity of the Spanish version of GAD-7 has been tested showing good results [24].

Brief-COPE

This questionnaire [25] consists of 28 items assessing different coping strategies through 14 subscales. The response scale ranges from 0 ("I never do this") to 3 ("I always do this"). The Spanish version of this instrument shows good psychometric properties [26].

Procedure

The translation of the ADNM-20 into Spanish was done using the translation and back-translation method [27]. Two bilingual members of the team independently translated the ADNM-20 from English into Spanish (IR and SQ) until a reconciled version was generated. Subsequently, this first version was backtranslated by a native English-speaking translator. Another team member was responsible for comparing the fit of the back-translated version with the original text (SQ). The discrepancies were discussed with the bilingual team members until an agreement was reached that resulted in the final Spanish version of the ADNM-20 (see Additional file 1).

The Spanish version of the ADNM-20 was adapted to the online software Qualtrics in order to be administered via the Internet, as were the rest of the questionnaires of the assessment protocol. The platform used for data collection complies with data protection laws. This study received approval from the Universitat Jaume I Ethics Committee in March 2022 (CD/42/2022).

In the non-clinical sample, the survey was distributed through social media and using posters and flyers around the Universitat Jaume I and the University of Valencia. All participants, after signing an informed consent and on a voluntary basis, answered questions about their sociodemographic data and completed the battery of questionnaires. For the high-risk sample, participants were recruited from the Red Cross association and through the Emotional Disorders Clinic at the Universitat Jaume I. In this case, only the response to ADNM-20 was available.

Data analysis

First, the distribution of the different administered measures and their internal consistency indices were analyzed. Second, the evidence of factor structure was analyzed by means of several confirmatory factor analysis models. To assess the fit of the data to the models, three types of goodness-of-fit indices were used: (1) Absolute fit indices, to see if the theoretical model fits the empirical data: the $\chi 2/df$ index [28], where values below 3 indicate a good fit; the Goodness-of-Fit Index (GFI) [29], with values > 0.95 considered a good fit; and the Standardized Root Mean Square Residual (SRMR) [30], with values < 0.08 indicating a good fit [31]; (2) Incremental fit indices, to compare the obtained model with the null model: the Normed Fit Index (NFI) [28], with values > 0.95 indicating a good fit; and (3) Parsimony fit indices, which penalize the number of estimated parameters: the Parsimony Goodness-of-Fit Index (PGFI) [29] and the Parsimony Normed Fit Index (PNFI) [32], both with values > 0.50 indicating good fit. The authors recommend 10 participants per indicator for factor analysis [33]. We had 203 participants in the non-clinical sample, and 20 indicators: $203/20 = 10.15 \approx 10$, so the recommended ratio was met. Third, the internal consistency of the ADNM-20 was calculated, as well as the correlation of each item with the total corrected test score to study the internal discrimination of the test. Fourth, a confirmatory model relating ADNM-20 to the rest of the measures was estimated. Seventh, the evidence of differential validity of the ADNM-20 according to sex and type of sample (high risk and non-clinical) studied using a Student's t-test. Eighth, we calculated the cut-off point following the criteria of Lorenz et al. [12]: (1) we performed a hierarchical cluster analysis employing the squared Euclidean distance to see how non-clinical participants were classified according to the depression (PHQ-9) and anxiety (GAD-7) scales; and (2) we calculated the cut-off score on the ADNM-20 scale according to the groups obtained with the cluster analysis. Finally, the normative data of the ADNM-20

were calculated: percentile scores, Z, standardized Z, and T scores.

The analyses were performed using the statistical package SPSS V. 23 and the AMOS V. 23 software [34].

Results

Descriptive analysis

Table 2 shows the descriptive data for the two samples for the different measures of the study. The only measure that did not present a normal distribution was the Substance Use subscale (COPE questionnaire), given that its skewness values are greater than 2 and its kurtosis greater than 7, in absolute values [35]. Regarding the internal consistency (Cronbach's alpha) we can observe that all scale totals had values of at least 0.70, which is the minimum recommended [31]. There were some subscales with values below this critical point, mainly in the COPE test. Therefore, the results obtained should be treated with caution when relating the ADNM-20 and the coping scale. Given the small $n=46$ in the high-risk sample, attention should only be paid to the total value of the scale, which presented an adequate reliability value (0.855).

Table 3 shows the descriptive data for the 20 items of the ADNM-20, all of which presented a normal distribution with skewness values lower than 0 and kurtosis values lower than 7 in absolute value.

Additionally, the Pearson's correlation between the number of stressors and the total score of the ADNM-20 was calculated. A correlation of 0.208 ($p<0.001$) was obtained, indicating that those with more stressors score higher on the AjD scale.

Evidence of internal structure

To determine if the 20 items were related to each other and to extract latent factors, the Pearson correlation was calculated between them for the non-clinical sample. Table 3 shows these correlations, most of which

Table 2 Descriptive statistics and internal consistency for the measures

Sample		Mean	SD	Asymmetry	Kurtosis	Cronbach's α	McDonald's Omega
Non-clinical	Preoccupation (ADNM)	9.93	3.63	0.04	-1.13	0.838	0.840
	Failure to adapt (ADNM)	8.38	3.53	0.34	-0.98	0.821	0.818
	Avoidance (ADNM)	9.26	3.53	0.06	-1.11	0.776	0.773
	Depression (ADNM)	7.31	2.40	0.13	-0.79	0.704	0.672
	Anxiety (ADNM)	5.04	1.97	-0.04	-1.20	0.687	0.698
	Impulsivity (ADNM)	7.06	2.96	0.14	-1.25	0.866	0.867
	Adjustment disorder (ADNM)	46.99	15.15	-0.04	-1.06	0.942	0.971
	Depression (PHQ)	7.43	5.35	0.96	0.54	0.858	
	Anxiety (GAD)	7.51	5.64	0.75	-0.32	0.875	
	Emotional support (COPE)	3.33	1.42	0.08	-0.61	0.685	
	Social support (COPE)	3.11	1.40	0.16	-0.57	0.674	
	Active coping (COPE)	3.97	1.34	-0.11	-0.95	0.733	
	Planning (COPE)	3.49	1.43	-0.10	-0.32	0.710	
	Substance use (COPE)	0.51	1.09	2.69	8.37	0.938	
	Humor (COPE)	2.46	1.79	0.43	-0.63	0.836	
	Religion (COPE)	0.90	1.42	1.78	2.70	0.848	
	Self-distraction (COPE)	3.02	1.31	0.38	-0.14	0.444	
	Negation (COPE)	0.88	1.14	1.55	2.63	0.513	
	Relief (COPE)	2.49	1.32	0.51	0.29	0.477	
	Self-incrimination (COPE)	2.60	1.50	0.40	-0.38	0.740	
	Disconnection (COPE)	0.95	1.02	0.73	0.01	0.584	
	Positive reinterpretation (COPE)	2.95	1.45	0.10	-0.35	0.659	
	Cognitive coping (COPE)	17.92	4.76	-0.15	-0.37	0.794	
	Social support coping (COPE)	8.94	3.33	0.11	-0.30	0.774	
	Avoidance coping (COPE)	9.48	3.86	0.56	-0.10	0.645	
	Spiritual coping (COPE)	0.90	1.42	1.78	2.70	0.848	
High-risk	Preoccupation (ADNM)	12.52	2.47	-0.63	0.35	0.715	
	Failure to adapt (ADNM)	11.24	2.55	-0.39	-0.43	0.594	
	Avoidance (ADNM)	11.22	2.94	-0.08	-1.07	0.655	
	Depression (ADNM)	8.67	1.75	-0.15	-0.27	0.231	
	Anxiety (ADNM)	6.52	1.64	-0.94	-0.43	0.672	
	Impulsivity (ADNM)	8.83	2.42	-0.47	-0.52	0.700	
	Adjustment disorder (ADNM)	59.00	9.89	-0.52	0.15	0.855	

Table 3 Pearson correlations and descriptive statistics for the ADNM-20 items and item correlation with the total corrected ($R_{item-total}$)

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18	Item 19	Item 20
Item 1	1.00																			
Item 2	0.54	1.00																		
Item 3	0.30	0.32	1.00																	
Item 4	0.56	0.66	0.41	1.00																
Item 5	0.31	0.43	0.29	0.46	1.00															
Item 6	0.52	0.49	0.39	0.58	0.46	1.00														
Item 7	0.44	0.32	0.51	0.43	0.24	0.52	1.00													
Item 8	0.51	0.60	0.37	0.62	0.44	0.64	0.47	1.00												
Item 9	0.43	0.43	0.28	0.49	0.55	0.58	0.34	0.64	1.00											
Item 10	0.39	0.49	0.30	0.56	0.51	0.58	0.41	0.62	0.63	1.00										
Item 11	0.32	0.23	0.41	0.29	0.17	0.48	0.54	0.27	0.24	0.34	1.00									
Item 12	0.39	0.41	0.31	0.47	0.51	0.56	0.44	0.62	0.78	0.62	0.33	1.00								
Item 13	0.46	0.47	0.19	0.50	0.36	0.56	0.40	0.52	0.39	0.50	0.30	0.46	1.00							
Item 14	0.43	0.42	0.42	0.50	0.46	0.52	0.45	0.45	0.44	0.50	0.46	0.44	0.42	1.00						
Item 15	0.47	0.53	0.21	0.62	0.42	0.54	0.31	0.57	0.48	0.50	0.29	0.47	0.61	0.54	1.00					
Item 16	0.35	0.34	0.43	0.43	0.34	0.52	0.49	0.45	0.40	0.41	0.41	0.38	0.44	0.46	0.46	1.00				
Item 17	0.29	0.32	0.20	0.47	0.40	0.34	0.27	0.40	0.38	0.49	0.22	0.39	0.25	0.40	0.43	0.39	1.00			
Item 18	0.57	0.43	0.28	0.49	0.47	0.53	0.42	0.53	0.56	0.63	0.34	0.54	0.36	0.47	0.46	0.43	0.49	1.00		
Item 19	0.44	0.46	0.27	0.48	0.37	0.48	0.36	0.52	0.50	0.54	0.29	0.45	0.42	0.44	0.48	0.47	0.50	0.55	1.00	
Item 20	0.50	0.52	0.35	0.60	0.65	0.56	0.41	0.60	0.54	0.62	0.30	0.50	0.48	0.51	0.55	0.46	0.55	0.61	0.51	1.00
Mean	2.91	2.67	2.48	2.51	2.06	2.73	2.35	2.55	2.19	2.32	2.25	2.32	2.32	2.17	2.43	2.32	1.78	2.34	2.08	2.21
SD	0.88	1.09	1.18	1.17	1.07	1.09	1.13	1.09	1.10	1.09	1.12	1.15	1.12	1.13	1.04	1.16	1.01	1.06	1.14	1.13
Asymmetry	-0.60	-0.26	-0.04	-0.02	0.58	-0.34	0.14	-0.10	0.34	0.15	0.25	0.21	0.21	0.38	0.05	0.19	1.07	0.17	0.54	0.33
Kurtosis	-0.22	-1.22	-1.50	-1.47	-0.96	-1.19	-1.38	-1.27	-1.25	-1.30	-1.35	-1.40	-1.33	-1.30	-1.16	-1.44	-0.07	-1.19	-1.19	-1.33
$R_{item-total}$	0.62	0.64	0.47	0.74	0.60	0.76	0.59	0.76	0.69	0.74	0.47	0.69	0.61	0.67	0.68	0.61	0.54	0.70	0,65	0.75

Note: All Pearson correlations are statistically significant at 1%

presented medium-high effect size values according to Cohen's criteria [36]: 0.10 low, 0.30 medium and 0.50 high. Therefore, we can consider that the items have enough variance in common that would allow us to extract latent factors.

Four confirmatory factor models were estimated to analyze the internal structure of the scale for the non-clinical sample: (1) a first-order factor, (2) six first-order correlated factors, (3) a bifactorial model consisting of six specific correlated factors and one general factor, and (4) a hierarchical model consisting of six first-order factors and one second-order factor that explains the previous ones. No model showed multivariate normality through Bollen-Stine bootstrap [37] (p=0.005), so they were estimated with unweighted least squares. Table 4 shows the goodness-of-fit indexes for the four models. The indices were adequate for all 4 models, with better values for the bifactorial model, followed by the hierarchical model. However, if we look at the factor weights of the models (see Figs. 1, 2, 3 and 4) we can see that the two-factor model in some cases presented values below the recommended ones |±0.40 [31] for all subscales except anxiety. The first-order one-factor model provided the worst fit to the data. And the six-factor correlated model offered a better fit than the latter, but the correlations between the factors were quite high, with values above 0.80, which reflects the presence of a second-order factor that explains the data [31]. Therefore, according to the goodness of fit and factorial weights, we consider the hierarchical model to be the model with the best values.

Reliability

The internal consistency of each of the subscales of the ADNM-20 and of the general AjD factor was calculated using Cronbach's alpha and McDonald's Omega. In the case of the clinical sample, reliability could not be calculated with the Omega procedure because the n=46, which did not allow estimation of a confirmatory model. Table 2 shows the results obtained in both samples. For the non-clinical sample, the internal consistency values using Cronbach's alpha were adequate for all subscales, except for anxiety, but with a value close to the recommended minimum (0.70) [31]. Similarly, when calculating the McDonald's Omega, it was the anxiety and depression subscales that obtained lower values, but also close to the recommended minimum. In the case of the high-risk sample, given there were only 46 participants, focusing on the total scale score, which was adequate (0.855), is the most appropriate approach. In addition, the internal discrimination of each item with the test total was calculated by correlating each item with the corrected test total. Table 3 shows the values and they were clearly higher than 0.40, which is the threshold for high discrimination [31]. Therefore, the scale, both at the general factor level and at the subfactor level, presented adequate reliability values.

Convergent and discriminant validity

In order to study the convergent and discriminant validity of AjD, a confirmatory model was estimated in which this test was related to other measures: depression, anxiety, and coping strategies. The measures did not show multivariate normality through Bollen-Stine bootstrap [37] (p=0.005), so they were estimated with unweighted least squares. Figure 5 shows the estimated model and Table 4 shows the goodness-of-fit indices obtained. The model presented a fairly good fit to the data. AjD was positively related to depression (β=0.71), anxiety (β=0.65), and avoidance coping (β=0.48) and negatively related to cognitive coping (β = -0.40), which would reflect evidence of convergent validity with those measures. In addition, AjD showed almost no relationship with socially supportive coping (β = -0.20) and spiritual coping (β=0.10), which would indicate evidence of discriminant validity. Therefore, a person with high risk of AjD would exhibit a tendency towards high values for depression, anxiety and avoidance coping and low values for cognitive coping.

Differential validity

The last type of validity evidence analyzed was differential validity, comparing sex differences (in non-clinical sample) and differences between the high-risk and non-clinical sample in AjD and its different subscales. Two independent measures t-tests were performed to compare these two groups in AjD. Table 5 summarizes the results found. There was not statistically significant difference between the two sexes for AjD and the effect sizes for the typed mean difference (d) were medium-low according to Cohen's criteria [36]: 0.20 low, 0.50 medium and 0.80 high. However, when comparing the high-risk sample with the non-clinical sample, there were statistically significant differences between the two samples and

Table 4 Goodness-of-fit indices for the models

Model	χ^2/df	GFI	NFI	PGFI	PNFI	SRMR
A first-order factor	6.70	0.982	0.977	0.795	0.874	0.065
Six first-order factors	3.08	0.989	0.986	0.734	0.809	0.080
Bifactorial	1.84	0.991	0.989	0.661	0.729	0.049
Hierarchical	3.85	0.988	0.985	0.772	0.850	0.054
Evidence of convergent-discriminant validity	52.42	0.995	0.993	0.741	0.813	0.091

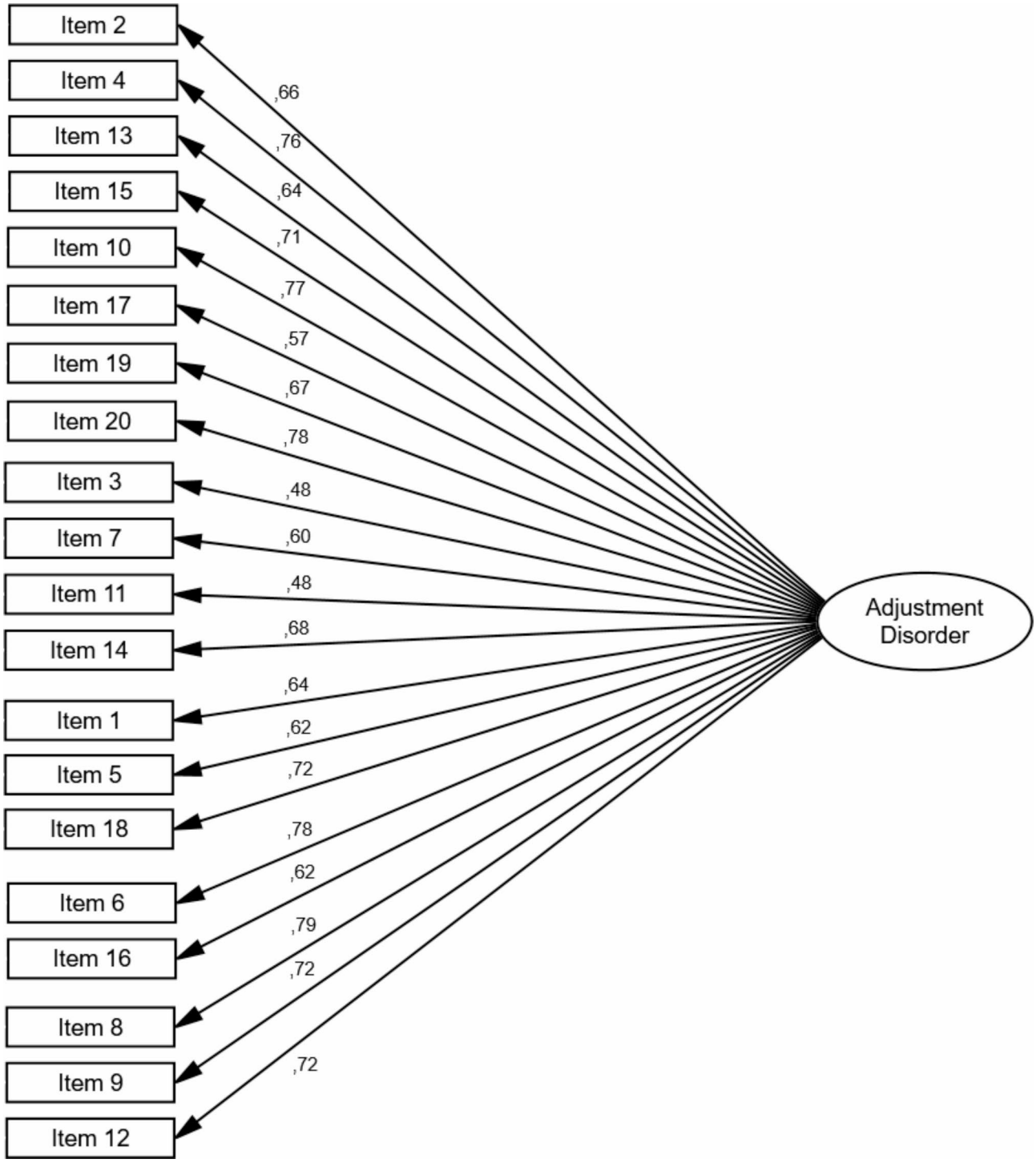

Fig. 1 First-order one-factor model

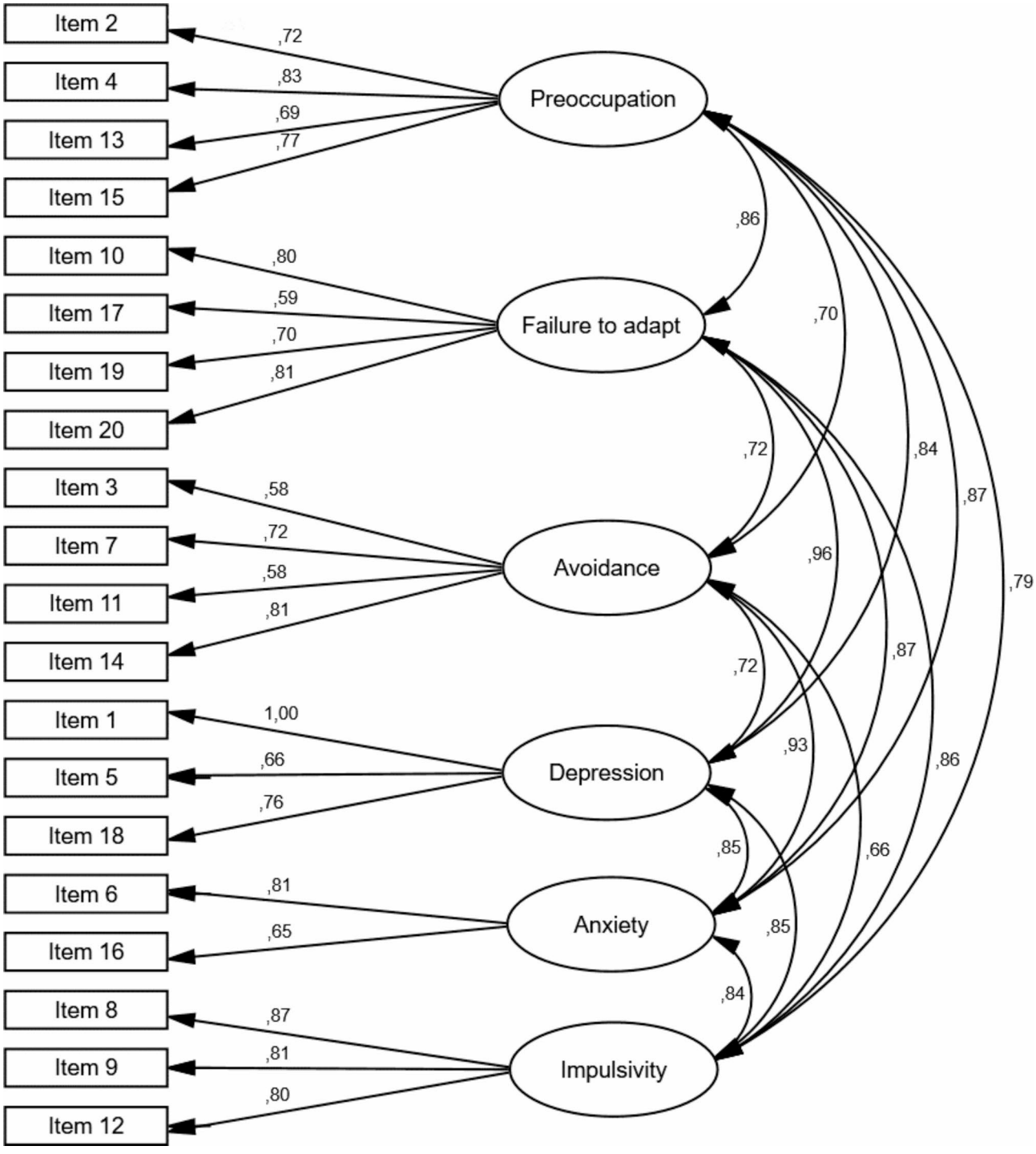

Fig. 2 Six-factor model of first-order correlated factors

fairly high effect sizes (d between 0.57 and 1.09) with values in all cases higher in the high-risk sample for the different measures of the ADNM-20.

Cut-off point

We calculated the cut-off point in non-clinical participants following the procedure of Lorenz et al. [12]. First, we performed a hierarchical cluster analysis employing the square of the Euclidean distance between participants to calculate clusters as a function of depression (PHQ-9) and anxiety (GAD-7) scale scores. Visually, the dendogram solution reflects two distinct clusters of participants: one with 64 participants (31.5%) who could be considered to have high levels of clinical distress and

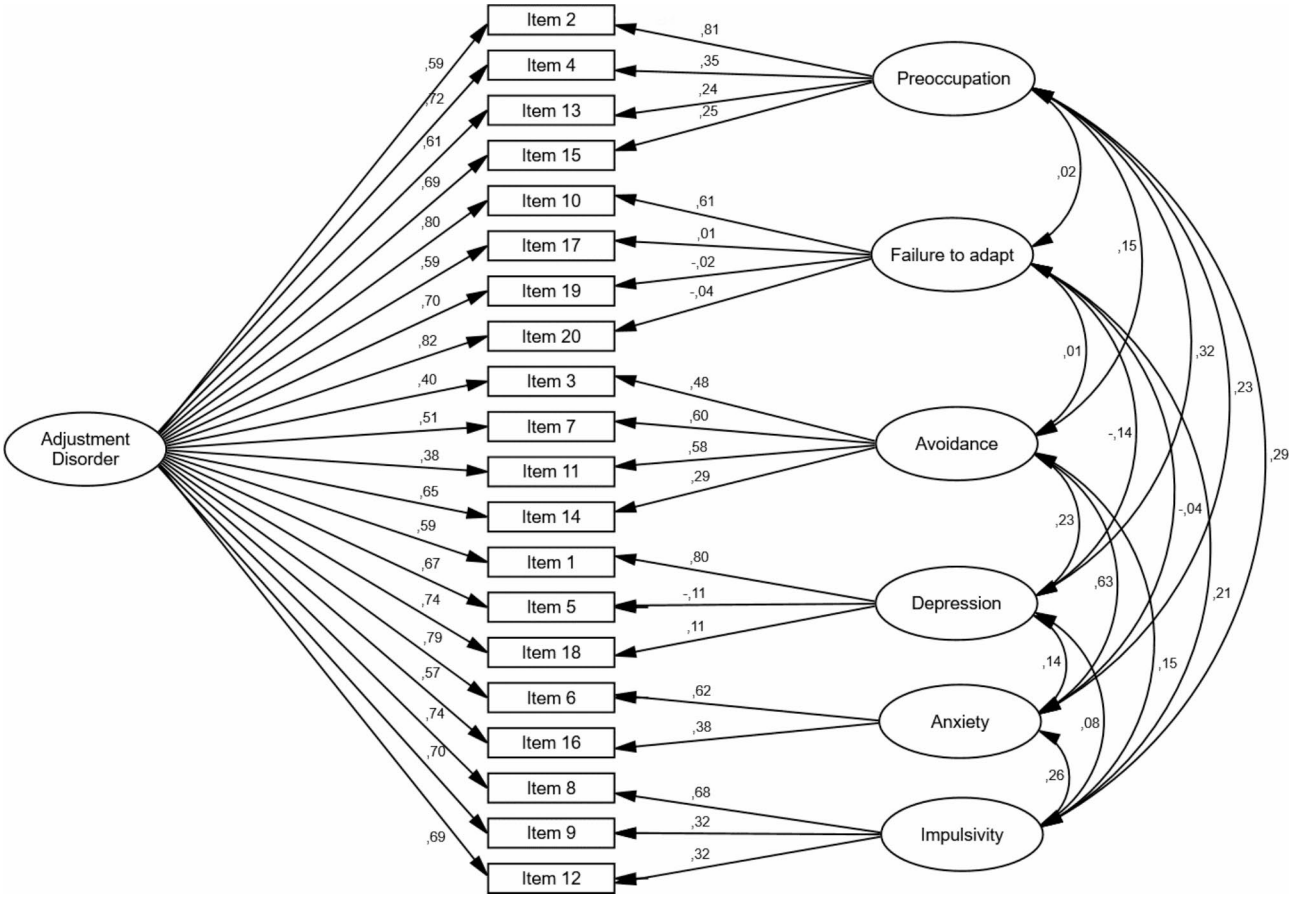

Fig. 3 Bifactorial model

another with 139 (68.5%) participants who would have low levels of clinical distress.

Second, the cut-off point for the ANDM-20 scale was estimated taking as a starting point the two clusters obtained previously. The Receiver operating characteristic (ROC) curve was calculated for the participants as a function of the ANDM-20 scale. Figure 6 shows this curve and the cut-off point. The area under the curve was 0.833 (95% confidence interval=0.768, 0.898), which would reflect a good estimate of participants who would have high scores on the AjD measure. The cut-off point on the ADNM-20 scale was 52.5 with a sensitivity value of 0.75 and 1-specificity of 0.23.

Norms

Finally, we calculated the normative data of the scale and its subscales so that subsequent evaluators could have a possible interpretation of the variances obtained in high-risk and non-clinical people. We estimated the normative data separated only according to the type of group evaluated: high-risk or non-clinical. The values can be found in the Additional file 2. For each direct score, percentile scores, standardized Z-scores (Z), normalized Z-scores, and T-scores (M=50, SD=10) were calculated.

Discussion

In this study we offered a validation and adaptation of the ADNM-20 AjD scale in a Spanish sample. We provided data for a high-risk sample (n=46) and a non-clinical sample (n=203). We tested four confirmatory factor models to analyze the internal structure of the scale in the non-clinical sample: one first-order factor, six correlated first-order factors, a bifactorial model, and a hierarchical model. Although the data fit fairly well in all four models, with the best fit being the bifactorial model followed by the hierarchical model, we consider the hierarchical model a better structure. This is because despite offering a slightly lower goodness of fit than the bifactorial model, it had higher factor weights of the factors over the 20 test items. Some previous validation studies reported similar data supporting the good fit of a bifactorial model with six specific correlated factors and one general factor [14, 15]. However, the high correlations found in the 6-factor model suggest the existence of a second-order factor. In addition, the unidimensional structure of AjD proposed by previous studies [3, 14] suggests that a hierarchical model could be adequate not only statistically but also theoretically.

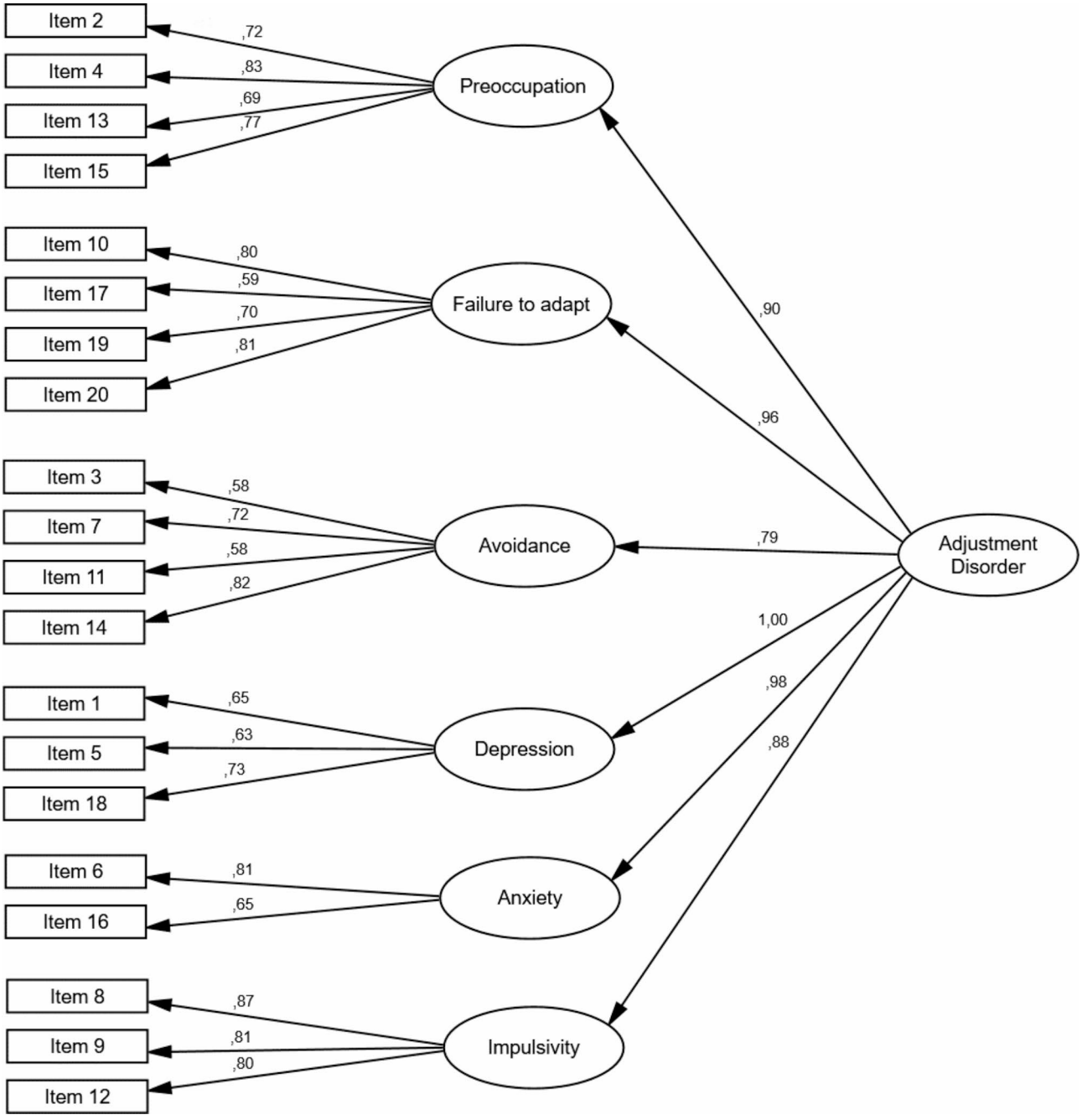

Fig. 4 Hierarchical model

In this work, the reliability indices based on the Cronbach's alpha for the total scale were quite good: 0.855 for the high-risk sample and 0.942 for the non-clinical sample. Similarly, the McDonald's Omega for the total scale in the non-clinical sample was 0.971. In addition, at the subscale level, when calculating the Cronbach's alpha, only the anxiety subscale presented a value slightly below 0.70 (0.687) in the non-clinical sample. Likewise, using the McDonald's Omega, the depression and anxiety subscales obtained slightly lower values than those recommended. These reliability indices are in line with those reported by previous studies testing ADNM, with figures ranging from 0.74 to 0.97 [7, 38, 39]. The lower levels of internal consistency in the anxiety and depression subscales were also found in previous validations [15, 38].

Regarding the evidence of convergent and discriminant validity, we found that the AjD presents positive convergent relationships with theoretically related measures such as depression, anxiety and avoidance coping, and

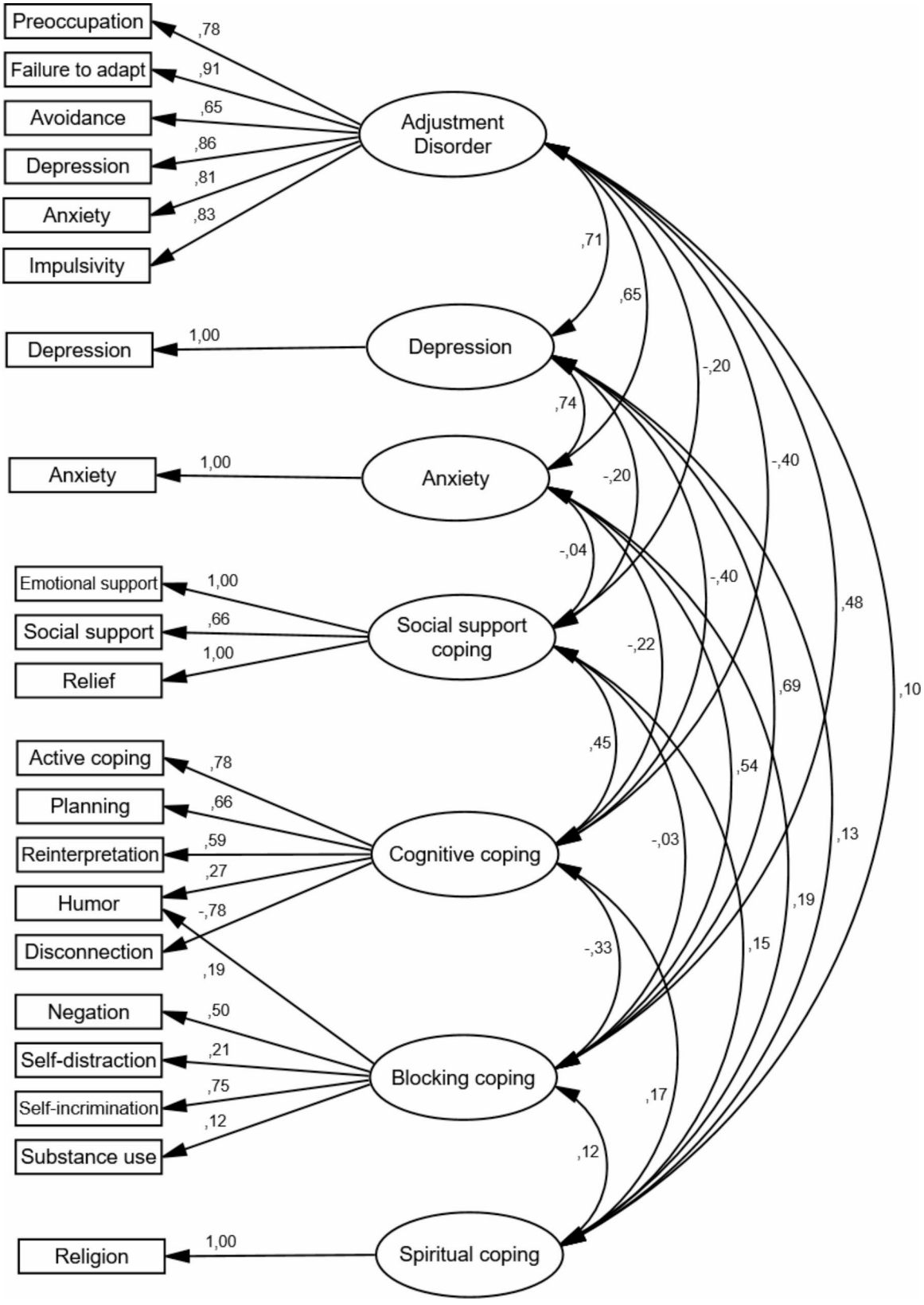

Fig. 5 Model evidence of convergent and discriminant validity

Table 5 Descriptives, Mean differences, and Effect sizes for the ADNM-20

Measure	**Male M (SD)**	**Female M (SD)**	**t-test**	**Cohen´s d**
Preoccupation	10.12 (3.56)	9.89 (3.66)	$t200=0.34, p=0.737$	0.06
Failure to adapt	7.97 (3,49)	8.47 (3.56)	$t200=-0.75, p=0.456$	0.14
Avoidance	8,48 (3.42)	9,38 (3,54)	$t200=-1.34, p=0.181$	0.26
Depression	6.91 (2.18)	7,38 (2,44)	$t200=-1.04, p=0.299$	0.20
Anxiety	4.58 (1.89)	5.12 (1.98)	$t200=-1.47, p=0.144$	0.28
Impulsivity	6.15 (2.79)	7.23 (2.98)	$t200=-1.92, p=0.056$	0.37
Adjustment disorder	44.21 (14.30)	47.49 (15.33)	$t200=-1.13, p=0.258$	0.22
Measure	**High-risk sample M (SD)**	**Non-clinical sample M (SD)**	**t-test**	**Cohen´s d**
Preoccupation	12.52 (2.47)	9.93 (3.63)	$t95=5.84, p<0.001$	0.96
Failure to adapt	11.24 (2.55)	8.38 (3.53)	$t89=6.34, p<0.001$	1.04
Avoidance	11.22 (2.94)	9,26 (3.53)	$t247=3.50, p<0.001$	0.57
Depression	8.67 (1.75)	7.31 (2.40)	$t88=4.42, p<0.001$	0.72
Anxiety	6.52 (1.64)	5.04 (1.97)	$t247=4.73, p<0.001$	0.77
Impulsivity	8.83 (2.42)	7.06 (2.96)	$t79=4.27, p<0.001$	0.70
Adjustment disorder	59.00 (9.89)	46.99 (15.15)	$t99=6.66, p<0.001$	1.09

negative ones with cognitive coping. In this study, the test was barely related to other measures such as social support coping and spiritual coping, which could reflect discriminant validity. This could indicate that a person with high AjD scores would exhibit a tendency towards high values of depression, anxiety, and avoidance coping and low levels of cognitive coping. This study replicates the findings of multiple works identifying a positive relationship between anxiety and depressive symptoms and AjD [3, 15, 40]. Regarding coping strategies, Einsle et al. [7] reported a positive relationship between AjD and the use of emotional-oriented coping in the original validation. This type of coping includes strategies such as blaming oneself for wasting time or for the lack of time to deal with the situation, worrying about minor aspects or for not being able to cope. Similarly, other authors suggested a positive relationship between experiencing more AjD symptoms and resorting more often to avoidance coping strategies such as denial, blame, or substance use. However, people with less symptomatology would use cognitive coping strategies, such as planning or positive reframing, more frequently [15].

It is important to mention that the study by Vancappel et al. [15] was conducted in France during the COVID outbreak and quarantine. In this line, it is suggested that the stressful aspects of the situation and its consequences may have led to a greater use of some coping strategies over others [41], such as enganging in exercise, being busy with studies or different activities, or socializing with loved ones. This coincides with that reported in the longitudinal study by Lotzin et al. [42] conducted during the post-pandemic period in multiple European countries. These authors suggested that planning and involvement in pleasurable activities was a protective factor for AjD.

In relation to the discriminant validity, it should be noted that although in this study no relationship was found between AjD symptoms and the coping strategies of social and spiritual support, other authors found a significant relationship. An example is the study by Vancappel et al. [15], which stated that those who used strategies such as emotional support or religion also had greater AjD symptoms. In contrast, other studies such as that of Lotzin et al. [42] reported that contact with others was a protective factor for symptomatology.

In this work, the AjD measure presented clear differences between the high-risk and non-clinical sample, with very high values and medium-high effect sizes (d=0.57 to 1.09) for the high-risk sample. However, we found no sex differences in this test. Previous literature suggests a clear difference in prevalence rates between non-clinical and high-risk and clinical samples, being higher in the latter [20]. However, to the best of our knowledge there are no validation studies comparing

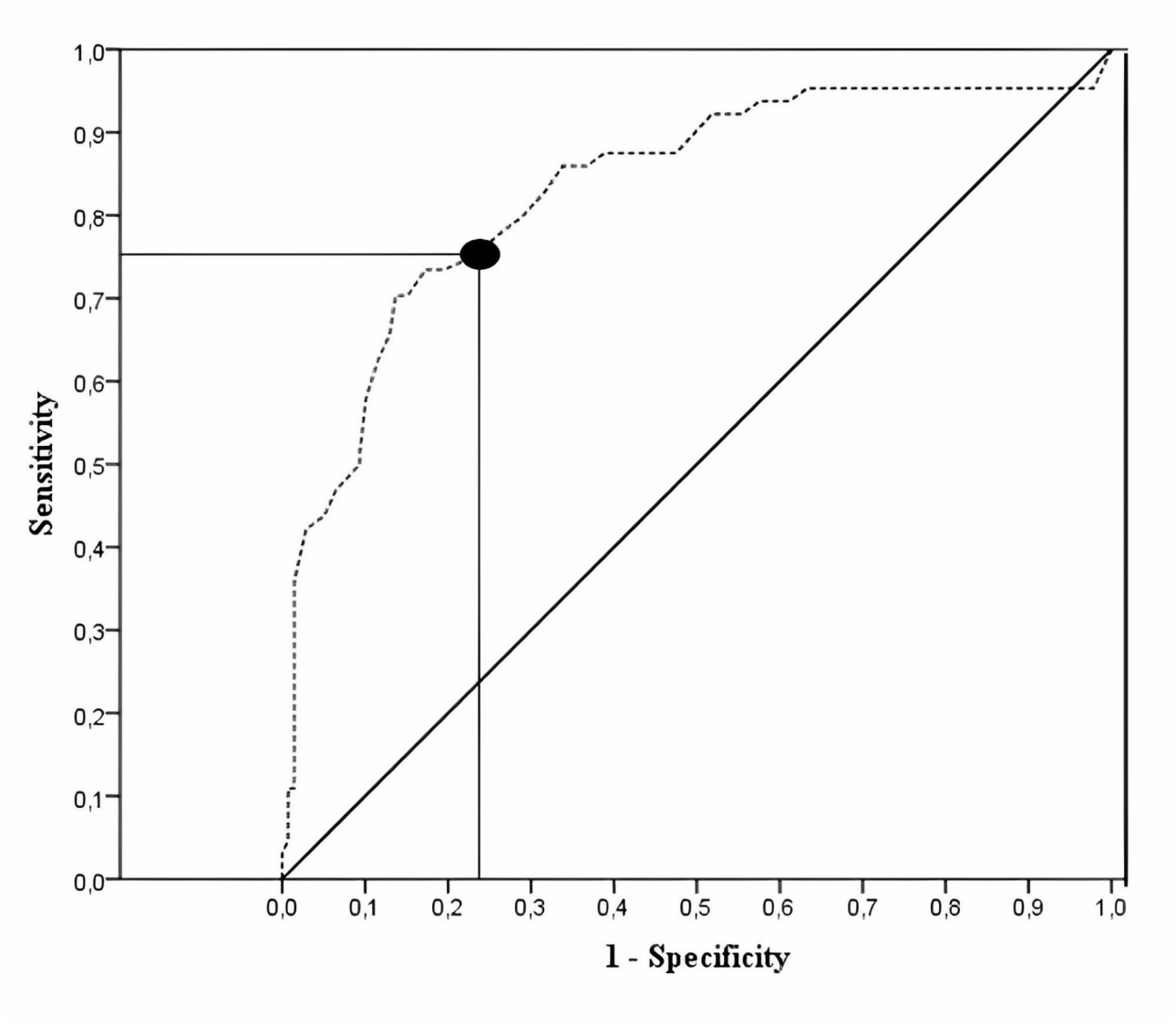

Fig. 6 ROC curve for the ADNM-20 scale as a function of anxiety and depression levels in the non-clinical sample

these two populations. Regarding the sex difference, although some authors have not reported a difference in AjD prevalence rates between males and females [12], most previous validations with the general population have found that the mean scores on the ADNM were significantly higher in females [8, 15, 18]. It is suggested that the inequality in the study samples could impact the result, and further research is needed to address this issue.

The cut-off point on the ADNM-20 scale in this study was 52.5. To the best of our knowledge, only one other study calculated a cut-off point for this questionnaire [12], resulting in a score of 47.5. One possible explanation for the increase in this score could be the impact of the COVID pandemic on the mental health of the population. Multiple studies report a considerable increase in the prevalence of anxiety and depression in recent years [43]. In addition, the sample used in the Lorenz study came from a previous randomized controlled trial carried out in Switzerland, whereas in this study it was conducted in Spain, so it is not surprising that there may be differences in the cut-off point established.

This study has notable clinical implications. The incorporation of two different samples (general population and a high-risk sample) is expected to enhance the use of this questionnaire in new populations. Additionally, the evidence regarding the reliability and validity of the questionnaire, as well as the establishment of norms and a cut-off point for the Spanish version of the ADNM-20, could facilitate the clinical evaluation and diagnosis of AjD both in epidemiological research and clinical trials and, ultimately, in clinical practice, helping to identify

people with significant symptomatology that may need treatment. The relationship found between AjD symptoms and the different coping strategies may also provide relevant information for treatment, suggesting that the reduction of avoidance and the favoring of active coping and positive reappraisal through the elaboration of the stressful event may be appropriate strategies [15].

Among the limitations of the present study, we can highlight the following: First, the small sample recruited for high-risk individuals. Despite this, we hope that it can assist evaluators in using the scale and provide guidance on the results obtained. Second, the non-clinical sample is not representative of the population; it would be necessary to try to replicate these results in a more representative sample. Third, the higher percentage of women in the sample introduces uncertainty regarding the validity of comparisons between sexes, as the absence of differences between the two could be attributed to the small number of men. Finally, assessing AjD using only a self-questionnaire may make it difficult to differentiate AjD from other mental disorders, so future studies should include a diagnostic interview to make a more accurate diagnosis.

Conclusions

To the authors' knowledge, this study presents the first validation of the ADNM-20 in Spanish. The scale presents a well-fitting factor structure and high reliability. In addition, a comparison with a high-risk sample is offered and scales are provided to assist future evaluators and to promote the use of this tool in both research and clinical practice.

Abbreviations

AjD	Adjustment Disorder
DSM-5	Statistical Manual of Mental Disorders-5
APA	American Psychiatric Asocciation
ICD-11	International Classification of Diseases-11
WHO	World Health Organization
IADQ	International Adjustment Disorder Questionnaire
ADNM	Adjustment Disorder New Module
PHQ-9	Patient Health Questionnaire-9
GAD-7	General Anxiety Disorder-7
GFI	Goodness-of-Fit Index (GFI)
SRMR	Standardized Root Mean Square Residual
PGFI	Parsimony Goodness-of-Fit Index
PNFI	Parsimony Normed Fit Index
ROC	Receiver Operating Characteristic

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-024-02298-0.

Additional file 1: Spanish version of the Adjustment Disorder New Module – 20 questionnaire (ADNM; Einsle et al., 2010). This document presents the Spanish translation of the ADNM-20 validated in this study.

Additional file 2: Norms for the Spanish ADNM-20. This document presents the norms for the Spanish version of the ADNM-20.

Acknowledgements

We would like to thanks Iryna Rachyla for her help in the back translation of the ADNM-20.

Author contributions

S.Q. contributed to the study design, research development and writing of the manuscript, and supervised the study. S.F.B. participated in the research and writing of the manuscript. J.G. also contributed to the research and writing of the manuscript. J.P. conducted the formal analysis and participated in writing the manuscript. P.C. supervised the work and participated in writing the manuscript. All authors read and approved the final manuscript.

Funding

This study was supported by 2021 Research Promotion Plan at Universitat Jaume I [UJI-B2021-47], the Grant Prometeo Program for Research Groups of Excellence [CIPROM/2021/041 – Project "IMPULSA"] of the Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital of the Valencian Community, a PhD grant of the Spanish Ministerio de Universidades [FPU20/00514] and CIBEROBN, an initiative of the ISCIIII [CB06 03/0052].

Data availability

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All participants signed an informed consent form after receiving clear and precise information about the study. Their participation was voluntary, and they could leave the study at any time. This study was conducted according to the principles of the Declaration of Helsinki and received approval from the Universitat Jaume I Ethics Committee in March 2022 (CD/42/2022) in Castellón, Spain. The website used for data collection comply with the European Union data protection law. Personal information was anonymized using codes and clinical information was separated from personal information. Only members of this research had access to the data.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 13 September 2024 / Accepted: 17 December 2024
Published online: 21 December 2024

References

1. Evans SC, Reed GM, Roberts MC, Esparza P, Watts AD, Correia JM, et al. Psychologists' perspectives on the diagnostic classification of mental disorders: results from the WHO-IUPsyS Global Survey. Int J Psychol. 2013;48(3):177–93. https://doi.org/10.1080/00207594.2013.804189.
2. Reed GM, Correia JM, Esparza P, Saxena S, Maj M. The WPA-WHO global survey of psychiatrists' attitudes towards mental disorders classification. World Psychiatry. 2011;10(2):118. https://doi.org/10.1002/j.2051-5545.2011.tb00034.x.
3. Lorenz L, Ho GW, Chan AC, Bressington DT, Chien WT, Shevlin M, et al. Translation and psychometric evaluation of the Chinese adjustment disorder–new module 20. Int J Ment Health. 2019;49(2):170–85. https://doi.org/10.1080/00207411.2019.1684687.
4. American Psychiatric Association. Diagnostic and statistical Manual of Mental disorders. 5th ed. Arlington (VA): American Psychiatric Association; 2013.
5. World Health Organization. International classification of diseases. 11th ed. Geneva: World Health Organization; 2018.
6. Shevlin M, Hyland P, Ben-Ezra M, Karatzias T, Cloitre M, Vallières F, et al. Measuring ICD-11 adjustment disorder: the development and initial validation of the International Adjustment Disorder Questionnaire. Acta Psychiatr Scand. 2020;141(3):265–74. https://doi.org/10.1111/acps.13126.
7. Einsle F, Köllner V, Dannemann S, Maercker A. Development and validation of a self-report for the assessment of adjustment disorders. Psychol Health Med. 2010;15(5):584–95. https://doi.org/10.1080/13548506.2010.487107.

8. Glaesmer H, Romppel M, Braehler E, Hinz A, Maercker A. Adjustment disorder as proposed for ICD-11: dimensionality and symptom differentiation. Psychiatry Res. 2015;229(3):940–8. https://doi.org/10.1016/j.psychres.2015.07.010.
9. Kazlauskas E, Zelviene P, Lorenz L, Quero S, Maercker A. A scoping review of ICD-11 adjustment disorder research. Eur J Psychotraumatol. 2017;8(7):1421819. https://doi.org/10.1080/20008198.2017.1421819.
10. Kazlauskas E, Gegieckaite G, Eimontas J, Zelviene P, Maercker A. A brief measure of the International classification of Diseases-11 adjustment disorder: investigation of psychometric properties in an adult help-seeking sample. Psychopathology. 2018;51(1):10–5. https://doi.org/10.1159/000484415.
11. Ben-Ezra M, Mahat-Shamir M, Lorenz L, Lavenda O, Maercker A. Screening of adjustment disorder: Scale based on the ICD-11 and the Adjustment Disorder New Module. J Psychiatr Res. 2018;103:91–6. https://doi.org/10.1016/j.jpsychires.2018.05.011.
12. Lorenz L, Bachem RC, Maercker A. The adjustment disorder–new module 20 as a screening instrument: cluster analysis and cut-off values. Int J Occup Environ Med. 2016;7(4):215. https://doi.org/10.15171/ijoem.2016.775.
13. Zelviene P, Kazlauskas E, Eimontas J, Maercker A. Adjustment disorder: empirical study of a new diagnostic concept for ICD-11 in the general population in Lithuania. Eur Psychiatry. 2017;40:20–5. https://doi.org/10.1016/j.eurpsy.2016.06.009.
14. Lorenz L, Hyland P, Perkonigg A, Maercker A. Is adjustment disorder unidimensional or multidimensional? Implications for ICD-11. Int J Methods Psychiatr Res. 2018;27(1). https://doi.org/10.1002/mpr.1591.
15. Vancappel A, Jansen E, Bachem R, Bray A, Egreteau L, Réveillère C, et al. Validation of the French ADNM-20 in the assessment of emotional difficulties resulting from COVID-19 quarantine and outbreak. BMC Psychol. 2021;9(1):1–9. https://doi.org/10.1186/s40359-021-00683-7.
16. Almaghrebi AH, Alhajjar L, Alkusayer A, Al Zahrani S, Al Jumah M. A cross-sectional study on the Arabic Version of the Adjustment disorder–new Module20 for Cancer patients: Tool Validation, Prevalence, and risk factors. Res Sq. 2023. https://doi.org/10.21203/rs.3.rs-3705219/v1.
17. Bachem R, Perkonigg A, Stein DJ, Maercker A. Measuring the ICD-11 adjustment disorder concept: validity and sensitivity to change of the Adjustment disorder–new Module questionnaire in a clinical intervention study. Int J Methods Psychiatr Res. 2016;26(4):e1545. https://doi.org/10.1002/mpr.1545.
18. Lorenz L, Hyland P, Maercker A, Ben-Ezra M. An empirical assessment of adjustment disorder as proposed for ICD-11 in a general population sample of Israel. J Anxiety Disord. 2018;54:65–70. https://doi.org/10.1016/j.janxdis.2018.01.007.
19. Lorenz L, Maercker A, Bachem R. The 12-month course of ICD-11 adjustment disorder in the context of involuntary job loss. Clin Psychol Eur. 2020;2(3). https://doi.org/10.32872/cpe.v2i3.3027.
20. O'Donnell ML, Agathos JA, Metcalf O, Gibson K, Lau W. Adjustment disorder: current developments and future directions. Int J Environ Res Public Health. 2019;16(14):2537. https://doi.org/10.3390/ijerph16142537.
21. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16(9):606–13. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.
22. Muñoz-Navarro R, Cano-Vindel A, Medrano LA, Schmitz F, Ruiz-Rodríguez P, Abellán-Maeso C, et al. Utility of the PHQ-9 to identify major depressive disorder in adult patients in Spanish primary care centres. BMC Psychiatry. 2017;17(1):145. https://doi.org/10.1186/s12888-017-1450-8.
23. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092–7. https://doi.org/10.1001/archinte.166.10.1092.
24. García-Campayo J, Zamorano E, Ruiz MA, Pardo A, Pérez-Páramo M, López-Gómez V, et al. Cultural adaptation into Spanish of the generalized anxiety disorder-7 (GAD-7) scale as a screening tool. Health Qual Life Outcomes. 2010;8:8. https://doi.org/10.1186/1477-7525-8-8.
25. Carver CS. You want to measure coping but your protocol's too long: consider the brief cope. Int J Behav Med. 1997;4(1):92–100. https://doi.org/10.1207/s15327558ijbm0401_6.
26. Morán C, Landero R, González MT. COPE-28: un análisis psicométrico de la versión en español del Brief COPE. Universitas Psychologica. 2010;9(2):543 – 52. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1657-92672010000200020&lng=en&tlng=es
27. Eremenco SL, Cella D, Arnold BJ. A comprehensive method for the translation and cross-cultural validation of health status questionnaires. Eval Health Prof. 2005;28(2):212–32. https://doi.org/10.1177/0163278705275342.
28. Bentler PM, Bonett DG. Significance tests and goodness of fit in the analysis of covariance structures. Psychol Bull. 1980;88:588–606. https://doi.org/10.1037/0033-2909.88.3.588.
29. Jöreskog KG, Sörbom D. LISREL 8: user's guide. Lincolnwood: Scientific Software International; 1993.
30. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Model. 1999;6:1–55. https://doi.org/10.1080/10705519909540118.
31. Hair JF, Anderson RE, Tatham RL, Black WC. Análisis Multivariante. Madrid: Prentice Hall; 1999.
32. James LR, Mulaik SA, Brett JM. Causal analysis: models, assumptions and data. Beverly Hills: Sage; 1982.
33. Byrne BM. Structural equation modeling with AMOS: basic concepts, applications, and programming. Mahwah: Lawrence Erlbaum Associates; 2001.
34. Arbuckle JL. Amos [software]., Chicago. IBM SPSS; 2006. https://www.ibm.com/es-es/products/structural-equation-modeling-sem
35. West SG, Finch JF, Curran PJ. Structural equation models with non-normal variables. In: Hoyle RH, editor. Structural equation modeling: concepts, issues and applications. Thousand Oaks: Sage; 1995. pp. 56–75.
36. Cohen J. A power primer. Psychol Bull. 1992;112(1):155–9.
37. Bollen KA, Stine RA. Bootstrapping goodness-of-fit measures in structural equation models. In: Bollen KA, Long JS, editors. Testing structural equation models. Charlotte: Sage; 1993. pp. 111–35.
38. Tang H, Xiong H, Deng L, Maercker A, Zhang J, Meng H. Psychometric properties of the Chinese version of adjustment disorder new module-20 in breast cancer patients. BMC Psychol. 2020;8:1–8. https://doi.org/10.1186/s40359-020-00494-2.
39. Liang L, Ben-Ezra M, Chan EW, Liu H, Lavenda O, Hou WK. Psychometric evaluation of the Adjustment Disorder New Module-20 (ADNM-20): a multi-study analysis. J Anxiety Disord. 2021;81:102406. https://doi.org/10.1016/j.janxdis.2021.102406.
40. Jannini TB, Rossi R, Socci V, Reda F, Pacitti F, Di Lorenzo G. Psychometric and factorial validity of the International Adjustment Disorder Questionnaire (IADQ) in an Italian sample: a validation and prevalence estimate study. Clin Psychol Psychother. 2022;30(2):436–45. https://doi.org/10.1002/cpp.2813.
41. Ogueji IA, Okoloba MM, Demoko-Ceccaldi BM. Coping strategies of individuals in the United Kingdom during the COVID-19 pandemic. Curr Psychol. 2021;41(11):7493–9. https://doi.org/10.1007/s12144-020-01318-7.
42. Lotzin A, Stahlmann K, Acquarini E, Ajdukovic D, Ajdukovic M, Anastassiou-Hadjicharalambous X, Ardino V, Bondjers K, Bragesjö M, Böttche M, Dragan M, Figueiredo-Braga M, Gelezelyte O, Grajewski P, Javakhishvili JD, Kazlauskas E, Lenferink L, Lioupi C, Lueger-Schuster B, Mooren T, Sales L, Tsiskarishvili L, Zrnic I, Schäfer I. A longitudinal study of risk and protective factors for symptoms of adjustment disorder during the COVID-19 pandemic. Eur J Psychotraumatol. 2024;15(1). https://doi.org/10.1080/20008066.2024.2318944.
43. Bouza E, Arango C, Moreno C, Gracia D, Martín M, Pérez V, Lázaro L, Ferre F, Salazar G, Tejerina-Picado F, Navío M, Granda Revilla J, Palomo E, Gil-Monte PR. Impact of the COVID-19 pandemic on the mental health of the general population and health care workers. Rev Esp Quimioter. 2023;36(2):125–43. https://doi.org/10.37201/req/018.2023.
44. Sarafraz T, Shahvand T, Zarea M. Psychometric properties of adjustment disorder New model-20 (ADNM-20). J Clin Psychol. 2018;9(4):45–54. https://doi.org/10.22075/JCP.2018.12995.1268.

Publisher's note