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Psychometric properties and validation of the Portuguese version of the Anxiety Control Questionnaire Revised (ACQ-R)

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Abstract
Early experiences appear to influence the sense of unpredictability and uncontrollability of both life events and emotions in vulnerable individuals. The perception of low control has been considered a general psychological vulnerability factor in emotional disorders. One of the most commonly used measures of perceived control is the Anxiety Control Questionnaire-Revised (ACQ-R). However, its internal structure has shown structural inconsistencies among several studies finding two or three factors. Our aim is to analyze the internal structure of the Portuguese adaptation of the ACQ-R in a general population sample of 267 individuals, in a confirmatory way, as well as to explore sources of validity evidence (i.e., correlations with the Depression Anxiety Stress Scales and the Positive and Negative Affect Schedule). A three-factor solution showed the best data fit(χ^2 = 150.12, degrees of freedom = 87, $p < .0001$, Root Mean Square Error Approximation = 0.052, 90% Confidence Interval = 0.038–0.066, Confirmatory Fit Index = 0.935, Tucker Lewis Index = 0.921). We found moderate positive correlations between the ACQ-R dimensions and anxiety, depression, stress, and negative affect, as well as between small and moderate negative associations with positive affect. All measures presented satisfactory Cronbach alphas (from .77 to .92). The Portuguese version of the ACQ-R showed good psychometric properties and the same internal structure of its original version.

Keywords Anxiety control · ACQ-R · Psychometric properties · Validation · Emotional disorders

Background

The transdiagnostic psychopathology approach refers to the identification of the common vulnerability factors shared by different disorders or a group of disorders (Brown and Barlow 2009). These vulnerability factors explain the etiology and maintenance of these disorders and should be considered as key elements in the design of future psychological treatments. Ultimately, the hypothesis is that the inclusion of these vulnerability factors to treatments will enhance their efficacy and efficiency (Sauer-Zavala et al. 2017).

From the previous perspective, there is a large body of research exploring the common vulnerability factors shared by depressive and anxiety disorders, also known as emotional disorders (Brown and Barlow 2009). Specifically, the triple vulnerability model has received most attention in the literature and is currently considered the most comprehensive model explaining the etiology and maintenance of emotional disorders from a transdiagnostic approach (Suárez et al. 2009). In this model, the interaction between highly temperamental personality factors like extraversion and neuroticism (general biological vulnerability), early learning experiences and stressful life events (specific psychological vulnerability), and early experiences that have influenced the sense of unpredictability and uncontrollability of life events and emotions (general psychological vulnerability) are argued to underlie the onset and maintenance of emotional disorders. The goal of the present investigation is to adapt and validate a measure of perceived control, a key psychological construct included in this latter vulnerability factor of general psychological vulnerability.

Perceived control can be defined as a personal belief about one's capacity to control his/her own internal emotional reactions to threats or challenging, uncomfortable events (Mardiyono et al. 2011; Rezaei and Mousanezhad Jeddi 2018). An example of how these emotions are argued to play

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a role in emotional disorders is presented. When patients with emotional disorders feel strong, negative emotions (e.g., in the presence of an uncomfortable event),they tend to experience low sense of control over them (e.g., "Why am I feeling this way? I should not be feeling like this").In this scenario, individuals often try to escape or avoid these emotions by shaping their behavior (e.g., "I will never go to that place again"), ultimately reinforcing this low sense of control over emotions (Barlow et al. 2011). Indeed, patients with emotional disorders have reported low levels of perceived control and these have been attributed to their difficulties in managing their negative emotions (Bentley et al. 2013; Osma et al. 2016).

There is now a robust body of knowledge showing the importance of perceived control in the transdiagnostic approach of emotional disorders. For instance, a recent meta-analysis (Gallagher et al. 2014a) with 11,218 participants revealed a strong, negative association between perceived control and both trait and disorder-specific anxiety. Since these results have been obtained in heterogeneous samples with different anxiety disorders, it has been argued that perceived control is an important transdiagnostic predictor of symptom presence and severity. In addition to these findings, intraindividual changes in perceived control were found to be robust predictors of intraindividual changes in symptoms in patients with panic disorder with agoraphobia, social anxiety, general anxiety disorder, and obsessive compulsive disorder who followed a cognitive-behavioral intervention (Gallagher et al. 2014b).

The previous findings underline the importance of assessing perceived control in individuals with emotional disorders, so developing a psychometrically-sound measure became an important research agenda. With this goal in mind, the Anxiety Control Questionnaire (ACQ) was created to assess perceived control over a variety of potentially threatening internal and external events (Rapee et al. 1996). The ACQ has been a widely used instrument in a diversity of contexts, including basic and experimental research (Bourgeois and Brown 2015; Brown et al. 2004; Osma et al. 2018; Sassaroli et al. 2015; White et al. 2006). Its original version, which contained 30 items, has now been refined to a revised, 15-item version (ACQ-R) due to loading problems with some items and the inconsistencies found in the number of latent factors (Brown et al. 2004). Items in this final version of the questionnaire are grouped into three moderately correlated dimensions: perceived control of emotions, perceived control of threats, and perceived control of stress. As well as in the original version of the ACQ, the ACQ-R is composed of direct- and reverse-worded items to avoid acquiescence response bias.

To date, very few studies have validated and investigated the psychometric of the ACQ-R into different countries. This was recently done in Spanish settings (Osma et al. 2017), where an exploratory analysis of its factorial structure was conducted with a Spanish sample of college students ($n = 382$) and a clinical sample of patients with panic disorder ($n = 52$). Contrary to the three-factor solution proposed by Brown et al. (2004), the authors obtained two factors, which they named emotion control and threat and stress control. Therefore, the internal structure of the Spanish version was not consistent with the structure proposed by Brown et al. (2004). The Spanish validation study did not explore, however, whether the factor structure proposed by Brown et al. (2004) had an acceptable fit in a confirmatory manner, so it is unclear whether the original three-factor solution would also yield an adequate fit cross-culturally when conducting a confirmatory analysis.

The present investigation will validate the ACQ-R for its use in Portuguese settings using a nonclinical sample composed of college students and individuals from the community who belong to their circle of acquaintances. Specifically, we will analyze the internal structure of the questionnaire in a confirmatory way and explore its validity when correlated with other psychological variables. Based on the assumption that the perceived control is a multidimensional construct and considering the results of previous studies, we expect to replicate the original three-factor solution of the ACQ-R. Additionally, we expect the ACQ-R to correlate with measures of anxiety and negative affect. By doing this, this study will provide with a short measure of perceived control to be used in Portuguese settings and will provide further support for the cross-cultural utility of the ACQ-R.

Method

Procedure, Participants, and Sample Size Calculation

Based on the recommendations for sample size calculations in covariance structure models, such as in a confirmatory factor analysis, 179 was the minimum required sample size to test the exact model fit with 87 degrees of freedom (120 variances and covariances – 33 parameters to be estimated in the model), 80% power, and an alpha level of .05 (MacCallum et al. 1996). The final sample was composed of 267 participants (79% female) of between 18 and 78 years of age (mean age = 32.17, $SD = 12.76$).

For the sample recruitment and selection, a mixed procedure was used. A sample of undergraduate Psychology students ($n = 60$; 22.5% of the sample) completed the assessment protocol individually (Universidade do Algarve (Portugal)) using a Google web-based platform for online completion. In order to disseminate the instruments to participants from the general population in Portugal, some of these students were asked to disseminate the evaluation protocol into the community using a snow-ball approach, which resulted in the recruitment of 207 additional participants (77.5% of the

sample). The use of snow-ball sampling was preferred because, compared to other sampling methods, it is more straightforward to implement and more cost-effective (i.e., superior in terms of the number of participants recruited; Valerio et al. 2016). Protocols included an informed consent and the self-report instruments described below. The study protocol was approved by the Scientific Committee of the Faculty of Social and Human Sciences of the Universidade do Algarve (Portugal). All participants gave their consent to participate in the online application.

Following the International Test Commission (International Test Commission 2018) recommendations, the Portuguese version of the ACQ-R was obtained after a backward translation to ensure conceptual equivalency. Forward translation into Portuguese was carried out by two independent native-speaking translators who were proficient in English. The research team compared and corrected discrepancies in the translations, finally obtaining a Portuguese version. This Portuguese version was back translated into English by two independent English native translators who were fluent in Portuguese. No significant changes were required. The final version was applied to a small undergraduate sample. After minor modifications, the final Portuguese version was obtained.

Instruments

Anxiety Control Questionnaire-Revised (ACQ-R; Brown et al. 2004). This scale contains 15 items rated on a 6-point Likert scale ranging from 0 = *totally disagree* to 5 = *totally agree.* Eleven items are negatively-keyed. Brown et al. (2004) found a three-factor solution for the questionnaire: (1) *Perceived Control of Emotions* is composed of 5 items that reflect the ability to effectively control one's emotions ("I can usually relax when I want"), (2) *Perceived Control of Threats* contains 6 items and refers to the belief that frightening events are out of one's control ("When I am frightened by something, there is generally nothing I can do"), and (3) *Perceived Control of Stress* is formed by4 items that measure the perception of difficulty to cope with one's emotions in stressful situations ("I usually find it hard to deal with difficult problems"). The three factors presented correlations of between .52 and.54. The ACQ-R has shown good internal consistency and convergent validity, as well as adequate reliability in clinical and non-clinical samples (Brown et al. 2004). All ACQ scales should be interpreted as revealing adequate performance when scores are high. The questionnaire has been translated into Portuguese by the authors following the process described in the procedure section.

Depression Anxiety Stress Scales (DASS-21; Lovibond and Lovibond 1995). The DASS has 21 items which are group into 3 scales with 7 items each: Depression ("I couldn't seem to experience any positive feeling at all"), Anxiety ("I experienced breathing difficulty"), and Stress ("I found it hard to wind down"). Items are scored on a 4-point Likert-type response scale, ranging from 0 = *did not apply to me at all* to 3 = *applied to me very much or most of the time*. Higher scores indicate more frequent symptomatology. We used the Portuguese version of the DASS-21, which has obtained good psychometric properties (Cronbach alphas between .836 and.897; Alves Apóstolo et al. 2012).

Positive and Negative Affect Schedule (PANAS; Watson et al. 1988). The State version of the PANAS was used to explore the current affective status of individuals. The PANAS measures both positive and negative affect with and has 10 items for each of the two subscales. In the PANAS, participants are asked to rate their experience of different feelings and emotions (e.g., "enthusiastic" for positive affect or "nervous" for negative affect) on a 5-point Likert scale, ranging from 1 = *very slightly* or *not at all* to 5 = *extremely.* The Portuguese version used has shown good psychometric properties ($\alpha = .86$ for negative affect and $\alpha = .89$ for positive affect; Galinha and Pais-Ribeiro 2005).

Data Analysis

We first calculated the sample demographic characteristics and explored whether the demographic profile of individuals was important to understand their levels of perceived control by means of a Student's *t* test. Next, we investigated the internal structure of the ACQ-R. Because the factor-solution proposed by Brown et al. (2004) differed from the one obtained in other studies that used an exploratory analysis (Osma et al. 2017), we conducted a confirmatory factor analysis (CFA) to explore whether the original three-factor structure proposed by Brown et al. (2004) was replicated in our sample. The CFA was conducted with Mplus version 6.12. To assess model fit we used the conventional cut-offs proposed by Hu and Bentler (1999) and the fit indexes proposed in similar investigations (Checa et al. 2017). Specifically, root mean square error of approximation (RMSEA) values smaller than .08 or .06 are argued to indicate acceptable and excellent model fit to the data, respectively. Additionally, we calculated the comparative fit index (CFI) and Tucker-Lewis index (TLI). In the CFI and the TLI, values greater than .90 and .95 are interpreted as revealing an adequate and excellent model fit, respectively. To compare the fit of the competing models, we considered both increments in the CFI $\geq .01$ and improvements in the RMSEA and TLI, as well as a preference for more parsimonious models when fit was comparable (Morin et al. 2016).

We next calculated Pearson correlations between the ACQ-R scores and the remaining study measures, namely positive and negative affect and depression, anxiety, and stress. For the correlations, we selected the factor structure of the ACQ-R that showed the best fit (see the Results section).

Results

Sample Characteristics and Differences in Perceived Control as a Function of Demographic Factors

A description of sample characteristics and the differences in perceived control are shown in Table 1. The analysis revealed no sex differences in perceived control. By contrast, differences in perceived control emerged as a function of marital status, job status, and educational level. Overall, individuals in a relationship, who were working at the time of assessment, and who had completed more years of education indicated higher levels of perceived control, especially in relation to emotions and stress.

Internal Structure of the ACQ-R

Results from the confirmatory analyses are presented in Tables 2 (goodness of fit) and 3 (item loadings). The CFA revealed a just acceptable fit when the three-factor solution proposed by Brown et al. (2004) was replicated ($\chi^2 = 230.87$, df = 87, $p < .0001$, RMSEA = 0.079, 90% CI = 0.066–0.091, CFI = 0.851, TLI = 0.821). However, the modification indices suggested that changing item 15 "When I am anxious, I find it hard to focus on anything other than my anxiety" from the Emotion Control scale to the Stress Control scale would significantly improve the fit of the model. Indeed, when this was done the fit to the data notably improved ($\chi^2 = 150.12$, df = 87, $p < .0001$, RMSEA = 0.052, 90% CI = 0.038–0.066, CFI = 0.935, TLI = 0.921), suggesting that item 15 was interpreted differently from expected in our sample. All further analyses were performed using this three-factor solution with item 15 in the Stress Control scale.

As a final step, we calculated the correlations between the ACQ-R scales and arguably related psychological constructs (i.e., anxiety, depression, and stress and negative and positive affect), as well as the Cronbach's alphas for all measures (Table 4). Unsurprisingly, we found moderate positive correlations between ACQ-R dimensions and anxiety, depression, stress, and negative affect, and between small and moderate negative associations with positive affect. All measures presented satisfactory internal consistency estimates.

Discussion

The transdiagnostic approach of psychopathology has identified a number of vulnerability factors, including perceived control over emotional reactions to threats, which are argued to be shared by different emotional disorders (Suárez et al. 2009). The identification of these vulnerability factors has relevant implications in the prevention and treatment of emotional disorders. Specifically, it has resulted in a shift from symptom-focused psychological interventions to vulnerability-based treatments (Sauer-Zavala et al. 2017). From this perspective, perception of control has been identified as a general psychological vulnerability factor (Brown and Barlow 2009), as well as a predictor of symptom severity and treatment outcomes (Gallagher et al. 2014b). Therefore, the adequate assessment of this vulnerability factor has become essential from a research and clinical point of view.

In order to provide with a measure of control perception to be used by Portuguese speakers, we have validated the ACQ-R in a community sample. The results obtained in this study partially confirmed our hypothesis. On the one hand, a three-factor solution revealed an excellent fit when explored in a

Table 1 Participants demographic characteristics and differences in perceived control

	Percentage (%)	Control of threats		Control of emotions		Control of stress	
		Mean (*SD*)	*t*	Mean (*SD*)	*t*	Mean (*SD*)	*t*
Sex							
Male	21.0	22.25 (5.12)	0.89	9.68 (4.40)	1.13	16.20 (5.10)	1.78
Female	79.0	21.54 (5.37)		8.94 (4.34)		14.74 (5.51)	
Marital status							
Not in a relationship	64.4	21.29 (5.53)	−1.64	8.45 (3.99)	−3.32**	14.24 (5.55)	−3.31**
In a relationship	35.6	22.40 (4.86)		10.26 (4.75)		16.51 (4.96)	
Job status							
Unemployed	47.5	21.17 (5.54)	−1.53	8.35 (4.09)	−2.67**	13.69 (5.62)	−3.98***
Working	52.5	22.16 (5.07)		9.77 (4.49)		16.28 (4.99)	
Educational level							
< 12 years of education	24.3	19.72 (5.74)	−3.49***	7.28 (4.34)	−3.97***	13.22 (6.00)	−2.93**
> 12 years of education	75.7	22.32 (5.03)		9.68 (4.21)		15.64 (5.13)	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2 Goodness of fit indices for the different models

Model	$\chi 2$	df	*p*	RMSEA	90% CI RMSEA	CFI	TLI
CFA, 3 factors (Brown et al. 2004)	230.87	87	<.0001	.079	.066–.091	.851	.821
CFA, 3 factors with item 15 in the Stress Control scale	150.12	87	<.0001	.052	.038–.066	.935	.921

CFA: Confirmatory factor analysis; RMSEA: Root mean square error of approximation; CFI: Comparative fit index; TLI: Tucker-Lewis index

confirmatory manner, supporting the idea that perception of control is a multidimensional construct composed by three dimensions (Brown et al. 2004). On the other hand, an adequate fit of this three-factor solution required forcing one item (i.e., item 15) to load into a different factor from the original version of the ACQ-R (i.e., from the Emotion Control scale to the Stress Control scale).

Previous efforts to validate the ACQ-R cross-culturally include a recent investigation in Spain (Osma et al. 2017), a relatively similar country in cultural terms when compared with Portugal. Therefore, the aforementioned study will be used to compare the present study findings. Contrary to the present investigation and the original study by Brown et al. (2004), Osma et al. (2017) proposed a two-factor solution of the ACQ-R as a result of a an exploratory analysis only. In the present study, however, we replicated the three-factorial structure proposed by Brown et al. (2004), namely (1) *Perceived Control of Emotions*, (2) *Perceived Control of Threats*, and (3) *Perceived Control of Stress*. There might be several reasons that explained why a two-factor solution was obtained in the Spanish validation of the ACQ-R, including sample characteristics (e.g., the Spanish validation was conducted with college students only) or undetected issues when translating the questionnaire might explain the discrepancies revealed in the number of factors in the Spanish validation of the ACQ-R. It is also possible that Spanish individuals interpret items in the ACQ-R as belonging to two categories only. Ultimately, however, we cannot conclude that the three-factor solution cross-culturally replicated in the present investigation is not acceptable in Spanish settings because of the exploratory nature of the analyses performed by Osma et al. (2017).

Table 3 Item loadings of the different models

	CFA, 3 factors (Brown et al. 2004)			CFA, 3 factors with item 15 in F2		
	F1	F2	F3	F1	F2	F3
1		.76			.77	
2		1.07			1.02	
3	.96			.96		
4	.87			.86		
5			.78			.82
6			1.02			1.09
7	.78			.78		
8	.71			.71		
9	.63			.62		
10			.84			.89
11		.76			.77	
12	.69			.70		
13			.99			1.00
14		1.08			1.10	
15			.94		1.16	

F1: Emotional control; F2: Threat control; F3: Stress control; CFA: Confirmatory factor analysis

It is important to note that the original ACQ-R factor solution proposed by Brown et al. (2004) only obtained an adequate fit when item 15 ("When I am anxious, I find it hard to focus on anything other than my anxiety") was forced to load on the *Perceived Control of Stress* factor as opposed to the *Perceived Control of Emotions* factor. What this suggests is that a different interpretation of this item emerged when asking Portuguese participants. At this stage, it is important to note that the process of translating items from English to Portuguese included a cultural adaption (e.g., the language use),so item 15 was translated into Portuguese as follows: "When I am nervous, I find it hard to focus on anything other than my anxiety". It is possible that the word "nervous" in the sentence led the participants to associate this item with the control of stress as opposed to the control of emotions. Contrary to this idea, however, the same scenario (i.e., change in conceptual meaning and internal structure of the scale) was not revealed with items that suffered the same linguistic process in the present study (e.g., item 12: "Most events that make me anxious are outside my control" was translated as "Most events that make me nervous are outside my control"). Further research is needed to explore whether a more literal translation of item 15 indeed results in a complete replication of the original structure proposed by Brown et al. (2004) or whether item 15 has a different interpretation across cultures.

With the exception of the aforementioned findings with item 15, the results obtained in the present study support the use of the ACQ-R in Portuguese settings. Specifically, all items yielded excellent loadings in the expected dimensions (all greater than .60). Similar to Brown et al. (2004), the reliability estimates of the three subscales (internal consistency) was also satisfactory ($\alpha \geq .76$) in the present investigation. Additionally, the sources of validity evidence included in

Table 4 Means, standard deviations, Cronbach's alphas, and intercorrelations of study variables ($n = 267$)

	Mean (*SD*)	ACQ-T	ACQ-E	ACQ-S	DASS-D	DASS-A	DASS-S	PANAS-PA	PANAS-NA
ACQ-T	21.69 (5.32)	(.771)							
ACQ-E	9.10 (4.35)	.21***	(.760)						
ACQ-S	15.05 (5.45)	.60***	.43***	(.789)					
DASS-D	4.87 (5.02)	−.44***	−.35***	−.47***	(.920)				
DASS-A	4.16 (4.18)	−.33***	−.29***	−.38***	.66***	(.870)			
DASS-S	7.01 (4.49)	−.40***	−.40***	−.57***	.76***	.76***	(.886)		
PANAS-PA	30.60 (7.82)	.22***	.41***	.15*	−.17**	−.15*	−.33***	(.897)	
PANAS-NA	19.26 (7.91)	−.43***	−.48**	−.51***	.63**	.51***	.47***	−.20**	(.904)

SD, Standard Deviation; ACQ-T, Anxiety Control Questionnaire-Threat, ACQ-E, Anxiety Control Questionnaire-Emotional; ACQ-S, Anxiety Control Questionnaire-Stress; DASS-D, Depression Anxiety Stress Scales- Depression; DASS-A, Depression Anxiety Stress Scales-Anxiety; DASS-S, Depression Anxiety Stress Scales-Stress; PANAS-PA, Positive and Negative Affect Schedule-Positive Affect; PANAS-NA, Positive and Negative Affect Schedule-Negative Affect

our study also suggest that the ACQ-R is a psychometrically adequate measure ready to be used in Portuguese settings. Specifically, all ACQ-R scales (*Perceived Control of Threats, Perceived Emotion Control,* and *Perceived Control of Stress)*, showed small-to-moderate negative associations with depression, anxiety, stress, and negative affectivity and a positive relationship with positive affectivity. Overall, these outcomes are comparable to those obtained by Osma et al. (2017) and Brown et al. (2004) and provide evidence for the validity of the ACQ-R in its Portuguese version.

This investigation is not without limitations. First, a convenience community sample with a significant percentage of undergraduate students was used. Therefore, the generalizability of the results to specific clinical samples (i.e., with emotional disorders), as well as the impact of including Psychology students, who are frequently aware of the constructs measured by psychological questionnaires, on the study findings are unclear. Similarly, the sampling method used in the present study (i.e., snowball approach using college students) is also likely to have influenced the characteristics of the sample, as noted by high unemployment rates (i.e., 47.5%) and a large proportion of single individuals (64.4%). For instance, 87.4% of unemployed participants were students and we would expect being unemployed to be more distressing when one is expected to have a job (i.e., after completing education). A similar interpretation might apply to marital status. Therefore, the applicability of the findings on perceived control differences as a function of job status and marital status should be interpreted with caution. Similar to the previous point, psychiatric diagnoses were not investigated in the study, which again should not be ignored when considering the generalizability of findings. Additionally, the discriminant validity and the temporal stability of the measure, as well as the convergent validity with other important and control-related factors, such as intolerance of uncertainty, were not investigated. Future studies may address these limitations, as well as to provide data about the predictive validity of the ACQ-R in clinical samples.

While acknowledging the aforementioned limitations, this study is important because it is one of the first cross-cultural adaptations of the ACQ-R and the first one in Portugal. Importantly, we replicated the internal structure of the original version (Brown et al. 2004) and we obtained adequate reliability and validity estimates, which support the use of the ACQ-R in Portuguese research and clinical settings.

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Compliance with Ethical Standards

Conflict of Interest The study protocol was approved by the Scientific Committee of the Faculty of Social and Human Sciences of the Universidade do Algarve (Portugal). All participants gave their consent to participate in the online application.

Authors have no potential conflicts of interest to disclosure.

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