Original Article

Brazilian Portuguese Validated Version of the Cardiac Anxiety Questionnaire

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Abstract

Background: Cardiac Anxiety (CA) is the fear of cardiac sensations, characterized by recurrent anxiety symptoms, in patients with or without cardiovascular disease. The Cardiac Anxiety Questionnaire (CAQ) is a tool to assess CA, already adapted but not validated to Portuguese.

Objective: This paper presents the three phases of the validation studies of the Brazilian CAQ.

Methods: To extract the factor structure and assess the reliability of the CAQ (phase 1), 98 patients with coronary artery disease were recruited. The aim of phase 2 was to explore the convergent and divergent validity. Fifty-six patients completed the CAQ, along with the Body Sensations Questionnaire (BSQ) and the Social Phobia Inventory (SPIN). To determine the discriminative validity (phase 3), we compared the CAQ scores of two subgroups formed with patients from phase 1 (n = 98), according to the diagnoses of panic disorder and agoraphobia, obtained with the MINI – Mini International Neuropsychiatric Interview.

Results: A 2-factor solution was the most interpretable (46.4% of the variance). Subscales were named "Fear and Hypervigilance" (n = 9; alpha = 0.88), and "Avoidance", (n = 5; alpha = 0.82). Significant correlation was found between factor 1 and the BSQ total score ($p < 0.01$), but not with factor 2. SPIN factors showed significant correlations with CAQ subscales ($p < 0.01$). In phase 3, "Cardiac with panic" patients scored significantly higher in CAQ factor 1 ($t = -3.42$; $p < 0.01$, CI = -1.02 to -0.27), and higher, but not significantly different, in factor 2 ($t = -1.98$; $p = 0.51$, CI = -0.87 to 0.00).

Conclusions: These results provide a definite Brazilian validated version of the CAQ, adequate to clinical and research settings. (Arq Bras Cardiol. 2013; 101(6):554-561)

Keywords: Cardiovascular Diseases; Anxiety; Psychometrics; Psychological Tests; Questionnaires.

Introduction

Psychiatric disorders seem to play a role as risk factors to cardiovascular morbidity and mortality[1]. They also seem to have a negative impact on disease stability[2], adherence to treatment[3] and quality of life[4] in cardiac patients. Despite that, anxiety disorders are often unrecognized and mistreated in this population, evidencing a gap in the knowledge in the field[5].

Distinguishing between clinically relevant cardiac-related symptoms and manifestations of anxiety can be challenging, especially in patients with cardiovascular diseases and anxiety comorbidity[6]. The boundaries are usually unclear, negatively affecting clinical decision-making and treatment[7].

Cardiac anxiety (CA) is the fear of cardiac-related stimuli and sensations, perceived as negative or dangerous[8]. It is a syndrome characterized by recurrent aversive sensations or chest pain, in the absence of physical abnormalities. Often, individuals with high CA engage in a variety of hypochondriacal behaviors that raise the risk for unnecessary diagnostic procedures and cause considerable expenditure of financial and medical resources[9].

CA has been demonstrated in a variety of anxiety-related conditions, but is also significantly prevalent among cardiac patients[10-12]. The cognitive-behavioral model highlights the role of heart-focused attention and interoceptive conditioning in the origin of cardiorespiratory manifestations and acute thoracic pain[9]. To address these concerns, a psychometric instrument – the Cardiac Anxiety Questionnaire (CAQ) - was designed to clinical use in cardiology settings, demonstrating

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Manuscript received April 21, 2013; revised manuscript June 19, 2013; accepted July 10, 2013.

DOI: 10.5935/abc.20130207

good psychometric properties[8]. The CAQ has been translated and tested in different cultures and samples with consistent results[11,13-15]. Although the Brazilian translated version of the instrument has been transculturally adapted, it has not yet been validated[16].

Validations studies of translated instruments allow comparisons between data from different cultures and have been demonstrated to be a valuable contribution to clinical and research practice[17]. This paper presents a validation study comprising three distinct phases that aimed to evaluate the psychometric properties of the Brazilian adapted version of the CAQ. The objective was to provide clinicians with an adapted, valid and simple tool to assess CA in Brazilian cardiac patients.

Methods

Phase 1 - Factor structure and reliability

The initial Brazilian adapted version of the CAQ consisted of an 18-item 5-point Likert scale as to how frequently the behavior typically occurs with response anchors ranging from 0 (never) to 4 (always). Higher scores indicate greater CA. To extract the factor structure and assess the reliability of the instrument, this initial version was administered to 98 patients (61 men) known to have coronary artery disease (CAD), with ages between 34 and 89 years (mean = 64.2; SD = 10.64). Patients were recruited in two outpatient cardiac clinics in Rio de Janeiro: a public outpatient hospital-based service and a private exercise-based cardiac rehabilitation program. Thirty eight percent of the participants had a university degree, whereas 36% had more than eight years of formal education but no university studies and 14% (n = 14) had up to eight years of education. All participants signed an informed consent prior to participation. This study was approved by the institutional Research Ethics Committee and was funded by research grants from CNPq, INCT-TM and FAPERJ.

Besides filling in the CAQ, patients were screened for the presence of psychiatric comorbidities by the same trained researcher using the MINI – Mini International Neuropsychiatric Interview, version 5.0[18]. Data from the MINI was used to assess discriminative validity in the third phase of this study. The MINI is a short structured interview designed to explore each of the necessary criteria for the main diagnoses of DSM-IV, Axis I. Data obtained were analyzed using the Statistic Package for Social Sciences - SPSS (version 13).

The first step of the assessment of the factor structure was to test the sample adequacy, by calculation of the Kaiser-Meyer-Olkin measure of sampling adequacy, yielding the significant value of .83. Bartlett's test of sphericity also resulted in significant sample adequacy (χ = 842,55; $p < 0,001$). Factor extraction was assessed by calculating the exploratory factor analysis using Principal Axis Factor, with Oblimin rotation. Item-total correlations were also calculated. To be included in one subscale, item´s factor loading should be higher than 0.3 in that factor and lower that 0.2 in any other factor[19]. The number of factors to retain was evaluated using (a) Kaiser's eigenvalue > 1 factor extraction rule, (b) scree plot analysis[20], and (c) the interpretability of the resulting factor structures[21].

Phase 2 - Convergent and divergent validity

Once the Brazilian CAQ basic factor structure and internal consistency were established, the aim of phase 2 was to explore the convergent and divergent validity of the scale. For this phase, a different sample of cardiac patients was recruited in an exercise-based rehabilitation program. Fifty-six patients with a formal diagnosis of coronary artery disease were assessed. In this sample, 35 participants were men and ages ranged from 58 to 94 years (mean = 71.1; SD = 7.90). All patients read and signed an informed consent prior to participation. All participants had at least eight years of education and 67% (n = 37) had university degree. Patients completed the Brazilian version of the CAQ, followed by two other questionnaires: the Brazilian adapted version[22] of the Body Sensations Questionnaire (BSQ)[23] and the Brazilian validated version of the Social Phobia Inventory (SPIN)[24].

Briefly, the BSQ is a unifactorial 17-item self-report questionnaire that assesses the individual's level of fear of bodily sensations associated with autonomic arousal. Patients rated the degree to which they experience anxiety as a result of bodily sensations on a 5-point scale with anchors ranging from 1 (not frightened/worried by sensation) to 5 (extremely frightened/worried by sensation)[22].

The SPIN is an instrument for the evaluation of fear, avoidance and physiological symptoms associated with social anxiety disorder. This is a 17-item scale where each item can be rated by respondent in a 5-point Likert-type scale ranging from 0 (nothing) to 4 (extremely), indicating the level of discomfort experimented in the social situation presented. The validation process of the Brazilian version of the SPIN indicated a three-factor structure, composed by the following subscales: "fear and avoidance of situations of social evaluation and of figures of authority and physiological symptoms", "fear and avoidance of interaction with strangers, of public speaking, and of being the center of attention" and "fear and avoidance of social events"[24].

We assessed convergent and divergent validity of the CAQ by computing correlations between CAQ subscales obtained in factor analysis (phase 1) and the other measurements subscales. To establish convergent validity, the scores of the CAQ subscales were correlated to the BSQ total score, once it presents a unifactorial structure. This instrument was also used to assess convergent validity in the original scale validation process and was selected due to the existence of a Brazilian adapted version and psychometric properties previously assessed for our population.

Divergent validity was calculated by the correlation between the scores obtained by the cardiac patients in the two subscales of the CAQ and the three subscales of the SPIN. This instrument was selected because social anxiety should not be conceptually related to the construct of CA. In the original study, a social anxiety measure was also used to assess divergent validity.

Phase 3 - Discriminative validity

To determine the discriminative validity of the Brazilian version of the CAQ we sought to test whether different groups of cardiac patients presented significant differences in the CAQ score. We used the same sample of phase 1 (98 coronary artery disease outpatients) and compared the scores obtained in the CAQ using two different groups formed according the diagnoses obtained with the MINI – Mini International Neuropsychiatric Interview version 5.0[18]. For the purposes of the present study, we screened patients for present and past prevalence of panic disorder, panic attacks and agoraphobia, in terms of frequency, and included those in the so-called "cardiac with panic" patient subgroup. Patients who met the criteria for mild other psychiatric disorders but no anxiety disorders were included in the "cardiac without panic" subgroup. The rationale for this design was the prediction based in some previous findings that CA could be associated with a higher prevalence of current and past panic disorder and agoraphobia diagnosis or prodromal symptoms[10]. T-test was used to compare mean scores obtained in the two subgroups.

Results

In the factor structure study, five factors were identified with eigenvalues greater than one (eigenvalues: 6.53, 1.81, 1.31, 1.12 and 1.02). Cattell's scree plot analysis indicated that the factor structure was best described as having either two, three, or four factors. Thus, solutions with two, three, and four factors were attempted and subjected to oblique (Oblimin) rotation. The results clearly indicated that a 2-factor solution was the most interpretable. This solution accounted for 46.4% of the cumulative variance, with factor one accounting for 36.39% and factor two, 10.16%.

Theoretical analysis of the items indicated that factor one combined items that pertained to factors I and III in the original scale ("Fear" and "Heart-focused attention") and were designated in the Brazilian version as "Fear and Hypervigilance", comprising nine items. Factor two related to "Avoidance" and was formed by five items, maintaining the same structure of the "Avoidance" subscale of the original instrument. In this solution, items 6, 8, 11 and 18 were deleted for improving internal consistency. After deleting these items, the scale was renumbered accordingly. Cronbach's alpha coefficients for the subscales were, respectively, 0.88 and 0.82. Item-total correlations were assessed for all items of the CAQ, with all correlations coefficients being higher than 0.30[19]. Correlations and rotated factor loadings for the 2-factor solution are presented in Table 1.

In the convergent validity study, a higher direct significant correlation was found between the "Fear and Hypervigilance" subscale and the BSQ total score ($p < 0.01$), as expected, but a weak non-significant correlation was achieved with the "Avoidance" subscale. As normality tests indicated a non-parametric distribution, Spearman correlations were calculated. Divergent validity assessment results showed moderate or higher direct significant correlations between factor 1 and all SPIN subscales ($p < 0.01$) and moderate direct and significant correlations between factor 2 and SPIN subscales ($p < 0.01$), except for SPIN factor 2, "fear and avoidance of interaction with strangers, of public speaking, and of being the center of attention". Mean scores, standard deviations and Spearman correlations between CAQ subscales and the other measurements are presented in Table 2.

In the discriminative validity phase, the "cardiac with panic" subgroup consisted of thirty-seven patients (20 men = 54%; Mean age = 69.5; SD = 11.5 years) that referred panic disorder or past history of panic attacks, with and without agoraphobia. From these patients, 6 (16%) met criteria for current panic disorder, 13 (35%) presented with a past history of panic attacks and 24 (65%) reported present agoraphobia, according to the DSM-IV criteria. In this group, 54% (n = 20) patients reported a previous history of acute myocardial infarction (AMI). In comparison, the "cardiac without panic" subgroup comprised sixty-one patients (41 men; 67%), with a mean age of 65.4 years (SD = 9.79). In this group, 27 patients (43%) reported a history of previous AMI. Minor differences between these subgroups were not significant for sex distribution ($p = 0.68$), history of AMI ($p = 0.74$) and mean age ($p = 0.18$).

As expected, cardiac anxiety was higher in the "cardiac with panic" subgroup. "Cardiac with panic" patients scored significantly higher in CAQ factor 1 ($t = -3.42$; $p < 0.01$, CI = -1.02 to -0.27), and higher, but not significantly different, in factor 2 ($t = -1.98$; $p = 0.51$, CI = -0.87 to 0.00). In factor 1, Fear and Hypervigilance, "cardiac with panic" patients obtained a mean score of 2.98 (SD = 0.91) whereas those in "cardiac without panic" subgroup yielded a mean score of 2.34 (SD = 0.91). In factor 2, Avoidance, patients presented, respectively, mean scores of 2.81 (SD =1.08) and 2.37 (SD =1.05).

Discussion

The present paper comprised three complementary phases of psychometric studies that composed the validation process of the Brazilian version of the CAQ, formerly published in its translated and transculturally adapted version[16]. The major contribution of the current study is to provide a definite Brazilian validated version of the instrument, composed by 14 items, to be used in clinical and research settings (see attachment 1), herein called Questionário de Ansiedade Cardíaca (QAC).

Based on the results of these studies, it appears that the QAC adequately measures cardiac anxiety using two subscales: fear and hypervigilance of cardiac-related stimuli and avoidance of activities that could bring on symptoms. Differently from the original version of the Cardiac Anxiety Questionnaire[8], the Brazilian version of CAQ (QAC) presented a two factor structure in this sample of cardiac patients in Brazil. Reliability analyses showed that the internal consistency of both QAC subscale scores was high. Although these findings provide preliminary evidence that this version of the instrument can assess CA in Brazilian cardiac patients, it would be important for future research to confirm the factor structure and further examine the psychometric properties of the QAC in more diverse, independent samples to determine the generalizability of the observed results.

Table 1 - Means (M), standard deviations (SD), corrected item-total correlations (r), and factor loadings of final CAQ items

Items	M	SD	r	Factor 1	Factor 2
Factor 1: Fear and Hypervigilance (n = 9)					
1. Presto atenção nas batidas do meu coração	2.92	1.37	0.64	0.78*	-0.55
3. Meu coração acelerado me acorda à noite	1.78	1.15	0.60	0.83*	-0.27
4. Dor ou desconforto no peito me acordam à noite	1.82	1.18	0.59	0.71*	-0.06
10. Mesmo que os exames estejam normais, eu continuo me preocupando com o meu coração	3.01	1.59	0.70	0.73*	0.12
13. Preocupa-me que os médicos não acreditem que meus sintomas sejam verdadeiros	2.12	1.53	0.50	0.52*	0.12
14. Quando tenho desconforto no peito ou meu coração está acelerado, preocupa-me que posso ter um ataque cardíaco	3.17	1.59	0.75	0.79*	0.03
15. Quando tenho desconforto no peito ou meu coração está acelerado, tenho dificuldade de me concentrar em qualquer outra coisa	2.16	1.21	0.65	0.68*	0.05
16. Quando tenho desconforto no peito ou meu coração está acelerado, fico com medo	2.68	1.50	0.68	0.69*	0.10
17. Quando tenho desconforto no peito ou meu coração está acelerado, gosto de ser examinado por um médico	3.45	1.53	0.56	0.63*	0.06
Factor 2: Avoidance (n = 5)					
2. Evito esforço físico	2.68	1.31	0.62	0.15	0.76*
5. Pego leve o máximo possível	2.87	1.43	0.56	-0.06	0.73*
7. Evito fazer exercícios ou outras atividades físicas	2.16	1.39	0.58	-0.02	0.73*
9. Evito atividades que acelerem o meu coração	2.84	1.47	0.70	0.29	0.67*
12. Evito atividades que me façam suar	2.15	1.44	0.64	0.04	0.74*
Deleted items (n = 4)					
6. Verifico minha pulsação	2.50	1.43	-	0.38	0.25
8. Posso sentir meu coração no meu peito	2.81	1.50	-	-0.01	0.13
11. Sinto-me seguro estando próximo a hospitais, médicos e outros serviços de saúde	2.96	1.55	-	0.39	0.25
18. Quando tenho desconforto no peito ou meu coração está acelerado, conto para minha família ou amigos	3.04	1.55	-	0.09	0.30

N = 98. Salient factor loadings (>0.30) are flagged (*).

Table 2 - Means and standard deviations (SD) of convergent and divergent validity measures, and Spearman correlations between QAC, BSQ and SPIN

Subscales	Mean	SD	Cardiac Anxiety Questionnaire (QAC)	
			Factor 1: Fear and Hypervigilance	Factor 2: Avoidance
QAC Factor 1: Fear and Hypervigilance	2.17	0.85	-	-
QAC Factor 2: Avoidance	1.82	0.81	-	-
BSQ (total score)	1.84	0.85	0,58*	0,28*
SPIN Factor 1: Fear and avoidance of situations of social evaluation and of figures of authority and physiological symptoms	0.66	0.71	0,52*	0,24
SPIN Factor 2: Fear and avoidance of interaction with strangers, of public speaking, and of being the center of attention	0.96	0.84	0,45*	0,12
SPIN Factor 3: Fear and avoidance of social events	0.39	0.78	0,35*	0,20

*N = 56. *Correlation is significant at the 0.05 level (2-tailed).*

Results from the three phases of the validation process were presented in terms of the mean scores, considering the Likert type scale of the instrument[1-5] to facilitate comparisons with other psychometric studies conducted with this instrument in other populations and languages. For clinical practice, however, we have observed that some practitioners find it more convenient to sum up all individual item scores thereby composing a total score for each subscale. It is important to notice that all the results presented above would not be any different if this scoring method had been used.

Although CA was originally conceptualized as a psychological problem of individuals without physical disease[14,25] our present findings indicate it also may be an issue to be addressed in the treatment of patients with heart diseases[2,3,13,26,27]. A greater focus on these patients is also merited by indications that after diagnosis is made, they frequently begin to focus intensely on their heart functioning, are overwhelmed with fear and worry about their heart[2-4,27,28].

It is noteworthy, however, that CA is frequently not directly associated with behaviors that actually contribute to reducing cardiovascular risk[29,30]. Research data indicate that anxiety symptoms can negatively impact adherence to exercise programs and medical treatment and, consequently, negatively affected clinical prognosis[3,31,32]. In addition, recent studies have shown that cardiac patients who experience emotional distress have higher rates of mortality and morbidity than those who are less anxious and depressed[2,33,34].

The value of using the CAQ for patients with heart disease has been demonstrated in a previous German study with 90 patients before and after undergoing coronary bypass, valve replacement or combined surgery[27]. Not surprisingly, this study found that all dimensions of CA were elevated in patients before surgery. However, a different pattern of findings emerged after surgery. CAQ-Fear was significantly reduced six weeks after surgery and at six-month follow-up, whereas CAQ-Avoidance was stable after surgery but declined at follow-up. Approximately 20% of patients continued to experience clinically elevated levels of CA at six-month follow-up. Thus, in contrast to global psychosocial indicators, which were not very useful in that study, the more specific assessment of CA may help identify individuals with elevated levels of CA who might benefit from interventions to help them adjust to the effects of surgery and lingering cardiac problems.

The level of internal consistency for the subscales found indicates that simply computing the score of the factors is an appropriate and useful tool for research and/or clinical screening activities. Identifying persons who have particularly high levels of CA and, therefore, may be at an increased risk for elevated anxious responding to cardiac-related stimuli and sensations can be a simple screening strategy for the potential need of psychological interventions, in addition to regular treatment of cardiological conditions[35]. Such quick screening could be particularly useful in busy emergency and/or outpatient cardiology settings, to avoid unnecessary invasive procedures and enhance adherence to the treatment prescription[5,36]. By using the subscale scores, it also may be possible to identify which specific aspects of CA are dysfunctionally high and in need of psychological intervention[35].

Data from our discriminative validity study show that anxious cardiac patients present a significantly higher average score when compared to cardiac patients without anxiety. A Norwegian study using QAC in patients with general genetic risk for arrhythmias referred to a specialized cardio-genetics outpatient clinics found lower mean scores of CA than the present investigation (0.6, 0.8 and 1.0, in the three subscales of the original QAC)[13]. These relatively low CA scores are consistent with the hypothesis previously formulated by Sardinha et al that CA is more strongly associated with presence of psychiatric comorbidity rather than severity of cardiovascular illness[12]. This is also supported by White et al[37], who reported a full mediation of CA in patients with pain non-cardiac chest and found that those with a DSM-IV Axis I anxiety or mood disorder were more body vigilant compared to patients who did not have a disorder. We could expect, however, that even patients without psychiatric comorbidities, who already have a cardiac diagnosis, particularly those who had experienced an acute cardiovascular event, might present higher scores of CA compared to those with a general genetic risk, as was demonstrated by Marker et al[11]. These authors investigated CA in 658 individuals referred for electron beam tomographic screening and found that the group without coronary atherosclerosis had significantly higher mean CA scores suggesting that people without a diagnosed cardiac condition pay more attention to and worry more about their cardiac related symptoms than those people who have coronary atherosclerosis[11].

In this sense, it is likely that a person with high scores in the QAC could benefit from a more deep psychiatric investigation to prevent and treat behaviors that could negatively impair functioning, treatment and prognosis[31]. Psychological interventions based on the cognitive behavioral model of CA used in the QAC should be designed to help these patients with or without cardiovascular disease to break the cycle of cardiac-focused anxiety, increased attention and worry, reassurance-seeking, symptom presentation and renewed anxiety[9,25,31]. Following referral, the QAC also may be useful for identifying the most pertinent treatment targets and to measure the effectiveness of interventions targeting specific aspects of cardiac anxiety.

Data from our convergent validity studies show a strong direct significant correlation between the "Fear and Hypervigilance" subscale and the BSQ, but a weak and non-significant correlation with the "Avoidance" subscale. This finding is actually to be expected because the BSQ assess fear of bodily events, including cardiorespiratory distress, but it does not assess avoidance and attention to such stimuli and sensations[38]. In this sense, as proposed by the authors of the original scale, the QAC can be considered a distinct and perhaps more comprehensive index of CA[8]. The QAC thus, represent an important contribution to the assessment of health-focused anxiety in conditions in which CA is particularly relevant, such as cardiology settings.

Our data did not provide support to the divergent validity of the QAC in this population. We can hypothesize that the shared variation found can be due the fact that patients who seek much help and reassurance because of their CA

also may fear and worry about public display of autonomic anxiety manifestations, like tachycardia or trembling, as occurs in socially anxious patients. Despite that, the correlations found between QAC subscale scores and the results obtained by participants in SPIN subscales indicate that QAC was unable to adequately distinguish between CA and social anxiety in this sample. To address that limitation, we propose the use of other validated psychometric instruments and, if it is the case, a structured interview such as the MINI[18], to inform differential diagnosis.

Along with that, it would be important to replicate this validation process using samples from other populations, such as physically healthy participants and patients with anxiety disorders, particularly panic disorder, agoraphobia and generalized anxiety disorder. Our study focused in validating the QAC in cardiac patients because the main aim of this effort was to provide a simple tool to help cardiologists and the general practitioners screen cardiac patients for cardiac anxiety in order to adequately address psychological aspects that could impact treatment adherence and prognosis and inform further psychotherapy referral. In this sense, it was mandatory to evaluate the psychometric properties of the instrument in the target population. A greater focus on patients with CAD also is merited by indications that after patients have been diagnosed with heart disease, they frequently begin to focus intensely on their heart functioning, are overwhelmed with fear and worry about their heart, become overly dependent on medical and familial resources, and erroneously avoid activities that may actually strengthen their myocardium[8]. It is important, thus, to test whether the factor structure described herein is confirmed in studies with different populations before using data obtained with the proposed version of the QAC with non-cardiac patients.

Fischer et al[14] tested and validated a German version of the Cardiac Anxiety Questionnaire in the general population, providing normative data for that version[14] and confirming the original three-factor structure subscales: fear ($\alpha = 0.86$), attention ($\alpha = 0.83$), and avoidance ($\alpha = 0.81$). The same structure was yield with the Greek version validations studies, but only after deleting eight items, resulting in a 10-item instrument (fear $\alpha = 0.83$, heart-focused anxiety $\alpha = 0.64$, and avoidance $\alpha = 0.74$)[15]. The Brazilian Version of the QAC best fit a two-factor solution, merging the fear and attention subscales, and maintaining the avoidance subscale, ending up with 14 items. Despite that, the items that composed the original subscales were confirmed in the Brazilian version. The present version of the QAC also reached high Crombach´s Alpha values (fear and hypervigilance $\alpha = 0.88$ and avoidance $\alpha = 0.82$), similar to the original scale and the other psychometric studies with this instrument available in the literature.

Another relevant contribution for further studies would be to generate Brazilian valid normative data and establish cut-off points that could better subside clinical decision making, including referral of the patients with high QAC scores for additional psychosocial assessment and support. Future research could also add to the psychometric evaluation of the QAC by studying its test-retest properties, which is needed to establish the reliability of the scale over time. Last, the stability of the instrument's factor structure should be examined in a larger sample using confirmatory factor analysis.

Conclusion

Our data provide a validated Brazilian version of the QAC to evaluate CA in patients with cardiovascular diseases in both clinical and research settings. We hope this can be a valuable contribution to help cardiologists and general practitioners adequately identify dysfunctional manifestations of anxiety that can negatively impact treatment and inform decision-making on how to address this issue in clinical practice. As any other psychometric instrument, the QAC warrants further studies to verify the stability of its properties in other contexts.

Acknowledgements

Authors would like to thank Clinimex – Clínica de Medicina do Exercício and Instituto de Cardiologia Aloysio de Castro for allowing data collection. This research received financial support from CNPq, Instituto Nacional de Ciência e Tecnologia – Translational Medicine (INCT-TM, CNPq), CAPES and FAPERJ.

Author contributions

Conception and design of the research: Sardinha A, Nardi AE, Ferreira MC, Eifert GH; Acquisition of data and Writing of the manuscript: Sardinha A, Araujo CGS; Analysis and interpretation of the data: Sardinha A, Araujo CGS, Ferreira MC; Statistical analysis: Sardinha A, Ferreira MC; Obtaining funding: Nardi AE; Critical revision of the manuscript for intellectual content: Nardi AE, Araujo CGS, Ferreira MC, Eifert GH.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

This study was funded by CNPq, CAPES, FAPERJ and Instituto Nacional de Ciência e Tecnologia.

Study Association

This article is part of PhD dissertation submitted by Aline Sardinha to the Psychiatry Institute of the Federal University of Rio de Janeiro.

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Appendix 1:

Questionário de Ansiedade Cardíaca (Versão Validada - Sardinha et al., 2013)

Por favor, avalie cada item marcando a resposta que melhor corresponde ao que acontece com você:

	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. Presto atenção nas batidas do meu coração					
2. Evito esforço físico					
3. Meu coração acelerado me acorda à noite					
4. Dor ou desconforto no peito me acordam à noite					
5. Pego leve o máximo possível					
6. Evito fazer exercícios ou outras atividades físicas					
7. Evito atividades que acelerem o meu coração					
8. Mesmo que os exames estejam normais, eu continuo me preocupando com o meu coração					
9. Evito atividades que me façam suar					
10. Preocupa-me que os médicos não acreditem que meus sintomas sejam verdadeiros					
11. Quando tenho desconforto no peito ou meu coração está acelerado, preocupa-me que posso ter um ataque cardíaco					
12. Quando tenho desconforto no peito ou meu coração está acelerado, tenho dificuldade de me concentrar em qualquer outra coisa					
13. Quando tenho desconforto no peito ou meu coração está acelerado, fico com medo					
14. Quando tenho desconforto no peito ou meu coração está acelerado, gosto de ser examinado por um médico					