

Factor Structure of the Beck Anxiety Inventory among Cardiac Rehabilitation Patients: Longitudinal Measurement Invariance

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Introduction

- Cardiovascular disease (CVD) is the leading cause of death in the United States, accounting for one of every three deaths.
- Anxiety is a predictor of CVD onset and negative outcomes, such as recurrence and mortality, following a cardiac event.
- Prevalence rates of anxiety disorders within the CVD population are estimated to be almost double the rates within the American adult population (36.0% and 18.1%, respectively).
- Conceptual definitions of anxiety incorporate cognitive and somatic components, evaluation of the impact of somatic and cognitive components of anxiety on CVD has been limited to their influence on onset rather than prognosis following diagnosis.
- Using the Beck Anxiety Inventory (BAI), a four-factor model, with cognitive, autonomic, neuromotor, and panic factors, has been supported in a sample of patients with CVD enrolled in cardiac rehabilitation (CR). Research examining the invariance of the structure of the BAI, specifically within the CVD population, is limited.

Purpose

- We examined longitudinal measurement invariance of a four-factor model of the BAI from the beginning of CR to the end of CR (approximately 12-weeks later).

Methods

Participants and Procedures

- Data were collected by a self-administered questionnaire from 151 patients at the onset of a Phase II CR program (Time 1). Patients then completed a follow-up questionnaire at the end of CR, approximately 12-weeks later (Time 2):
 - 67.5% male
 - Average age was 64.2 years (SD = 10.2)
 - 94.7% European American
 - 45% completed high school or attended some college/trade school; 40% completed either a four-year college degree or graduate degree
 - 69% partnered
 - Median annual household income ranged from \$50,000 to \$59,999
 - The most common diagnosis was the placement of a stent (34.4%)
 - 59.5%, 36.4%, and 4% had low, medium, and high risk stratification, respectively

Measure

- Beck Anxiety Inventory (BAI).** The BAI (Beck et al., 1993) is a 21-item self-report measure designed to assess the presence and degree of anxiety symptoms within the past week, and to distinguish these symptoms from depressive symptoms. Specifically, the questionnaire refers to both cognitive and somatic symptoms of anxiety. With each item being scored on a 4-point scale, from 0 (*not at all*) to 3 (*severely, I could barely stand it*), the total score may range from 0 to 63.

Results

Single Group Analysis

- 38.4% of participants at **Time 1** reported experiencing at least mild symptoms of anxiety. Total BAI scores ranged from 0-37, with a mean of 7.54 (*SD*=7.74).
- 35.8% of participants at **Time 2** reported experiencing at least mild symptoms of anxiety. Total BAI scores ranged from 0-41, with a mean of 7.51 (*SD*=8.44).
- Confirmatory factor analysis, with weighted least-squares with mean and variance adjustment, suggested acceptable fit of the four-factor model to our data at **Time 1** ($\chi^2[182] = 381.61, p < .001$; CFI = .94; RMSEA = .09; RMSEA 90% CI [.07, .10]; WRMR = 1.19). Standardized factor loadings for Time 1 are presented in **Figure 1**.
- Similarly, the four-factor model fit our data well at **Time 2** ($\chi^2[182] = 245.92, p < .001$; CFI = .98; RMSEA = .05; RMSEA 90% CI [.03, .06]; WRMR = .84). Standardized factor loadings for Time 2 are presented in **Figure 2**.

Multi-Group Analysis

- Multi-group analysis, constraining all factor loadings and means, indicated good fit of our data at Time 1 and Time 2, supporting longitudinal measurement invariance ($\chi^2[411] = 664.81, p < .001$; CFI = .96; RMSEA = .06; RMSEA 90% CI [.06, .07]; WRMR = 1.54).

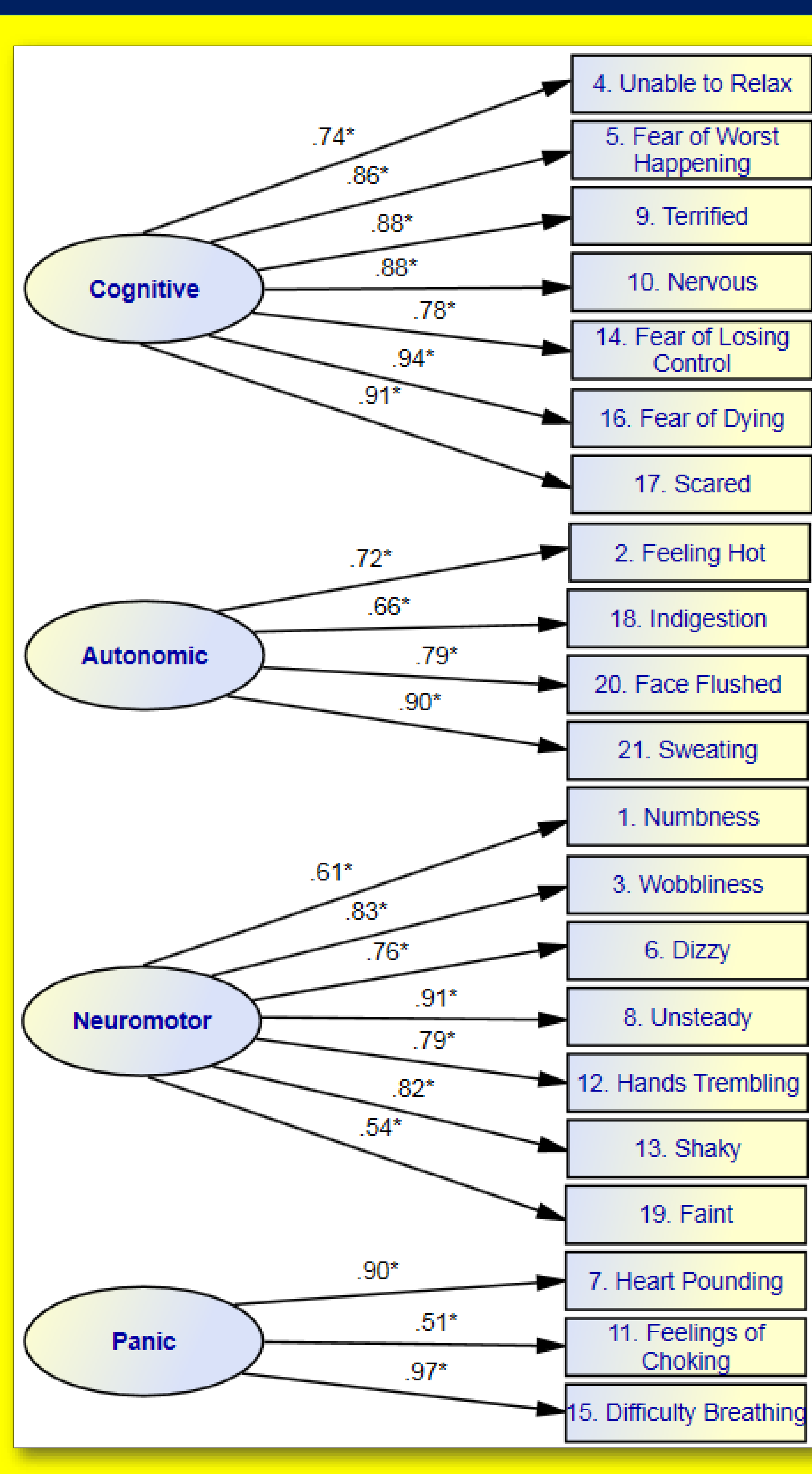


Figure 1. Four-factor model of the Beck Anxiety Inventory with standardized factor loadings at Time 1. * $p < .001$.

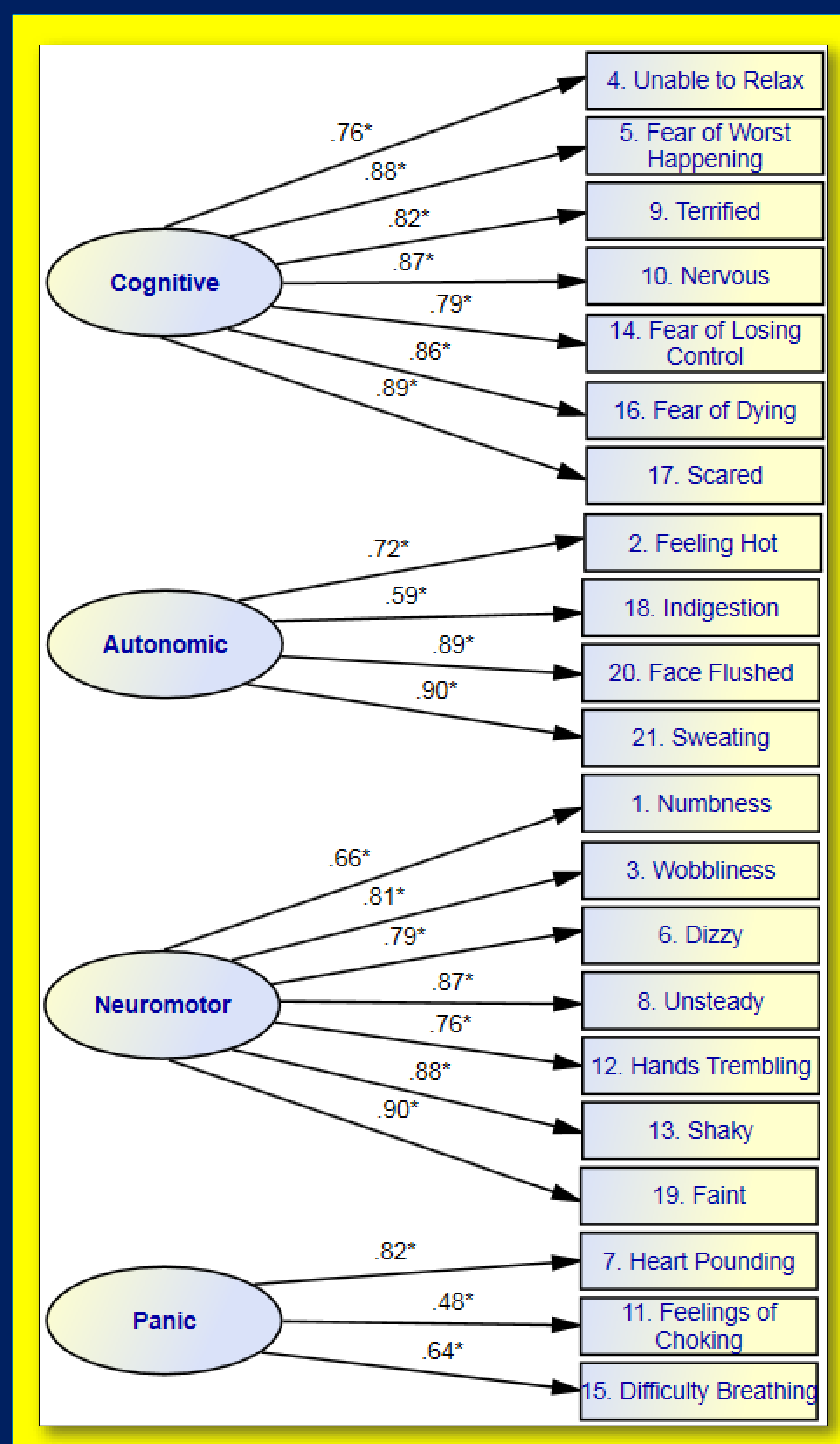


Figure 2. Four-factor model of the Beck Anxiety Inventory with standardized factor loadings at Time 2. * $p < .001$.

Conclusions

- Our results suggest that a four-factor structure of the BAI adequately represents data in CVD patients at the beginning of CR and at the end of CR, approximately 12-weeks later.
- Our findings support the use of this four-factor structure of the BAI when examining longitudinal aspects of anxiety in CVD patients, as these results provide evidence that changes in anxiety overtime are not due to structural changes of the BAI measure.

Implications & Future Research

- Continued longitudinal examination of anxiety using the BAI with CVD patients is warranted. Specifically, longitudinal studies examining anxiety as an overall construct, and the relationship between each of these four components and outcomes to better understand the role anxiety plays on outcomes following CVD is needed.

Limitations

- Our sample was highly homogenous and affluent. Our results may not generalize to other patients with CVD.
- Our sample size ($n=151$) is small.

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