Anxiety sensitivity and fear of exercise in patients attending cardiac rehabilitation

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ABSTRACT

Background: Habitual engagement in aerobic exercise is critically important for the secondary prevention of cardiovascular disease. Anxiety sensitivity, the fear of anxiety and arousal sensations, is a cognitive factor associated with risk and persistence of anxiety and stress disorders. Anxiety sensitivity has also been linked to various problematic health behaviors, including low levels of physical activity. Thus, anxiety sensitivity may undermine aerobic exercise participation in patients enrolled in cardiac rehabilitation (CR).
Purpose: This is the first study to evaluate anxiety sensitivity in patients enrolled in CR, and examine the association between anxiety sensitivity and fears about the negative consequences of exercise.
Methods: Patients ($n = 69$, 68.1% male) were enrolled in an outpatient, medically-supervised, multi-component 12-week CR program. Anxiety sensitivity was assessed with the Anxiety Sensitivity Index-3 (ASI-3).
Results: On average, patients had completed 5.3 ($SD = 3.5$) weeks of CR. Scores on the ASI-3 indicated moderate levels of anxiety sensitivity ($M = 17.2$, $SD = 12.3$). Moderate and high levels of anxiety sensitivity were present in 43.5% and 31.9% of patients. Anxiety sensitivity was significantly moderately correlated with fear of negative consequences from exercise. After adjusting for relevant covariates, anxiety sensitivity accounted for significant incremental variance in fears of negative consequences from exercise, which was a medium-sized effect.
Conclusions: Elevated anxiety sensitivity is common in patients enrolled in CR and is associated with greater fears of negative consequences from exercise. Anxiety sensitivity may be an important clinical target in CR to decrease patients' fears about bodily sensations to promote exercise engagement, and in turn, enhance CR outcomes.

1. Introduction

Cardiovascular disease (CVD) accounts for approximately 1 in every 3 deaths annually in the United States (Centers for Disease Control and Prevention, 2014; Go et al., 2013) and costs more than any other medical condition (Go et al., 2013). Habitual physical activity, especially aerobic exercise, is critical for secondary prevention of CVD to facilitate stabilization, slowing, or reversing of the atherosclerosis process (Anderson & Taylor, 2014). However, exercise levels are low in patients with CVD, even after acute coronary events, revascularization

or surgical procedures (Mons, Hahmann, & Brenner, 2014). Although structured aerobic exercise through cardiac rehabilitation (CR) is a critical part of post-hospital care in patients with CVD (Anderson & Taylor, 2014), less than one-third of patients utilize CR services (Fang, Ayala, Luncheon, Ritchey, & Loustalot, 2017; Pack et al., 2014) and maintenance of habitual physical activity is low regardless of attendance to exercise-based CR (ter Hoeve et al., 2015).

One understudied barrier to aerobic exercise in CVD patients is anxiety, which is among the earliest and most intense psychological reactions following cardiac events (Moser & Dracup, 1996). Clinically-

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elevated anxiety is associated with including three-fold increased risk for all-cause mortality following acute coronary event and an almost two-fold increased likelihood of reinfarction (e.g., Edmondson et al., 2012; Januzzi, Stern, Pasternak, & DeSanctis, 2000; Tully, Cosh, & Baumeister, 2014; Tully, Cosh, & Baune, 2013). Although anxiety and fear is a normative response to a life-threatening event, increased worry and fear about cardiac sensations potentiates subjective experience of cardiac pain (Zvolensky, Eifert, Feldner, & Leen-Feldner, 2003) and can maintain anxiety (Telch et al., 2010). Such anxiety and fear may subsequently promote avoidance of activities that elicit physical sensations (e.g., aerobic exercise). Indeed, elevated anxiety following an acute coronary event is associated with elevated physical symptoms and low levels of physical activity one year later (Mayou et al., 2000).

Anxiety sensitivity is a cognitive vulnerability defined as the tendency to be fearful of, or catastrophically interpret the meaning of, anxiety and related physical sensations (Reiss, 1991). Simply put, anxiety sensitivity can be conceptualized as the fear of anxiety. Anxiety sensitivity is primarily implicated in the development and maintenance of anxiety and stress disorders (Olatunji & Wolitzky-Taylor, 2009). Limited work has examined the nature of anxiety sensitivity in patients with CVD. Theoretically, following an acute cardiac event or procedure or in the presence of cardiac threat, individuals may be fearful and overestimate the danger and risk associated with experiencing bodily sensations potentially due to cognitive biases to prominent physical and cardiac symptoms (Aikens, Zvolensky, & Eifert, 2001; Telch et al., 2010; Zvolensky et al., 2003). Initial data indicate that anxiety sensitivity is significantly higher in cigarette smokers with a self-reported history of CVD relative to smokers with no CVD history (Farris & Abrantes, 2017). Additionally, clinically-elevated levels of anxiety sensitivity were documented in a small sample of patients with coronary artery disease (Schroeder, Gerlach, Achenbach, & Martin, 2015). Further, anxiety sensitivity is associated with increased carotid plaques and arterial stiffness in those without CVD (Seldenrijk et al., 2013), suggesting its link to risk for CVD.

A growing literature, not specific to CVD, supports the link between anxiety sensitivity and various problematic health behaviors, including physical inactivity (Otto et al., 2016). Anxiety sensitivity is associated with lower levels of physical activity (Moshier, Szuhany, Hearon, Smits, & Otto, 2016), potentially due to the fear of the distressing bodily sensations evoked during exercise. Indeed, individuals with elevated anxiety sensitivity experience greater fear when engaging in structured bouts of aerobic exercise, particularly if they have a higher body mass index (Smits, Tart, Presnell, Rosenfield, & Otto, 2010), and perceive prolonged bouts of exercise as more effortful (Farris et al., 2017), relative to individuals with lower levels of anxiety sensitivity. Theoretically, anxiety sensitivity may be particularly important for patients enrolled in CR, for whom the presence of various physical symptoms and medical comorbidities can amplify anxiety and the salience and fear of body sensations (Farris & Abrantes, 2017; Zvolensky et al., 2003), especially during exercise.

Therefore, we aimed to characterize the nature of anxiety sensitivity in patients with CVD enrolled in CR, and examine the association between anxiety sensitivity and fears of potential negative health consequences of exercise. It was hypothesized that anxiety sensitivity would be (a) clinically elevated in the sample and (b) associated with more severe fears about the negative consequences of exercise.

2. Method

2.1. Participants and procedures

Patients (n = 69) were enrolled in an outpatient, medically-supervised, multi-component 12-week CR program. Patients were eligible for the CR program if they had a diagnosis of unstable angina, myocardial infarction, heart failure, had a left ventricular assist device, or had recent percutaneous coronary intervention, heart valve repair or

replacement, heart bypass or transplant surgery. The CR program included three-times weekly structured supervised aerobic exercise, educational classes that addressed a range of topics including modifiable lifestyle factors and mental health, case management by exercise physiologist, nurse or physical therapist, peer-support programming, and, when indicated, the option for individual treatment sessions (e.g., psychologist, dietitian, pharmacist). At admission to the program, patients completed a standardized battery of self-report assessments, including measures of anxiety and depression. Anxiety sensitivity and fear of exercise were assessed at a single CR session for all patients, regardless of their current CR treatment week. Thus, all data presented are cross-sectional.

2.2. Measures

Demographic Characteristics and Medical History. Demographic factors, CR admission diagnosis, and cardiac risk status were extracted from clinic medical database. The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) protocol was used to determine cardiac risk during exercise, which is stratified as low, moderate, or high risk, numerically coded in these data as 0, 1, and 2 (respectively). Risk stratification is used to provide instruction to clinicians regarding the amount and type of exercise supervision provided to patients during CR (Warburton, Bredin, Jamnik, Shephard, & Gledhill, 2016), and patients were not informed of their AACVPR risk stratification.

Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007). The ASI-3 is an 18-item self-report measure in which respondents indicate the extent to which they are concerned about possible negative consequences of anxiety and related physical sensations (e.g., "It scares me when my heart beats rapidly"). Responses are rated on a five-point Likert scale ranging from 0 (very little) to 4 (very much) and summed to create a total score (possible range 0–72) and three subscale scores (possible range 0–24) reflecting physical, cognitive, and social consequences. The ASI-3 measure has strong psychometric properties (Taylor et al., 2007). Internal consistency of ASI-3 total and subscales scores in the current sample was good: Cronbach's α = 0.78 (total), α = 0.82 (physical), α = 0.90 (cognitive), and α = 0.74 (social). Clinical cut-scores ≥ 17 and ≥ 23 indicate moderate and high levels of anxiety sensitivity, respectively, which have been documented in undergraduate students (Allan, Korte, Capron, Raines, & Schmidt, 2014) and daily cigarette smokers (Allan et al., 2014).

Fear of Exercise Questionnaire. We developed items that assess fearful beliefs about the negative consequences of exercise (e.g., belief that something might suddenly happen physically during exercise, not being able to breathe properly during exercise, fear that a cardiac event will occur during exercise), low exercise confidence, and related avoidance behaviors (e.g., slowing down/stopping exercise when feeling physical discomfort, avoiding exercise alone because it is medically unsafe). Six items are rated on scale from a 0 (very little) to 4 (very much) and summed to create a total score (possible range 0–24). An exploratory factor analysis (EFA) using principal components analysis was conducted to examine the underlying structure of the items. The factor structure was determined by examination of the scree plot for clear discontinuities of eigenvalues and eigenvalues > 1 (Goldberg & Velicer, 2006) and factor loadings ≥ 0.40 was used to determine significant item loading (Tabachnick & Fidell, 2000). Examination of scree plot indicated that a one-factor structure was the best solution (eigenvalue = 3.15), which explained 52.5% of the total variance. The minimum average partial (MAP; Velicer, 1976) and parallel analysis with 1000 random sample datasets (O'Connor, 2000) confirmed the single component solution. All factor loadings were ≥ 0.52. Internal consistency of items was good (Cronbach's α = 0.81).

Generalized Anxiety Disorder-7 (GAD-7 Spitzer, Kroenke, Williams, & Löwe, 2006) and Patient Health Questionnaire-9 (PHQ-9 Kroenke, Spitzer, & Williams, 2001). The GAD-7 and PHQ-9 are validated self-