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Exercise behavior and gender-related differences in posttraumatic stress disorder symptoms

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ABSTRACT

Objectives: Exercise has been proposed as a potential treatment for posttraumatic stress disorder (PTSD). However, the relationship between exercise, gender, and PTSD symptoms is unknown.
Design: This study examined the cross-sectional relationship among these variables in a national sample of 165 men and women who screened positive for PTSD.
Method: Participants completed an online survey consisting of the Godin Leisure-Time Exercise Questionnaire and the PTSD Checklist-Civilian.
Results: Active participants had significantly lower PTSD symptoms than insufficiently active participants. Significant interactions between gender and exercise for PTSD symptoms were found, such that active men had significantly lower PTSD symptoms than active women, and insufficiently active men and women. Additionally, strenuously active men reported significantly lower hyperarousal symptoms than strenuously active women, and insufficiently active men and women.
Conclusion: Findings suggest that the relationship between PTSD and exercise may differ for specific subpopulations of individuals with PTSD, such as men and women.

1. Introduction

Posttraumatic stress disorder (PTSD) is a mental disorder that affects about 5% of men and 10% women in the United States (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Its disabling symptoms include re-experiencing (e.g., flashbacks), avoidance behaviors, hyperarousal, and mood symptoms, such as negative affect (American Psychiatric Association, 2013). There are several effective treatments for PTSD, including psychotherapy and medication (Watts et al., 2013), however, the rates of use are low. For example, only about a third of individuals with PTSD seek treatment from a healthcare professional (Kessler et al., 2005; Madsen, Andersen, & Karstoft, 2016), often because of barriers to treatment such as stigma, the fear of negative social consequences, cost, and/or access to care (Kantor, Knefel, & Lueger-Schuster, 2017).

In addition, although PTSD has been shown to contribute to physical inactivity (Winning et al., 2017), exercise has recently been proposed as a possible treatment or treatment adjunct for PTSD (Whitworth & Ciccolo, 2016) given its well-known beneficial effects on negative mental health states (Ekkekakis, 2015; Herring, O'Connor, & Dishman, 2010). This is supported by several large cross-sectional studies that have repeatedly shown exercise to be inversely correlated to PTSD and its co-occurring conditions. More specifically, exercise has consistently been found to be inversely correlated with a PTSD diagnosis (Chwastiak, Rosenheck, & Kazis, 2011) and its symptoms, such as poor sleep quality (Talbot, Neylan, Metzler, & Cohen, 2014) and co-occurring depressive symptoms (Rutter, Weatherill, Krill, Orazem, & Taft, 2013). There is also emerging evidence supporting an inverse relationship between exercise participation and the severity of PTSD symptoms. For instance, regular participation in strenuous intensity exercise has been shown to be longitudinally associated with reductions in PTSD severity over time (Whitworth, Craft, Dunsiger, & Ciccolo, 2017). Additionally, exercise participation has been shown to be inversely associated with hyperarousal and avoidance symptoms in individuals who have experienced a traumatic event (Harte, Vujanovic, & Potter, 2013; Vujanovic, Farris, Harte, Smits, & Zvolensky, 2013).

The proposed beneficial relationship between exercise participation and PTSD symptoms is also theoretically supported by the

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Cross-Stressor Adaptation Hypothesis (Sothmann et al., 1996). Specifically, repeated exposure to a stressor, such as exercise for a sufficient intensity and duration can lead to adaptations in the stress response system. Further, these adaptations may lead a reduction in negative cognitive appraisals in response to a stressor (e.g., a reduction in PTSD symptoms).

Despite the growing amount of observational research in the field of PTSD and exercise, several important areas need further research. For instance, given the increased risk of PTSD for military personnel (American Psychiatric Association, 2013), a majority of the current studies have specifically targeted treatment seeking veterans, and by proxy, men (Chwastiak et al., 2011; LeardMann, Kelton, Smith, Littman, & Boyko, 2011). Additionally, other studies have purposefully excluded individuals with a current or past diagnosis of axis-1 psychological disorders in order to better understand the relationship between exercise and PTSD. However, these studies lack generalizability to other at-risk populations, such as women, non-treatment seeking individuals, or those who have a history of mental illness. This is an important shortcoming of the current research because it is not likely to be representative of the typical adult with PTSD, who is most likely to be female with co-occurring conditions (e.g., depression) (Sareen, 2014), and is less likely to engage in treatment (Kantor et al., 2017).

The above issues are further compounded by a lack of scientific rigor applied to the measurement of exercise. For instance, most studies have not used a validated measure of exercise. In fact, the most common practice has been to use an unvalidated single-item questionnaire that only assesses exercise frequency (Whitworth & Ciccolo, 2016), leaving out other important components of exercise dose, such as intensity and total exercise volume. Importantly, the intensity of exercise is known to have a meaningful psychological impact (e.g., changes to affective valence) even after a single session of exercise (Ekkekakis, Parfitt, & Petruzzello, 2011). As such, the lack of studies measuring exercise dose variables beyond frequency has therefore created a major gap in the current literature.

Overall, more work is needed in this area, as the limitations of the current research reduce the generalizability of the reported findings and prevent a rigorous examination of the relationship between PTSD symptom severity and exercise participation. This is particularly problematic for determining any relationship that might exist or differ among certain sub-populations, such as men and women or those with a history of psychiatric illness. Therefore, the purpose of this study was to overcome limitations of previous research on exercise and PTSD by examining the relationship between PTSD symptoms (i.e., re-experiencing, avoidance/numbing, and hyperarousal), gender, and exercise dose (i.e., frequency, intensity, and total volume) in a national sample of adults who screened positive for PTSD.

2. Methods

2.1. Procedures

This study used a cross-sectional design. Potentially interested individuals were recruited through online-classified listings (e.g., Craigslist) and social media, such as Facebook and Twitter from each of the major US regions (i.e., Northeast, South, West, and Midwest). The listings sought to recruit individuals who were currently bothered by a previous traumatic life event. However, PTSD or other psychological disorders were not specifically mentioned in the recruitment materials in order to encourage those without a formal diagnosis to participate. Each listing provided a link to the study's informed consent, where the consenting participants were redirected to an online survey. All participants completing the survey were entered into a raffle to win a $50 gift card. The odds of winning were 1 in 25. The study was approved by the University's Institutional Review Board. All data were collected between May and August 2015.

2.2. Participants

To be eligible, participants needed to be living in the United States with access to the Internet. All had to be at least 18 years old, read English, report experiencing a traumatic life event (e.g., sexual assault, violent crime, natural disaster, military combat), and screen positive for PTSD (see PTSD screening and symptoms below for details).

2.3. Measures

Demographic questionnaire. This questionnaire assessed participant age, gender, race/ethnicity, education, income, military veteran status, physical disability status, and history of psychiatric illness.

Self-reported exercise. The Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985) was used to measure the amount of self-reported leisure-time exercise done in a typical week. Respondents were asked to indicate how many times in a typical week they participated in 15 min or more of minimal effort (e.g., easy walking), moderate (e.g., resistance training), and strenuous (e.g., vigorous running or cycling) exercise. For scoring, the frequency of minimal effort, moderate, and strenuous exercise was multiplied by 3, 5, and 9 metabolic equivalents, respectively. After scoring the individual intensities, moderate and strenuous intensity exercise were also summed to represent total leisure-time exercise (Godin, 2011). Higher scores on the GLTEQ represent greater exercise participation, and for interpretation, a cut-off score of 24 was used to determine if an individual was likely to be meeting the national physical activity guidelines of $\geq$150 min of moderate-to-vigorous weekly physical activity (Amireault & Godin, 2015; Garber et al., 2011). Specifically, participants scoring a 24 or more on moderate or strenuous intensity exercise independently, or through a combination of moderate and strenuous intensity exercise (i.e., total leisure-time exercise) were likely to be meeting the guidelines and considered to be “active”. Thus, those scoring less than a 24 were not likely to be meeting the recommendations and considered “insufficiently active”. The GLTEQ has been shown to be a reliable and valid measure of total leisure-time exercise, and exercise done at strenuous, moderate, and minimal intensities (Amireault & Godin, 2015; Godin & Shephard, 1985).

PTSD screening and symptoms. The PTSD Checklist-Civilian corresponding to the DSM-IV (PCL-C) was used to screen for PTSD, and to measure the severity of PTSD symptoms in the past month (Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-C is a 17-item, 5-point self-report scale that asks individuals to rate their PTSD symptoms from “Not at all” to “Extremely”. Total scores range from 17 to 85, with higher scores indicating worse PTSD symptoms. Additionally, each of the items on the PCL-C corresponds with specific PTSD symptoms (i.e., re-experiencing, avoidance/numbing, and hyperarousal). Specific scores for the re-experiencing, avoidance/numbing, and hyperarousal symptom clusters range from 5 to 25, 7 to 35, and 5 to 25 respectively. The PCL-C is a reliable and valid measure of PTSD and strongly correlates with the gold standard measure of PTSD (i.e., Clinician Administered PTSD Scale; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Importantly, the PCL-C has been shown to be reliable when administered via computer (Campbell et al., 1999). Given that participants were recruited from the general population, a recommended cut-point total score of 30 was used to indicate a positive screening for PTSD (Walker, Newman, Dobie, Ciechanowski, & Katon, 2002).