



## The interactive role of exercise and sleep on veteran recovery from symptoms of PTSD



Kimberly A. Babson<sup>a,\*</sup>, Adrienne J. Heinz<sup>a</sup>, Gil Ramirez<sup>b</sup>, Melissa Puckett<sup>b</sup>,  
Jessica G. Irons<sup>c</sup>, Marcel O. Bonn-Miller<sup>d,e,f</sup>, Steven H. Woodward<sup>g</sup>

<sup>a</sup> Center for Innovation to Implementation, VA Palo Alto Health Care System, Department of Psychiatry and Behavioral Sciences, Stanford School of Medicine, USA

<sup>b</sup> VA Palo Alto Health Care System, USA

<sup>c</sup> Department of Psychology, James Madison University, USA

<sup>d</sup> Center for Excellence in Substance Abuse Treatment and Education, Philadelphia VAMC, USA

<sup>e</sup> National Center for PTSD & Center for Innovation to Implementation, VA Palo Alto Health Care System, USA

<sup>f</sup> Department of Psychiatry, University of Pennsylvania Perelman School of Medicine, USA

<sup>g</sup> National Center for PTSD, VA Palo Alto Health Care System, USA

### ARTICLE INFO

#### Article history:

Received 29 May 2014

Received in revised form

16 December 2014

Accepted 30 December 2014

Available online 28 January 2015

#### Keywords:

PTSD

Veterans

Physical

Exercise

Sleep

Hyperarousal

### ABSTRACT

**Introduction:** Posttraumatic Stress Disorder (PTSD) is prevalent among military veterans and is associated with a number of negative outcomes. Despite available treatments, rates of recovery are poor and many symptoms persist post-treatment. Previous research suggests that exercise functions to reduce symptoms of anxiety and improve sleep quality, though its effects are understudied among those with PTSD.

**Method:** We sought to assess the extent to which exercise and sleep interactively impact changes in PTSD severity. Participants were 217 veterans in residential PTSD treatment who were offered the opportunity to participate in a bike-exercise program. Data were collected at treatment intake and discharge.

**Results:** Exercise (defined as total volume of cycling completed over the course of treatment) was associated with greater reductions in PTSD hyperarousal symptoms at discharge only among veterans with poor intake sleep quality.

**Conclusions:** Overall, exercise may be a beneficial adjunctive treatment for reducing hyperarousal symptoms among individuals with PTSD and poor sleep.

Published by Elsevier Ltd.

Posttraumatic stress disorder (PTSD) is characterized by an inability to recover from a stress reaction following exposure to a traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) and is defined as the non-remittance of symptoms by 1-month post-traumatic event exposure (DSM-5; APA, 2013). Military personnel are among the most at-risk populations for exposure to traumatic events and subsequent onset of PTSD (Schlenger et al., 2002). The percentage of veterans served by the Veterans Health Administration (VHA) and diagnosed with PTSD increased by 60% between 2001 and 2007 (VHA, 2009). Such trends are concerning given that PTSD is associated with a number of negative consequences including frequent comorbid psychiatric disorders

(Kessler, 2000), physical health problems (Green & Kimerling, 2004), and functional impairment (e.g., marital difficulties, unemployment; Kessler, 2000). Although effective interventions are available for PTSD (e.g., cognitive processing therapy and prolonged exposure; Foa et al., 1999; Resick, Monson, & Chard, 2007), they are time-intensive, require trained specialized clinicians, and residual symptoms of PTSD often persist following successful treatment completion (Zayfert & DeViva, 2004). Accordingly, identification of low-cost, non-specialized adjunctive interventions may allow providers to reach more individuals and further optimize treatment outcomes. Exercise is one such intervention that holds both empirical and theoretical promise.

A wealth of research has demonstrated that engagement in mild to moderate levels of exercise (e.g., a brisk walk of at least 30 min, multiple times weekly) is an effective independent and adjunctive intervention for psychological disorders. Indeed, meta-analyses

\* Corresponding author.

E-mail address: [kimberly.babson@gmail.com](mailto:kimberly.babson@gmail.com) (K.A. Babson).

collectively indicate that physical activity is associated with reductions in anxiety among both clinical and non-clinical populations (Petruzzello, Jones, & Tate, 1997; Wipfli, Rethorst, & Landers, 2008) and can yield effects (i.e., affective symptom reduction) equivalent to those observed with cognitive behavioral therapy for anxiety and depression (for a review see Zschucke, Gaudlitz, & Strohle, 2013).

Evidence has also consistently highlighted the benefits of exercise among individuals who suffer from poor sleep. Moderate intensity aerobic exercise has been associated with reduced polysomnographic measures: sleep onset latency, total wake time, number of awakenings, and amount of time spent in stage 1 sleep, while increasing total sleep time, sleep efficiency, and amount of time in stage 2 sleep (King et al., 2008; Passos et al., 2010). Moderate intensity exercise has also been shown to improve self-reported indices of sleep, including sleep quality, sleep latency, sleep duration, daytime dysfunction, and sleep efficiency (King, Oman, Brassington, Bliwise, & Haskell, 1997; Reid et al., 2010; Singh, Clements, & Fiatarone, 1997).

Taken together, these studies suggest that individuals with anxiety and co-occurring sleep problems may experience the greatest benefits from exercise (Asmundson et al., 2013; Brand et al., 2010). While the mechanisms underlying these relations are still being investigated, initial work suggests that exercise may have a positive impact on sleep and anxiety through improvement in physical fitness and habituation to somatic arousal (Salmon et al., 2001; Tworoger et al., 2003).

Although the benefits of exercise on anxiety, depression, and sleep are well documented, less is known about its impact on PTSD symptoms. Preliminary data, based on small non-controlled studies, have suggested positive benefits of including exercise within PTSD interventions (See Zschucke et al., 2013). Moreover, exercise holds theoretical promise for addressing symptoms of PTSD among those with particularly poor sleep. Sleep problems represent the primary presenting concern among individuals with PTSD, with 74–90% of currently deployed and post-deployed veterans reporting significant symptoms of insomnia (Lewis, Craemer, & Failla, 2009), which have in turn been associated with greater PTSD symptom severity (Krakow et al., 2001). Based on this co-occurrence, the positive impact of exercise on PTSD symptoms may be particularly salient for those with poor sleep.

The present study sought to examine the hypothesis that exercise (defined as total miles cycled over the course of treatment) would be associated with lower PTSD symptom severity at treatment discharge, particularly among those with poor baseline (treatment intake) sleep quality, after accounting for age, baseline (treatment intake) PTSD symptom severity, treatment changes in depression symptoms, and total number of days cycled. As the current study included Vietnam-era as well as Operation Iraqi Freedom-Operating Enduring Freedom (OEF/OIF) veterans, age was included as a covariate due to its association with sleep quality (Buysse, Monk, Carrier, & Begley, 2005).

## 1. Method

### 1.1. Participants

Participants were 217 male military veterans ( $M_{age} = 52.18$  years,  $SD = 7.06$ ; Range 24–70 years) admitted to a 60–90-day VA residential rehabilitation program for PTSD, during which time individuals participated in cognitive behavioral therapy (CBT) for PTSD. Exclusion criteria for enrollment in the program included: (a) illicit substance and/or alcohol use during treatment, and (b) medical conditions with high probabilities of significantly interfering with or preventing psychological treatment (i.e., those

unable to move about independently). The racial/ethnic composition of the sample was as follows: 60.9% Caucasian, 17.9% African American, 11.3% Hispanic/Latino, 3.3% Native American, 2.0% Pacific Islander, 0.7% Asian, and 4.0% identified as “other.” In terms of psychiatric comorbidities, 92.2% of the sample had a co-occurring mood disorder, 76.0% reported a history of at least one substance use disorder (patients were required to abstain from substance use), and 14.0% had a co-occurring anxiety disorder. Per treatment facility regulations at the time of the study, all patients admitted to treatment were required to be abstinent from all substances (except caffeine and nicotine) for at least 2 weeks prior to treatment intake. Abstinence was confirmed via urine toxicology screen at intake and weekly throughout the duration of treatment.

### 1.2. Measures

**Pittsburgh Sleep Quality Index (PSQI;** Buysse, Reynolds, Monk, & Berman, 1989). The PSQI is a 19-item questionnaire that provides an index of global sleep quality and seven components of sleep quality. Respondents (a) answer open-ended questions in which responses are coded based on established categories and (b) indicate answers on a 4-point Likert-type scale (0 = *very good* to 3 = *very bad*). In the current study the PSQI total score (sum of all 7 components) was used. Cronbach's  $\alpha = .51$  for the current sample. A total score on the PSQI greater than 5 is indicative of clinical levels of insomnia (Buysse et al., 1989).

**PTSD Checklist – Military Version (PCL-M;** Weathers, Litz, Herman, Huska, & Keane, 1993). The 17-item PCL-M was used to index PTSD symptom severity. The PCL-M yields three symptom clusters (re-experiencing, avoidance/numbing, and hyperarousal) as well as a total score indicative of PTSD symptom severity. To account for conceptual overlap with our measure of sleep quality, the sleep item was removed prior to scoring. Cronbach's  $\alpha$ 's = Intake (re-experiencing = .87, avoidance = .75, hyperarousal = .76); Discharge (re-experiencing = .88, avoidance = .87, hyperarousal = .87) for the current sample.

**Beck Depression Inventory –II (BDI-II;** Beck, Steer, & Brown, 1996) is a 21-item self-report measure of depression symptoms. The sleep item was removed prior to calculation of a total score. Cronbach's  $\alpha = .87$  (intake) and .93 (discharge) in the current sample.

**Exercise.** Distance cycled while engaged in a group bicycling program was used to index exercise. Interested veterans voluntarily participated in group bicycling outings led and supervised by a staff trainer. Veterans were provided access to a road bike outfitted with a cyclometer to measure total miles cycled per cycling event. Daily mileage was recorded. Upon discharge, the total number of days and miles cycled over the course of treatment was then calculated. This resulted in a continuous index of total mileage cycled over the course of treatment. In addition to the continuous index, exercise was trichotomized to generate groups as research has shown that varying levels of exercise have significantly different impact on mood (Arent, Landers, & Etnier, 2000). Examination of a histogram did not yield a natural cut-point. Therefore, an empirical method was necessary to determine where to split the groups. For this reason a median split was employed. This resulted in a non-cycling group ( $n = 176$ ), those who cycled between 1 and 59.5 miles (moderate mileage cycled;  $n = 20$ ), and those who cycled 59.6 miles or more (high mileage cycled;  $n = 21$ ).

### 1.3. Procedure

Demographic characteristics and the PSQI were obtained at intake; the BDI-II and PCL were administered at intake and discharge. Adjunct cycling occurred simultaneously to cognitive

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات