



Sleep and affective functioning: Examining the association between sleep quality and distress tolerance among veterans



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ABSTRACT

Poor sleep quality is common among veterans, and associated with numerous negative consequences. Although sleep may play a critical role in next-day emotion regulation functioning, it is currently unclear how sleep quality relates to distress tolerance. As such, the current study cross-sectionally examined the association between sleep quality and distress tolerance (measured behaviorally and via self-report) among 94 military veterans with cannabis use disorder. Results indicated that Perceived Sleep Quality was associated with self-reported distress tolerance and increased frustration on a distressing task, after accounting for covariates. The current study's findings should be replicated utilizing prospective designs, but are initially consistent with theoretical models suggesting that sufficient sleep quality is necessary for appropriate affective functioning, and have clinical implications given the negative effects of poor sleep quality on general psychological functioning.

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1. Introduction

Poor sleep quality is a public health epidemic, with over 70 million Americans affected, resulting in \$250 billion annually in lost productivity and related healthcare costs (Daley, Morin, LeBlanc, Gregoire, & Savard, 2009). Poor sleep quality is the subjective assessment of poor and unrefreshing sleep, and the daytime consequences of poor sleep quality (e.g., mood instability, fatigue, and problems with concentration and memory) can cause significant distress and functional impairment (Ancoli-Israel & Roth, 1999). Poor sleep quality may include symptoms of insomnia (difficulties with sleep onset and maintenance), but does not necessarily indicate insomnia disorder. One population particularly affected by poor sleep quality is veterans, with nearly two-thirds of veterans reporting concern about their sleep (Strong et al., 2014). Poor sleep quality among veterans is associated with numerous negative consequences, including increased depressive and posttraumatic stress disorder (PTSD) symptoms, as well as substance use (Wright et al., 2011; Vandrey, Babson, Herrmann, & Bonn-Miller, 2014). Considering the association between poor sleep quality and mental health concerns among veterans, it is important to investigate the breadth of consequences associated with poor sleep quality among this population.

Difficulties with affective functioning are one important and under-investigated consequence of poor sleep quality. Recent research has demonstrated that sleep plays a critical role in mood regulation and emotional responding (Goldstein & Walker, 2014). Indeed, a burgeoning line of research has documented associations between laboratory-based experimental sleep restriction and disturbances in affective responding, specifically increased negative affect (Babson, Feldner, Trainor, & Smith, 2009; Sagaspe et al., 2006) and emotional reactivity to negative emotional cues (Dinges et al., 1997; Minkel et al., 2012), as well as impairments in emotion regulation (Yoo, Gujar, Hu, Jolesz, & Walker, 2007). Furthermore, both acute and ongoing sleep disturbances appear to be associated with difficulties in emotion regulation (Yoo et al., 2007; Mauss, Troy, & LeBourgeois, 2013; Pickett, Barbaro, & Mello, 2015). It is possible that emotion regulation difficulties resulting from acute sleep disturbances could resolve after good sleep quality is restored (e.g., Gujar, McDonald, Nishida, & Walker, 2010), while those resulting from chronic sleep disturbances may become chronic as well. As such, it is likely that poor sleep quality could lead to difficulties in emotion regulation, and, in turn, increased risk for psychopathology and substance use. Indeed, research has shown that poor sleep quality is a risk factor for these problems, with disruptions in emotion regulation hypothesized as a potential mechanism (Neckelmann, Mykletun, & Dahl, 2007; Wong, Brower, Fitzgerald, & Zucker, 2004; Harvey, 2008). However, it is also known that the relationship between sleep and psychopathology is bidirectional, with psychological disorders

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also contributing to poor sleep (Harvey, 2008). Considering this, poor sleep may also follow the development of psychological disorders and substance use, exacerbating emotion regulation issues and psychological symptoms.

Despite the wealth of recent research demonstrating a relation between disturbed sleep and emotion regulatory responding, it remains unclear what underlying constructs may be affected by poor sleep quality. Distress tolerance (DT) is one such construct for which existing evidence highlights a potential association with poor sleep quality; however, no research has yet examined this association. Distress tolerance is defined as the perceived and/or actual behavioral capacity to tolerate negative emotional states (Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005), and is often measured through self-report inventories, such as the Distress Tolerance Scale (DTS) (Simons & Gaher, 2005), or task persistence on distressing tasks, such as the Mirror Tracing Task (Quinn, Brandon, & Copeland, 1996). DT has been conceptualized as a component of emotion regulation; individuals with low DT perceive themselves as unable to handle negative emotions, and thus often engage in maladaptive behaviors (e.g., substance use) to regulate their emotions, particularly to reduce or avoid distress (Brown et al., 2005; Zvolensky et al., 2009). The etiology of DT is unclear but DT is often conceptualized as a trait-like variable that can act as a risk factor for psychopathology (Simons & Gaher, 2005), and as such low DT may exist in the presence or absence of poor sleep quality. However, theoretical models of DT also suggest that it can change over time, based on individuals' characteristics and behavior (e.g., one's ability to consciously control or inhibit habitual reward or relief seeking) (Trafton & Gifford, 2011). Furthermore, characteristics such as impulsivity, reward seeking, decision-making, emotion regulation and executive functioning have all been hypothesized to contribute to DT, and are also known to be affected by sleep (Yoo et al., 2007; Trafton & Gifford, 2011; Anderson & Platten, 2011; Harrison & Horne, 1999; Gujar, Yoo, Hu, & Walker, 2011).

Although extant research has yet to examine the relation between sleep quality and DT, there are a number of reasons to believe that poor sleep quality may be associated with lower DT. First, those with poor sleep quality may be susceptible to more frequent and intense negative affect, such as stress, anxiety, and anger, in response to negative emotional cues (Minkel et al., 2012; Zohar, Tzischinsky, Epstein, & Lavie, 2005). Additionally, these individuals may be unable to effectively down-regulate these emotional responses (Yoo et al., 2007; Mauss et al., 2013). This confluence of factors may lead individuals with poor sleep quality to evaluate their negative emotions as uncontrollable, threatening, and intolerable.

Despite a growing literature demonstrating associations between sleep and affective functioning, there has yet to be an investigation of the relation between sleep and DT. In addition, no studies to our knowledge have examined the relation between sleep quality and affective functioning among clinical samples who may be vulnerable to the effects of poor sleep quality. Thus, the current study examined the association between sleep quality and DT among treatment-seeking veterans. Specifically, we chose to examine these associations among veterans with substance use disorder (i.e., cannabis use disorder; CUD), as both poor sleep quality and low DT are common among this population (Zvolensky et al., 2009; Babson & Bonn-Miller, 2014). We measured distress tolerance behaviorally (Mirror Tracing) (Quinn et al., 1996) and via self-report (DTS) (Simons & Gaher, 2005) given recent evidence highlighting the importance of multi-method assessment of this construct (McHugh et al., 2010; Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010).

Based on prior research indicating the importance of sleep for emotion regulatory functioning (Goldstein & Walker, 2014), we hypothesized that poor sleep quality would be associated with lower self-reported DT, as well as impaired task persistence and increased frustration on a distressing task (i.e., Mirror Tracing). Consistent with previous research indicating that sleep quality in particular may be important in the relationship between sleep and psychological functioning, we hypothesized that these associations would be specific to subjective

sleep quality, rather than sleep duration or efficiency (Babson, Blonigen, Boden, Drescher, & Bonn-Miller, 2012). Finally, we hypothesized that these associations would remain significant after accounting for current mood and anxiety disorder diagnoses as well as substance use (i.e., cannabis, alcohol, and tobacco), each of which have been associated with poor DT (Brown et al., 2005; Zvolensky et al., 2009; Allan, Macatee, Norr, & Schmidt, 2014).

2. Method

2.1. Participants

Participants were cannabis dependent veterans participating in a larger investigation of the predictors of relapse during a self-guided cannabis cessation attempt (Bonn-Miller et al., 2015). Participants were required to: (1) be US military veterans, (2) meet diagnostic criteria for current cannabis dependence,¹ and (3) report a current level of motivation to quit of at least 5 on a 10-point scale (5 = "I often think about quitting using marijuana, but I have no plans to quit", 10 = "I have changed my marijuana use and will never go back to the way I used marijuana before"), as indexed by a modified version of the Contemplation Ladder (Prochaska, DiClemente, & Norcross, 1992). Exclusion criteria involved the following: (1) inability to provide informed consent to participate, (2) a decrease of greater than 25% in the amount of cannabis used during the month preceding screening, and (3) current pregnancy or breastfeeding. The possible participant pool included veterans with a cannabis use disorder residing in the San Francisco Bay Area, and individuals were recruited using flyers posted at several of the various healthcare facilities (e.g., outpatient medical clinics, substance use treatment facilities, etc.). A total of 107 veterans met criteria for the larger study. For the current study, we excluded participants with missing data on any of the measures of interest, resulting in a sample size of 94 (see Fig. 1). Characteristics of the excluded individuals did not differ significantly from those included on any of our primary variables.

Participants' ages ranged from 20 to 67 ($M = 50.99$, $SD = 10.03$). Most participants were male (94.7%) and self-identified as White/Caucasian (38.3%), followed by Black/Non-Hispanic (33.3%), Hispanic (13.8%), Other (11.7%), Black/Hispanic (1.1%) and Asian (1.1%). On average, 41.5% of participants completed at least some college education. All of the samples presented with current cannabis dependence according to DSM-IV criteria with the addition of withdrawal as a symptom (American Psychiatric Association, 2000).¹ Nearly half of the sample was diagnosed with a co-occurring mood disorder (40.4%), and 34% with a co-occurring anxiety disorder. Participants were also diagnosed with the following co-occurring (current) substance use disorders: alcohol (25.5%), cocaine (6.4%), amphetamine (4.3%), opiate (4.3%), and sedative/hypnotic (3.2%). Regarding military involvement, participants self-reported their most recent period of military service via free response. The majority of participants endorsed service during the Cold War era (1945–1991; 63%), with 32% specifically indicating involvement in the Vietnam War, followed by service during Operation Iraqi Freedom/Operation Enduring Freedom (OEF/OIF; 9%), and the Post-Cold War era (1991–2001, including Gulf War and Somalia involvement specifically; 7%), while 20% did not respond.

2.2. Measures

2.2.1. Clinician-administered

2.2.1.1. *Structured Clinical Interview for DSM-IV – Non-Patient Version (SCID-I/NP)* (First, Spitzer, Gibbon, & Williams, 1996). The SCID is a semi-structured clinical interview designed to assess DSM-IV Axis-I diagnoses and was used with all participants in the current study. SCID

¹ The SCID was modified to assess withdrawal as a symptom for CUD, consistent with DSM-5 criteria [44].

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