



The impact of perceived sleep quality and sleep efficiency/duration on cannabis use during a self-guided quit attempt



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HIGHLIGHTS

- Those with poor efficiency/duration of sleep had greater cannabis use at baseline.
- Those with poor perceived sleep quality had less of a reduction in cannabis use.
- Poor sleep quality is associated with elevated cannabis use during a quit attempt.

ARTICLE INFO

Available online 2 July 2013

Keywords:
Sleep quality
Cannabis
Marijuana
Cessation

ABSTRACT

Poor sleep quality may play a significant role in observed high rates of sustained cannabis use among veterans attempting to quit. We investigated whether individuals with poorer perceived sleep quality (rather than sleep efficiency/duration), as measured via the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, & Berman, 1989), would have less of a reduction in cannabis use (measured via Timeline FollowBack; Sobell and Sobell, 1992) during the first 6 months following a self-guided quit attempt. We expected these effects to remain significant after adjusting for baseline age, posttraumatic stress symptoms, as well as alcohol, tobacco, and opioid use, and cannabis withdrawal severity over the course of 6 months following the cannabis cessation attempt. Generalized linear mixed modeling using a Poisson distribution was employed to test the hypotheses among 102 cannabis dependent, primarily male, military veterans. Results indicated that veterans with poor perceived sleep quality had less of a reduction in mean cannabis use following a self-guided cannabis cessation attempt compared to those with good perceived sleep quality, while efficiency/duration was unrelated to cannabis use outcomes. Conclusions from this study should be considered in light of limitations including the use of self-report measures and generalizability to non-veterans and women.

Published by Elsevier Ltd.

1. Introduction

Rates of cannabis use disorders (CUDs; including cannabis dependence and cannabis abuse) throughout the Veterans Health Administration (VHA) have been steadily rising, with a 50% increase in diagnoses of CUDs in the past decade (Bonn-Miller, Harris, & Trafton, 2012). This increase has been met with the dissemination of treatments such as Contingency Management, Motivational Enhancement, and Cognitive-Behavioral interventions (Roffman & Stephens, 2006). Despite the availability of these treatments, self-guided quit attempts

represent the most common method by which individuals attempt to quit cannabis (Copersino et al., 2006; Cunningham, 2000; Weiner, Sussman, McCuller, & Lichtman, 1999). Regardless of the method (formalized treatment versus self-guided attempt), cannabis quit attempts are frequently accompanied by high rates of sustained use (Larimer, Palmer, & Marlatt, 1993) despite a strong desire to quit (McRae, Budney, & Brady, 2003; Moore & Budney, 2003). It is therefore critical to better understand malleable factors (i.e., behaviors/characteristics that can be modified) that may impact cannabis quit success so as to inform optimization of treatments and improve outcomes among those interested in quitting.

Disturbed sleep quality represents one factor that has been shown to play a crucial role in cannabis quit outcomes. In fact, among current cannabis users reporting a previous period of abstinence, 48–77% reported lapsing/relapsing, or increasing the use of other substances,

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in order to improve poor sleep (Copersino et al., 2006; Levin et al., 2010). The majority of research in this area has focused on the impact of poor sleep quality subsequent to a quit attempt (e.g., as a withdrawal symptom; Budney, Moore, Vandrey, & Hughes, 2003; Vandrey, Smith, McCann, Budney, & Curran, 2011). For example, Budney, Vandrey, Hughes, Thostenson, and Bursac (2008) observed that 65% of cannabis users indicated that poor sleep was the contributing factor to their difficulties in quitting cannabis. Overall, evidence converges to suggest that poor sleep quality subsequent to a quit attempt is associated with an increased risk for poor outcomes (Copersino et al., 2006; Levin et al., 2010). More recently, research has also demonstrated that poor *pre-quit* sleep quality is associated with reduced quit success. For example, in a study using preliminary data from the current sample (i.e., first seven days following the cannabis quit attempt), we demonstrated that cannabis dependent military veterans with poor *pre-quit* perceived sleep quality had an elevated risk for lapse to cannabis within the first two days following their quit attempt, in comparison to those with relatively better perceived sleep quality (Babson, Boden, Harris, Stickle, & Bonn-Miller, 2012). Together, extant research has independently demonstrated that both *pre-quit* and *post-quit* sleep qualities increase risk for lapse and sustained use (Babson, Boden, et al., 2012; Budney et al., 2003; Vandrey et al., 2011).

The current study sought to contribute to this literature by addressing three gaps: (a) limited understanding of how sleep disturbance prior to a quit attempt and sleep disturbance during the course of a quit attempt impact cessation outcomes; (b) limited longitudinal research among individuals actively engaged in a cessation attempt; and (c) limited work among populations other than community samples of young adults. In order to address these gaps, we aimed to integrate pre- and post-quit sleep quality within one analytic approach. This allows for the parsing apart of the differential impact of pre- and post-quit sleep quality on cannabis use. Such information could inform the timing of sleep interventions in cannabis treatments in order to optimize outcomes. Next, we aimed to extend the study by Babson, Blonigen, Boden, Drescher, & Bonn-Miller (2012) and Babson, Boden, et al. (2012) by investigating the longitudinal impact of sleep quality on frequency/quantity of cannabis use over the course of a 6-month follow-up period. We sought to test our hypotheses among military veterans, providing an important extension to the current state of the research given the elevated risk (i.e., sleep disturbances, psychological conditions; Lewis, Creamer, & Failla, 2009; Smith et al., 2008) among this population that may make them particularly at-risk for poor outcomes from cannabis quit attempts. Determining these associations among military veterans is also aptly timed as rates of cannabis use disorder diagnoses among military veterans are steadily increasing (Bonn-Miller et al., 2012). Finally, as self-reported sleep disturbance (as measured by the Pittsburgh Sleep Quality Index; Buysse et al., 1989) has been shown to be conceptualized as a multidimensional construct among veterans, comprised of perceived sleep quality (i.e., self-reported overall quality of sleep) and sleep efficiency/duration (i.e., self-reported quantity of sleep; Babson, Blonigen, et al., 2012), we sought to examine how these components of sleep disturbance may differentially relate to cannabis use during a cessation attempt.

Based on previous research (Babson, Boden, et al., 2012), we hypothesized that perceived sleep quality (and not sleep efficiency/duration) would impact the trajectory of cannabis use during a self-guided quit attempt. Specifically, we hypothesized that individuals with poorer perceived sleep quality would have less of a reduction in cannabis use during the 6 months following a quit attempt. We expected these effects to remain significant after adjusting for relevant factors that have been associated with cannabis use and sleep, including age (Ohayon, Carskadon, Guilleminault, & Vitiello, 2004), baseline posttraumatic stress symptoms (Bonn-Miller, Babson, Vujanovic, & Feldner, 2010), co-occurring substance use (i.e., alcohol, tobacco, opioids; Degenhardt, & Hall, 2012; Degenhardt, Hall, & Lynskey,

2001; Roehrs & Roth, 2001; Wetter, Fiore, Baker, & Young, 1995), and cannabis withdrawal symptom severity over the study period.

2. Method

2.1. Participants

One hundred and fifteen participants were recruited, from February 2010 through June 2012, via advertisements placed throughout a VA medical center. Participants were recruited for a study which aimed to identify risk factors for lapse/relapse to cannabis over the course of a self-guided quit attempt (see Heinz et al., 2013). Eligible individuals met the following inclusionary criteria: (1) being a U.S. veteran, (2) meeting criteria for current cannabis dependence based on proposed DSM-5 diagnostic criteria (Budney, Hughes, Moore, & Vandrey, 2004), (3) reporting a current level of motivation to quit of at least 5 on a 10 point scale (0 = “no interest in quitting” to 10 = “definite interest in quitting”), and (4) self-reported interest in making a serious self-guided (i.e., without formal treatment) quit attempt. Individuals were excluded based on: (1) inability to give informed, voluntary, written consent to participate, (2) a significant change (decrease of >25%) in amount of cannabis smoked per day over the past month, (3) pregnancy or current breastfeeding, and (4) current suicidal ideation. Of this recruitment sample, eleven participants were recruited but excluded from all analyses because they (a) were ineligible to participate and did not complete any aspect of the study ($n = 8$), or (b) were eligible to participate but did not complete baseline and at least one follow-up assessment, or engage in a cessation attempt ($n = 3$). In addition, two recruited participants were removed from all analyses due to greater than 10% of items having missing data for sleep. Therefore, the current sample was comprised of 102 cannabis dependent military veterans (95.1% male; $M_{age} = 50.79$, $SD = 9.89$). All participants were reimbursed in the form of gift cards for their time (see procedures section below for a description of the reimbursement schedule).

2.2. Measures

2.2.1. AXIS-I diagnostic status

The Structured Clinical Interview-Non-Patient Version for DSM-IV (SCID I-N/P; First, Spitzer, Gibbon, & Williams, 1995) was used by trained study staff to assess for current AXIS I diagnoses (including substance abuse and dependence) at baseline. All interviews were audio-recorded and diagnoses were confirmed by the last author following a review of recorded interviews.

2.2.2. Posttraumatic stress symptom severity

Posttraumatic stress symptom severity was measured using the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995). The CAPS has excellent psychometric properties, and is considered a “gold-standard” in PTSD assessment (Weathers, Keane, & Davidson, 2001; $\alpha = .92$ in the current study). A continuous symptom severity score was generated by summing across the frequency and intensity of 15 symptoms of PTSD, as the two sleep-related symptoms (i.e., nightmares and insomnia) were removed prior to calculation of a total score in order to avoid construct contamination. Posttraumatic stress symptom severity was used as a covariate.

2.2.3. Motivation to quit cannabis

Motivation to quit cannabis was assessed using an adapted version of the Contemplation Ladder (CL) developed for tobacco cessation (Prochaska & DiClemente, 1983). The CL is a visual analog scale (VAS) comprised of 10 steps, each with a corresponding statement assessing motivation to quit cannabis. Items range from, 1 = “I enjoy using marijuana and have decided not to quit using marijuana for my lifetime,” to 10 = “I have quit using marijuana and I will never use

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