Social anxiety and cannabis use: An analysis from ecological momentary assessment

Julia D. Buckner [a,*], Ross D. Crosby [b], Stephen A. Wonderlich [b], Norman B. Schmidt [c]

[a] *Louisiana State University, USA*
[b] *University of North Dakota School of Medicine & Health Sciences, and the Neuropsychiatric Research Institute, USA*
[c] *Florida State University, USA*

ABSTRACT

Individuals with elevated social anxiety appear especially vulnerable to cannabis-related problems, yet little is known about the antecedents of cannabis-related behaviors among this high-risk population. The present study used ecological momentary assessment (EMA) to examine the relations among social anxiety, cannabis craving, state anxiety, situational variables, and cannabis use in the natural environment during ad-lib cannabis use episodes. Participants were 49 current cannabis users. During the two-week EMA period, social anxiety significantly interacted with cannabis craving to predict cannabis use both cross-sectionally and prospectively. Specifically, individuals with higher social anxiety and craving were most likely to use cannabis. There was a significant social anxiety × state anxiety × others' use interaction such that when others were using cannabis, those with elevations in both trait social anxiety and state anxiety were the most likely to use cannabis.

© 2011 Elsevier Ltd. All rights reserved.

1. Introduction

People with social anxiety disorder (SAD) appear particularly vulnerable to cannabis use disorders (CUD). Compared to those without SAD, adolescents with SAD show nearly five times greater risk of developing adult cannabis dependence after controlling for other anxiety disorders, depression, and other relevant Axis I psychopathology (Buckner et al., 2008). When accounting for covariance among internalizing disorders, SAD emerges as the only internalizing disorder related to cannabis problems (Buckner, Mallott, Schmidt, & Taylor, 2006; Buckner et al., 2008). Further, studies using continuous measures of social anxiety also find a positive, significant relationship between social anxiety and cannabis-related problems (Buckner & Schmidt, 2008; Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007; Buckner, Heimberg, & Schmidt, 2011; Buckner, Heimberg, Matthews, & Silgado, in press; Marmorstein, White, Loeber, & Stouthamer-Loeber, 2010). The relationship between social anxiety and cannabis problems remains even after controlling for relevant variables such as other substance use, other types of anxiety, depression, and delinquency (Buckner & Schmidt, 2009a,b; Buckner, Schmidt, Bobadilla, & Taylor, 2006; Buckner, Bonn-Miller, et al., 2007; Marmorstein et al., 2010).

Despite the high rates of cannabis-related problems among those with elevated social anxiety, the nature of this relationship is poorly understood. Consistent with motivational models of substance use (e.g., Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), it is assumed that people with elevated social anxiety use cannabis to reduce anxiety in social situations. Supporting this idea, using cannabis to manage social anxiety is related to greater cannabis use and use-related problems (Lee, Neighbors, Hendershot, & Grossbard, 2009). Cannabis users with elevated social anxiety report using cannabis to manage negative affect and to avoid social scrutiny (Buckner, Bonn-Miller, et al., 2007). Further, using cannabis to manage negative affect mediated the relationship between social anxiety and cannabis-related problems in that study.

The majority of the extant research in this area is limited by the use of retrospective accounts of reasons for cannabis use. Three experimental studies offer a more controlled account of the relations between social anxiety and cannabis use. Consistent with retrospective reports, those with SAD (but not those without SAD) reported greater desire to use cannabis during (though not before or after) a social stressor (i.e., speech) task (Buckner, Silgado, & Schmidt, 2011). Among cannabis abstainers, those with SAD who received cannabidiol (CBD; an active component of cannabis) reported significantly less of an increase in state social anxiety during (but not before or after) a speech task compared to individuals with SAD who received placebo (although anxiety reported by those with SAD who received CBD was significantly greater than that reported by non-anxious controls) (Bergamaschi et al., 2011).

* Corresponding author at: Department of Psychology, Louisiana State University, 236 Audubon Hall, Baton Rouge, LA 70803, USA. Tel.: +1 225 578 4096; fax: +1 225 578 4125.
E-mail address: jbuckner@lsu.edu (J.D. Buckner).

CBD resulted in decreases in state anxiety following (though not during) a speech task in healthy volunteers (Zuardi, Cosme, Graeff, & Guimarães, 1993). Taken together, these studies suggest that individuals with higher trait social anxiety may be especially vulnerable to using cannabis during social situations rather than when alone in anticipation of the situation (to manage anticipatory anxiety or to enter the situation already intoxicated) or following the situation (to manage post-event processing, found to be related to distress among socially anxious indivduals; for review see Dannahy & Stopa, 2007).

One limitation to this body of work is that participants were never truly alone during these situations (as they were monitored by study staff) so it remains unclear whether socially anxious individuals are vulnerable to using cannabis when alone. A second limitation is that participants either did not use cannabis or did not choose when to receive CBD during these tasks. Thus, it remains unclear whether participants actually use cannabis during social situations and if so whether they do so to manage unpleasant negative affective states. This literature also is limited by the use of laboratory methods that may dramatically impact the ecological validity of the findings. Thus, further elucidation of the circumstances in which socially anxious individuals are vulnerable to using cannabis in more naturalistic settings could have important treatment and prevention implications.

The use of ecological momentary assessment (EMA) in prospective designs is one way to further elucidate the relations between social anxiety and cannabis use. EMA involves daily monitoring of target behaviors. Some of the key benefits of EMA include: (1) collection of data in real-world environments, thereby enhancing ecological validity; (2) minimization of retrospective recall bias by assessing relations between affective states and behaviors while participants experience the affect and/or engage in the targeted behavior; and (3) aggregation of observations over multiple assessments to facilitate within-subject assessments of behaviors across time and context (Shiffman, Stone, & Hufford, 2008).

We know of no studies using EMA to examine the affective and situational antecedents and correlates of cannabis use among socially anxious individuals. We recently found that concerns regarding the social consequences of anxiety symptoms (anxiety sensitivity [AS] social concerns) moderated the relation between cannabis craving and use (Buckner, Silgado, et al., 2011). In that study, AS-social concerns was the only AS facet to have an interactive effect on cannabis use (i.e., fears of physical or mental/psychological consequences of anxiety did not interact with craving to predict use), suggesting that fears regarding social scrutiny may be especially important in cannabis use behaviors. Therefore, the present study aims to extend these findings by testing whether social anxiety more broadly interacted with cannabis craving and state anxiety to predict cannabis use using real-world data about ad-lib cannabis use episodes during a two-week EMA monitoring period. We also tested whether social anxiety would interact with situation type (alone vs social situation) to predict use. In light of data suggesting that social anxiety is related to conformity cannabis use motives (Buckner, Bonn-Miller, et al., 2007), we also examined whether social anxiety would interact with others' use to predict participant use.

We examined these relationships among undergraduates, a population ideally suited for studying the relationships between social anxiety and cannabis-related behaviors given that young adults broadly and college students specifically appear vulnerable to cannabis use and cannabis-related problems (Caldeira, Arria, O'Grady, Vincent, & Wish, 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2007). In fact, the rate of cannabis use is increasing among college students but not same age, non-college peers (Substance Abuse and Mental Health Services Administration, 2010). Furthermore, the transition from high school to college is

associated with increased social anxiety (Spokas & Heimberg, 2009) and elevated social anxiety and SAD are associated with cannabis-related problems in undergraduate samples (Buckner & Schmidt, 2008, 2009a,b; Buckner, Mallott, et al., 2006; Buckner, Schmidt, et al., 2006; Buckner, Bonn-Miller, et al., 2007; Buckner, Silgado, et al., 2011). The use of a non-clinical sample allows for the examination of these relationships among current users to provide insight into affective and situational variables that may play a role in maintaining cannabis use.

2. Method

2.1. Participants and recruitment

Participants were recruited from October 2006-April 2008 based on responses to a mass screening assessing current (any past three months) cannabis use. Of the 3,200 undergraduates screened, 44.1% endorsed current cannabis use and were invited via email to participate. Of the 60 prospective participants that came to the laboratory and were assessed for eligibility, 3 were excluded because they denied lifetime cannabis use during the appointment, 3 were excluded due to non-availability of personal digital assistants (PDAs) at the time of their appointment, 1 was excluded due to loss of his PDA, and 4 were not compliant with EMA protocol (information regarding compliance provided below). The final sample was comprised of 49 (38.8% female) participants aged 18–22 years (M = 19.14, SD = 1.02). Participants reported using cannabis an average of 5–6 times a week in the past 3 months with 40.1% reporting daily cannabis use and only 12.2% reporting less than weekly use.

Regarding prevalence of current DSM-IV diagnoses[1], 63% met criteria for a current CUD (26.5% met criteria for cannabis abuse, 36.7% met criteria for cannabis dependence), 51.0% met for an alcohol use disorder (36.7% met for alcohol abuse), 6.1% had a non-cannabis illicit substance use disorder, and 2.0% had major depressive disorder. Regarding anxiety disorders, 20% had SAD, 2.0% had panic disorder, 6.1% had obsessive–compulsive disorder, and 2.0% had generalized anxiety disorder. Comorbidity was common with 51.0% meeting criteria for more than one disorder. The racial/ethnic composition of the sample was: 2.0% American Indian, 83.7% Caucasian, 2.0% Hispanic/Latino, 10.2% mixed, and 2.0% other.

2.2. EMA assessments

EMA data were collected via PDAs that were manufactured by Palm® (Z22 Handheld). Data were collected using forms created with Satellite Forms 5.2 developed by Pumatech. EMA data collection included three types of EMA assessments (Wheeler & Reis, 1991). First, participants completed signal contingent assessments in which they completed assessments upon receipt of PDA signal. Participants were signaled six semi-random times throughout the day. The timing of the signal was determined randomly to be within ±17 min of each of six anchor times distributed evenly throughout the day (between 10:00 a.m. and midnight). Second, participants completed interval contingent assessments in which they completed assessments at the end of day (i.e., bedtime). Third, participants completed event contingent assessments in which they completed assessments each time they used cannabis. Assessments were automatically date and time stamped. Participants were presented with the same questions regardless of assessment type.

---

[1] Percentages add up to greater than 100% due to comorbidity.