



Short Communication

Cannabis-related impairment and social anxiety: The roles of gender and cannabis use motives

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ABSTRACT

Social anxiety appears to be especially related to cannabis-related problems, yet the nature of this association remains unclear. Some data suggest that socially anxious men may be especially vulnerable to problematic cannabis use. The current study examined the relations between social anxiety, cannabis use and use-related problems, and motives for cannabis use by gender among 174 (42.5% female) current (past-month) cannabis users. Among men, social anxiety was significantly, positively related to the number of cannabis-related problems and coping and conformity motives. Coping and conformity motives mediated the relation between social anxiety and cannabis-related problems. Among women, social anxiety was significantly related only to social motives, and was unrelated to cannabis-related problems. These findings suggest that socially anxious men may be especially vulnerable to using cannabis as a means of avoidance coping (avoiding scrutiny and negative affect), which may contribute to the high rates of cannabis-related problems among socially anxious individuals.

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1. Introduction

Social anxiety plays an important role in the etiology and maintenance of cannabis-related problems. Among those with cannabis dependence, the rate of lifetime social anxiety disorder (SAD) is higher than the rates of generalized anxiety disorder, panic disorder and PTSD (Agosti, Nunes, & Levin, 2002). Adolescents with SAD are seven times more likely to develop cannabis dependence by age 30 (Buckner et al., 2008). Subclinically elevated social anxiety also is related to cannabis-related problems (e.g., Buckner & Schmidt, 2008; Buckner & Schmidt, 2009; Buckner, Schmidt, Bobadilla, & Taylor, 2006).

It may be that socially anxious users are vulnerable to cannabis-related problems because they not only use cannabis to attempt to cope with negative affect (coping motives) but also to bond with cannabis-using peers (social motives) and to avoid scrutiny for non-use when with cannabis-using peers (conformity motives). Individuals with SAD are especially vulnerable to wanting to use cannabis during elevated state anxiety (Buckner, Silgado, & Schmidt, 2011). Persons with co-occurring CUD–SAD report using cannabis to reduce social fears (Buckner, Heimberg, Schneier et al., 2012) and social anxiety is related to using cannabis to cope in social situations and avoiding social situations if cannabis is unavailable (Buckner, Heimberg, Matthews, &

Silgado, 2012). Further, social anxiety is related to coping and conformity motives, and coping motives mediate the social anxiety–cannabis problem relation (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007). Social anxiety is also related to having more substance-using peers (Buckner, Mallott, Schmidt, & Taylor, 2006), suggesting that there may be a social component to cannabis use.

There are gender differences in substance use behaviors among socially anxious individuals. Social anxiety is related to drinking problems for women, but not men (Buckner & Turner, 2009; Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011) and social anxiety is differentially related to drinking motives by gender (Norberg, Norton, Olivier, & Zvolensky, 2010). Among those with SAD, men are more likely to have a co-occurring CUD (Buckner, Heimberg, Schneier et al., 2012) and socially avoidant men are more vulnerable to cannabis-related problems than women and men with less social avoidance (Buckner, Heimberg, & Schmidt, 2011). Social avoidance may be but one type of avoidance coping in which these men engage. They also may be vulnerable to using cannabis to help them cope with (i.e., avoid experiencing) negative affective states and to avoid scrutiny from cannabis-using peers.

The aim of the present study was to examine the relations between social anxiety and cannabis use behaviors in several ways. First, the relations between social anxiety and cannabis use and use-related problems were examined separately by gender. In line with prior work (Buckner et al., 2011; Oyefeso, 1991), it was hypothesized that social anxiety would be related to cannabis-related behaviors among men. Second, the relations between social anxiety and cannabis use motives

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were examined by gender. It was hypothesized that social anxiety would be related to coping and conformity motives among men and to social motives among women. Third, we examined whether coping and conformity motives mediated the relation between social anxiety and cannabis-related behaviors for men. These relations were examined among those who use both tobacco and cannabis given that these individuals are especially vulnerable to pathological social anxiety (Agrawal et al., 2011).

2. Method

2.1. Participants and procedure

Participants were adult smokers who responded to community-based advertisements to participate in a larger study examining the efficacy of a tobacco smoking cessation program. Participants had to smoke 8 or more cig/day on average for at least 1 year, provide a CO breath sample of 10 ppm or higher, and be at least 18 years old. Exclusion criteria included: high-risk suicidal behaviors, psychosis, currently using other tobacco smoking cessation treatment, or unable to give informed consent. All participants provided informed consent prior to data collection. The multi-site study was approved by both universities' Institutional Review Boards. Participants completed computerized versions of measures at baseline.

Although the original sample consisted of 538 participants, the current study is concerned with the 174 participants (42.5% female) that endorsed current (past-month) cannabis use. Ages ranged from 18 to 60 ($M = 29.4$, $SD = 12.3$) and the racial/ethnic composition was: 1.2% Asian or Asian American, 83.8% Caucasian, 7.5% Black/non-Hispanic, 1.2% Black/Hispanic, 2.9% non-Black/Hispanic, and 3.5% "other".

2.2. Measures

2.2.1. The Marijuana Smoking History Questionnaire

The Marijuana Smoking History Questionnaire includes an item assessing current cannabis use frequency on an eight-point Likert-type scale (0 = no use to 8 = more than once a day) and one assessing quantity of use (size of typical cannabis joint) (Bonn-Miller & Zvolensky, 2009). This questionnaire has performed well in prior studies (e.g., Bonn-Miller, Zvolensky, Marshall, & Bernstein, 2007; Zvolensky et al., 2007).

2.2.2. Marijuana Problems Scale (MPS)

Marijuana Problems Scale (MPS) is a 19-item list of negative consequences of cannabis use in the past 90 days (Stephens, Roffman, & Curtin, 2000). Endorsed items were summed to create a total count of cannabis-related problems. This scoring method has demonstrated adequate internal consistency (e.g., Buckner, Ecker, & Cohen, 2010; Stephens et al., 2000; Stephens et al., 2004). In the present sample, $\alpha = .82$.

2.2.3. Marijuana Motives Measure (MMM)

Marijuana Motives Measure (MMM) is a 25-item measure assessing on a 5-point Likert-type scale the degree to which one has smoked cannabis for the following motives: enhancement (e.g., to get high), coping (e.g., to forget my worries), social (e.g., to enjoy a party), conformity (e.g., to fit in with a group I like), and expansion (e.g., to expand my awareness) (Simons, Correia, Carey, & Borsari, 1998). MMM subscales have demonstrated excellent internal consistency (Chabrol, Ducongé, Casas, Roura, & Carey, 2005). In the present sample, α 's = .84–.94.

2.2.4. Social Interaction Anxiety Scale (SIAS)

Social Interaction Anxiety Scale (SIAS) assessed general social interaction fears (Mattick & Clarke, 1998). The scale demonstrates adequate internal consistency and test-retest reliability in clinical and non-clinical samples (e.g., Heimberg, Mueller, Holt, Hope, &

Table 1

Multivariate analysis of variance of gender differences on cannabis-related behaviors and social anxiety.

| | Men ($n = 99$) | Women ($n = 74$) | <i>F</i> | <i>p</i> | <i>d</i> |
|------------------------|------------------------|------------------------|----------|----------|----------|
| | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | | | |
| # Cannabis problems | 3.98 (3.54) | 3.00 (3.10) | 3.80 | .05 | .30 |
| Cannabis use frequency | 4.71 (2.38) | 5.14 (2.50) | 1.20 | .28 | .17 |
| Cannabis use quantity | 3.98 (2.41) | 3.53 (2.41) | 1.63 | .20 | .20 |
| Enhancement motives | 17.12 (4.92) | 16.49 (6.22) | 0.52 | .47 | .11 |
| Social motives | 12.74 (5.65) | 12.38 (6.02) | 0.14 | .71 | .06 |
| Conformity motives | 6.93 (3.09) | 5.94 (2.38) | 4.65 | .03 | .33 |
| Coping motives | 10.43 (5.03) | 11.74 (6.27) | 2.21 | .14 | .23 |
| Expansion motives | 11.10 (6.09) | 10.62 (6.50) | 0.27 | .61 | .08 |
| Social anxiety | 16.36 (12.49) | 16.96 (11.71) | 0.10 | .75 | .05 |

Note. Cannabis use frequency refers to the past 30 day use.

Liebowitz, 1992). As recommended by Rodebaugh, Woods, and Heimberg (2007), only the straightforwardly worded items were used. In this sample, $\alpha = .94$.

3. Results

A multivariate analysis of variance (MANOVA) was conducted to examine whether men and women differed on cannabis-related behaviors and social anxiety. The overall model was significant, $F(9, 162) = 2.52$, $p = .010$. Men endorsed more conformity motives and cannabis-related problems (Table 1).¹

Among men, social anxiety was positively related to cannabis-related problems and conformity and coping motives (Table 2). Among women, social anxiety was significantly correlated only with social motives.

There are four requirements for mediation (Kenny, Kashy, & Bolger, 1998). First, the predictor must be related to the criterion. In this case, social anxiety was related to cannabis-related problems among men (Table 2). Second, the predictor must be related to the proposed mediators. Among men, social anxiety was significantly related to coping and conformity motives (Table 1); thus these variables were examined as potential mediators of the social anxiety–cannabis problems relationship. Third, the proposed mediators (conformity and coping motives) remained significantly related to the criterion (cannabis problems) after controlling for the predictor (social anxiety; Table 3). The final requirement involves evaluating the relation between the predictor and the criterion when the variance accounted for by the proposed mediator has been removed. In these analyses, conformity and coping motives both partially mediated the relationship between social anxiety and cannabis-related problems (Table 3). Given the number of multiple comparisons in Table 3, Sobel tests confirmed partial mediation for both conformity ($z = 2.34$, $p = .019$) and coping ($z = 1.99$, $p = .046$) motives¹.

4. Discussion

Results highlight the importance of considering gender when examining the relations between social anxiety and cannabis use behaviors. Consistent with prior work (Buckner et al., 2011; Buckner, Heimberg, Schneier et al., 2012), findings suggest that socially anxious men are particularly vulnerable to cannabis-related problems. Social anxiety was related to those motives theoretically relevant to social anxiety (coping and conformity motives among men, social motives among women). These findings differ from prior work using a mixed gender sample (Buckner et al., 2007), suggesting that combining men and women in those analyses may have obfuscated these relations.

¹ Analyses were re-run controlling for severity of nicotine dependence as assessed with the Fagerstrom Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). A similar pattern of significant findings was obtained.

Table 2
Bivariate correlations for study variables by gender.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. Social anxiety | | .21* | -.11 | .01 | -.03 | .07 | .29** | .23* | .10 |
| 2. # Cannabis problems | .00 | | .24* | .26** | .19 | .31** | .36** | .41** | .33** |
| 3. Cannabis use frequency | .07 | .46** | | .64** | .53** | .31** | -.08 | .36** | .23* |
| 4. Cannabis use quantity | -.05 | .32** | .52** | | .38** | .26** | -.09 | .28** | .15 |
| 5. Enhancement motives | .18 | .44** | .55** | .50** | | .54** | .12 | .37** | .43** |
| 6. Social motives | .23* | .33** | .37** | .49** | .74** | | .38** | .55** | .54** |
| 7. Conformity motives | .12 | .31** | .08 | .18 | .25 | .43** | | .33** | .30** |
| 8. Coping motives | .16 | .49** | .44** | .37** | .49** | .52** | .34** | | .51** |
| 9. Expansion motives | .12 | .44** | .36** | .34** | .55** | .62** | .35** | .49** | |

Note. Correlations for women are presented below the diagonal (shaded area). Correlations for men are presented above the diagonal.
* p < .05; ** p < .01.

Among men, conformity and coping motives partially mediated the relation between social anxiety and cannabis-related problems. Given that socially avoidant men report more cannabis-related problems than those with lower social avoidance or women (Buckner et al., 2011), socially anxious men may be vulnerable to using cannabis to avoid scrutiny from cannabis-using peers. These men may, therefore, use more cannabis than intended and/or use for longer periods of time than intended while in social situations, increasing their likelihood of experiencing problems related to more severe intoxication. They may also be at risk for cannabis-related problems if, given their fear scrutiny from cannabis-using peers, they are less inclined to use adaptive coping strategies such as asking for a ride from a sober peer if too intoxicated to drive.

The finding that coping motives partially mediated the relation between social anxiety and cannabis-related problems among men is in line with prior work finding social anxiety to be related to using cannabis to cope specifically in social situations (Buckner, Heimberg, Matthews et al., 2012). Taken together, these data suggest that socially anxious men may rely on cannabis to help them cope with negative affect at the exclusion of more adaptive coping strategies. Furthermore, they may believe they need cannabis to cope and thus continue to use cannabis despite experiencing negative consequences. Future work could benefit from examination of ways in which coping motives are related to cannabis problems. Given social anxiety was unrelated to quantity or frequency of use, it may be that socially anxious men do not use cannabis more generally but rather only when in social situations. In fact, socially anxious individuals are especially likely to use cannabis when in social situations in which they experience elevated state anxiety (Buckner, Crosby, Wonderlich, & Schmidt, 2012).

Table 3
Regression analyses testing for mediation among men: (1) effect of social anxiety on cannabis-related problems, (2) effect of social anxiety on cannabis motives (mediator), (3) effect of cannabis motives on cannabis-related problems after controlling for social anxiety, and (4) effect of social anxiety on cannabis-related problems after controlling for cannabis motives.

| | Independent variable(s) | β | t | p | ΔR ² |
|-----------------------------|-------------------------|-----|------|-------|-----------------|
| # Cannabis-related problems | 1. Social anxiety | .23 | 2.33 | .022 | .053 |
| <i>Conformity motives</i> | | | | | |
| Conformity motives | 2. Social anxiety | .31 | 3.21 | .002 | .097 |
| # Cannabis-related problems | 3. Conformity motives | .35 | 3.49 | <.001 | .108 |
| # Cannabis-related problems | 4. Social anxiety | .12 | 1.25 | .215 | .014 |
| | Conformity motives | .38 | 4.07 | <.001 | .147 |
| <i>Coping motives</i> | | | | | |
| Coping motives | 2. Social anxiety | .23 | .23 | .024 | .052 |
| # Cannabis-related problems | 3. Coping motives | .38 | 3.99 | <.001 | .136 |
| # Cannabis-related problems | 4. Social anxiety | .15 | 1.53 | .131 | .170 |
| | Coping motives | .41 | 4.43 | <.001 | .020 |

Note. β = standardized beta weight provided for multiple regression. Social anxiety was separately regressed on each dependent variable in each step.

Among women, social anxiety was related only to social motives. This finding is somewhat consistent with prior work in which female cannabis users were vulnerable to wanting to use cannabis during (but not before or after) a social situation (Buckner et al., 2011). They did not report a greater desire to use cannabis to manage anticipatory anxiety before the social situation which is consistent with our finding that social anxiety was unrelated to coping motives for women. Interestingly, that social anxiety was unrelated to coping or conformity motives or to cannabis-related problems differs from the relations between social anxiety and drinking behaviors in which socially anxious women experienced more alcohol-related problems than men (Norberg et al., 2011) and coping and conformity drinking motives mediated the relationship between social anxiety and alcohol-related problems among women, but not men (Norberg et al., 2010). Thus, socially anxious women appear especially vulnerable to drinking problems whereas socially anxious men seem vulnerable to cannabis-related problems. It may be that socially anxious men are more likely to use cannabis than socially anxious women given that men generally are more likely to use cannabis and have cannabis-related problems (e.g., Stinson, Ruan, Pickering, & Grant, 2006). Socially anxious men (more so than socially anxious women) may therefore believe that cannabis is a more common (and thus more socially acceptable) means by which to cope and/or fit in. Future research identifying factors implicated in these gender differences will be an important next step in this line of work.

Findings should be considered in light of limitations. First, participants voluntarily sought tobacco smoking cessation treatment. Given tobacco smokers report higher rates of cannabis use and use-related problems (Agrawal et al., 2011), replication with other samples is necessary. Second, frequency and quantity of use were assessed via retrospective self-report and future work could benefit from a multi-method, multi-informant approach. Third, frequency was assessed using a Likert-type scale and future work could benefit from assessment of actual days of use. Quantity was assessed using a visual presentation of possible joint sizes and future work could benefit from more refined assessment (e.g., that includes how many people shared the joint). Fourth, the study's cross-sectional nature precludes our ability to make causal inferences. Given that anxiety is related to poorer CUD treatment outcomes (Buckner & Carroll, 2010), future work could benefit from examining whether cognitive strategies challenging high-risk motives decrease cannabis-related problems among socially anxious men.

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Contributors

Author Buckner designed the current study, conducted statistical analyses, and wrote the first draft of the manuscript. Authors Zvolensky and Schmidt designed the original study protocol. All authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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