

Cannabis Use Behaviors and Social Anxiety: The Roles of Perceived Descriptive and Injunctive Social Norms

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ABSTRACT. Objective: Individuals with greater social anxiety are particularly vulnerable to cannabis-related impairment. Descriptive norms (beliefs about others' use) and injunctive norms (beliefs regarding others' approval of risky use) may be particularly relevant to cannabis-related behaviors among socially anxious persons if they use cannabis for fear of evaluation for deviating from what they believe to be normative behaviors. Yet, little research has examined the impact of these social norms on the relationships between social anxiety and cannabis use behaviors. **Method:** The current study investigated whether the relationships of social anxiety to cannabis use and use-related problems varied as a function of social norms. The sample comprised 230 (63.0% female) current cannabis-using undergraduates. **Results:** Injunctive norms (regarding parents, not friends) moderated the relationship between social anxiety

and cannabis-related problem severity. Post hoc probing indicated that among participants with higher (but not lower) social anxiety, those with greater norm endorsement reported the most severe impairment. Injunctive norms (parents) also moderated the relationship between social anxiety and cannabis use frequency such that those with higher social anxiety and lower norm endorsement used cannabis less frequently. Descriptive norms did not moderate the relationship between social anxiety and cannabis use frequency. **Conclusions:** Socially anxious cannabis users appear to be especially influenced by beliefs regarding parents' approval of risky cannabis use. Results underscore the importance of considering reference groups and the specific types of norms in understanding factors related to cannabis use behaviors among this vulnerable population. (*J. Stud. Alcohol Drugs*, 75, 74–82, 2014)

CANNABIS USE DISORDERS (CUDs) and social anxiety disorder (SAD) co-occur at particularly high rates. In the National Comorbidity Survey, 29% of individuals with lifetime cannabis dependence met the criteria for lifetime SAD, whereas rates of other anxiety disorders ranged from 6.9% for panic disorder to 18.5% for posttraumatic stress disorder (Agosti et al., 2002). Elevated social anxiety in undergraduate samples is also associated with greater cannabis-related problems (e.g., Buckner and Schmidt, 2008, 2009; Buckner et al., 2006a, 2006b, 2007, 2011b, 2012b). Mounting evidence suggests that socially anxious individuals may be at particular risk for developing cannabis-related problems. Relative to adolescents without SAD, those with SAD were nearly seven times more likely to develop cannabis dependence as young adults (Buckner et al., 2008), and SAD begins before CUD for the vast majority of those with both CUD and SAD (Buckner et al., 2012c). Among cannabis users, social anxiety is also related to faster transition from first use to cannabis-related problems among males (Buckner et al., 2012d; Marmorstein et al., 2010).

The co-occurrence of cannabis-related problems and social anxiety is clinically significant. To illustrate, the co-

morbidity of CUD and SAD is related to greater impairment and more psychiatric comorbidity than either disorder alone (Buckner et al., 2012c). Social anxiety among frequent cannabis users is associated with greater suicidality (Buckner et al., 2012d). Further, patients in cannabis dependence treatment with elevated anxiety have more severe cannabis-related impairment and poorer treatment outcomes (Bonn-Miller and Moos, 2009; Buckner and Carroll, 2010).

Despite the clear association between social anxiety and cannabis-related impairment, data are less consistent regarding whether social anxiety is related to more frequent cannabis use. Although two studies found more frequent cannabis use to be related to social anxiety among adolescents and undergraduate men (Anderson et al., 2011; Oyefeso, 1991), this relationship was reduced to nonsignificance once other relevant psychosocial variables were considered (Anderson et al., 2011). In one study, moderate (but not high) levels of social anxiety were related to a greater likelihood of becoming a regular cannabis user among adolescent boys (Griffin et al., 2002), and several studies found social anxiety to be unrelated to frequency of cannabis use among undergraduates (e.g., Buckner and Schmidt, 2008; Buckner et al., 2007, 2010).

These mixed findings suggest that the relationship between cannabis use frequency and social anxiety may be influenced by other relevant factors. Given that the hallmark feature of social anxiety is fear of scrutiny (American Psychiatric Association, 1994), it may be that the relationship between social anxiety and cannabis use frequency varies as a function of normative beliefs regarding cannabis use. Specifically, those socially anxious persons who believe that

Received: December 13, 2012. Revision: June 6, 2013.

This research was supported by National Institute on Drug Abuse (NIDA) Grants 1R21DA029811-01A1 and 1R34DA031937-01A1 (awarded to Julia D. Buckner). NIDA had no role in the study design; the collection, analysis, or interpretation of the data; the writing of the article; or the decision to submit the article for publication.

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others use cannabis frequently may themselves use cannabis more frequently to avoid being negatively evaluated for deviating from what they perceive to be normative cannabis use.

Indirect evidence supports our contention that social norms may play an especially important role in cannabis-related behaviors among socially anxious users. Having more friends who use drugs moderated the relationship between the number of SAD symptoms and the number of CUD symptoms, such that among participants with more drug-using friends, those with more SAD symptoms reported more CUD symptoms (Buckner et al., 2006a). This was not the case among those with fewer drug-using friends. Further, social anxiety is related to using cannabis for conformity motives (i.e., to avoid scrutiny from cannabis-using peers; Buckner et al., 2007, 2012e). Despite theoretical reason to believe that social norms play a role in the relationship between social anxiety and cannabis use behaviors, there are no known studies of the relations between social anxiety, social norms, and cannabis use behaviors.

Perceived social norms

Perceived social norms are generally conceptualized as descriptive (perceived frequency of others' substance use), and injunctive norms have been conceptualized as approval of substance use frequency (LaBrie et al., 2010; Neighbors et al., 2008b) as well as approval of risky substance use (e.g., driving under the influence; Baer, 1994; Buckner et al., 2011a). Both descriptive and injunctive norms are positively related to greater substance use among college students (for a review, see Borsari and Carey, 2001). Regarding cannabis use specifically, descriptive and injunctive norms appear differentially related to cannabis use and cannabis-related problems. Although descriptive norms are positively related to using cannabis (Arbour-Nicitopoulos et al., 2010; Wolfson, 2000), to using it more frequently (Grossbard et al., 2009; Kilmer et al., 2006; Neighbors et al., 2008a), and to experiencing cannabis-related problems (Kilmer et al., 2006; Neighbors et al., 2008a), injunctive norms are related to more frequent self-use but not problems (Neighbors et al., 2008a).

However, socially anxious students may evince a different relationship between social norms and cannabis use behaviors. Given that injunctive norms can represent perceived acceptability of risky cannabis use, socially anxious cannabis users may experience cannabis-related problems as a result of using to conform to the belief that such problems are socially acceptable. In other words, injunctive norms may be associated with use-related problems among socially anxious persons.

Perceived social norms and reference group

Of note, the relations of social norms to substance use behaviors differ as a function of the reference group.

Specifically, beliefs about more proximal groups appear to exert a greater influence on cannabis-related behaviors than beliefs about more distal groups (Borsari and Carey, 2001). Although less research has examined the impact of reference group on social norms' relation to cannabis-related behaviors, injunctive norms regarding friends and parents (but not "typical students") appear related to greater cannabis use frequency (LaBrie et al., 2010, 2011).

Little work has examined which reference groups exert the greatest influence on the cannabis use behaviors of socially anxious undergraduates. In the only known study of reference group on social influences related to substance use among socially anxious persons, data indicated that parental influence may play an especially important role in substance use behaviors among socially anxious young adults. Specifically, familial influences acted synergistically with SAD to predict development of an alcohol use disorder, whereas peer and partner variables (including descriptive norms regarding friends' alcohol use) were unrelated to the subsequent development of an alcohol use disorder among socially anxious young adults (Buckner and Turner, 2009).

Current study

The present study set out to elucidate the impact of social norms on the relationships between social anxiety and cannabis use behaviors in several ways. First, we examined whether social anxiety was positively correlated with descriptive and/or injunctive norm endorsement. In line with our contention that socially anxious persons may continue to use cannabis despite their high rates of cannabis-related impairment if they believe that others approve of risky cannabis use, it was hypothesized that social anxiety would be positively related to believing others approve of risky use (i.e., injunctive norms). In light of data suggesting that familial factors play a role in the development of substance use disorders among socially anxious young adults (Buckner and Turner, 2009), it was hypothesized that social anxiety would be related to injunctive norms regarding parents specifically. Consistent with prior work (Buckner et al., 2006a), we did not expect social anxiety to be related to descriptive norms. Second, we tested whether normative beliefs moderated the relationship between social anxiety and cannabis-related problem severity. In line with prior work (Buckner et al., 2006a), it was hypothesized that descriptive norms regarding friends would moderate the relationship between social anxiety and the number of cannabis-related problems. We sought to extend this finding by testing whether social norms regarding parents would also moderate the social anxiety–cannabis problems relationship. Third, we tested whether social norms would moderate the relationship between social anxiety and cannabis use frequency. In line with our theory that socially anxious individuals who believe that others use cannabis more frequently may themselves use cannabis more frequently to

avoid negative evaluation for deviating from perceived normative behaviors, it was hypothesized that socially anxious users with a greater endorsement of descriptive norms would report the most frequent cannabis use.

We examined these relationships among college students given that young adults broadly and college students specifically appear vulnerable to cannabis use and use-related problems (Buckner et al., 2010; Caldeira et al., 2008) and that college students experience a greater increase in cannabis-related problems from ages 18 to 21 relative to same age, noncollege peers (White et al., 2005). Furthermore, the transition from high school to college appears associated with increased social anxiety (Spokas and Heimberg, 2009), and social anxiety and SAD have been found to be related to cannabis-related problems among college students (e.g., Buckner and Schmidt, 2008; Buckner et al., 2006a, 2006b, 2007, 2011b, 2012b).

Method

Participants and procedures

Data were collected as part of a larger study on cannabis use behaviors (Buckner et al., 2013). The university's institutional review board approved this study, and informed consent was obtained before data collection. Participants were recruited through the psychology student participant pool of a large state university in the southern United States from September to November 2011. They completed computerized versions of study measures using a secure, online data collection website (surveymonkey.com). Computerized and paper-and-pencil versions of self-report measures are highly correlated (Gwaltney et al., 2008). Participants received referrals to university-affiliated psychological outpatient clinics and research credit for completion of the survey.

Although 969 participants began the survey, 4.4% were deemed ineligible. Reasons included being outside the target age range of 18–24 years ($n = 22$), incomplete responses ($n = 15$), and questionable validity ($n = 4$; detailed below). The current study concerned the 24.8% of the remaining 926 who endorsed current (i.e., past-3-month) cannabis use. The final sample ($n = 230$) was predominantly female (63.0%) and non-Hispanic/Latino (92.6%), with 56.5% working part time or full time. The racial composition was as follows: 5.7% African American, 3.0% Asian American, 85.7% White, 4.3% mixed, and 1.3% other. Ages ranged from 18 to 23 years ($M = 19.68$, $SD = 1.34$), and class standings were as follows: 25.7% first year, 31.3% second year, 19.6% third year, 23.0% fourth year, and 0.4% other.

Measures

Assessment of cannabis use behaviors. Frequency of cannabis use was assessed with the Marijuana Use Form

(Buckner et al., 2007), a self-report measure of cannabis use frequency (rated on a 0 to 9 scale) for the past 90 days. This measure has demonstrated convergent validity (Buckner et al., 2012a). Cannabis-related problem severity for the past 90 days was assessed with the Marijuana Problems Scale (Stephens et al., 2000), which asks participants to rate 19 items from 0 (*no problem*) to 2 (*serious problem*). Consistent with prior work (Lozano et al., 2006), items scored as either 1 or 2 were counted to create a sum of the number of cannabis-related problems (possible scores range from 0 to 19). This measure has demonstrated adequate internal consistency in prior work (e.g., Buckner et al., 2010; Stephens et al., 2000) and in the present sample ($\alpha = .82$).

Assessment of anxiety and depression. The Social Interaction Anxiety Scale (Mattick and Clarke, 1998) is a measure of general social interaction fears. It demonstrates high levels of internal consistency and test-retest reliability across clinical, community, and student samples (Mattick and Clarke, 1998; Osman et al., 1998). Individuals with SAD score higher than individuals with other anxiety disorders and nonanxious individuals on this measure (Brown et al., 1997). The Social Interaction Anxiety Scale demonstrated adequate internal consistency in our sample ($\alpha = .89$). The Depression Anxiety Stress Scales (DASS-21; Lovibond and Lovibond, 1995) is a 21-item self-report measure of anxiety, depression, and stress over the previous week. Frequency and severity are rated using a 4-point scale. The DASS-21 has demonstrated adequate psychometric properties in other non-treatment-seeking samples (see Henry and Crawford, 2005). The anxiety and depression subscales of the DASS-21 were used in the current study to control for anxiety more broadly and depression. The anxiety ($\alpha = .84$) and depression ($\alpha = .89$) subscales demonstrated adequate internal consistency in our sample.

Descriptive norms. Items from the Core Institute's Campus Assessment of Alcohol and Other Drug Norms assessed descriptive norms for cannabis. Participants were asked to indicate how often they think students in each category ("your friends," "students in general") typically use cannabis. Response options were as follows: 8 (*daily*), 7 (*nearly every day*), 6 (*2–3 times per week*), 5 (*1 time per week*), 4 (*2–3 times per month*), 3 (*1 time per month*), 2 (*3–6 times per year*), 1 (*1–2 times per year*), and 0 (*never*). This measure has been used to successfully assess perceived peer substance use (e.g., Buckner et al., 2010).

Injunctive norms. Modified from a measure of injunctive norms of alcohol (Baer, 1994), perception of friends' and parents' approval of risky cannabis use behaviors was assessed with four questions asking how friends/parents would respond if they knew the participant (a) used cannabis every weekend, (b) used cannabis daily, (c) drove after using cannabis, and (d) used enough cannabis to pass out. Participants rated each item on a 7-point Likert-type scale. Items were summed such that higher scores reflect greater approval,

TABLE 1. Means, standard deviations, and correlations between study variables

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.
1. Social anxiety	24.38	4.08	–							
2. Cannabis use frequency	3.49	2.89	.02	–						
3. Cannabis-related problems	3.42	3.36	.29**	.35**	–					
4. Anxiety	7.43	7.71	.43**	.11**	.34**	–				
5. Depression	8.43	8.23	.46**	.10**	.46**	.69**	–			
6. Injunctive norms (friends)	13.10	4.08	.01	.60**	.24**	.07*	.07*	–		
7. Injunctive norms (parents)	5.86	3.80	.05	.31**	.22**	.14**	.12**	.40**	–	
8. Descriptive norms (friends)	3.78	1.99	.01	.61**	.30*	.07*	.03	.69**	.23**	–
9. Descriptive norms (students)	4.45	1.64	-.03	.13**	.02	.03	.01	.21*	.07*	.35**

* $p < .05$; ** $p < .01$.

with a maximum score of 28. The friend and parent scales demonstrated adequate internal consistency in our sample ($\alpha = .86$, $\alpha = .94$, respectively).

Infrequency scale. To identify responders who provided random or grossly invalid responses, we included four questions from the Infrequency Scale (Chapman and Chapman, 1983). As in similar studies (e.g., Buckner et al., 2010; Cohen et al., 2009), those who endorsed three or more infrequency items were excluded ($n = 4$).

Results

Relations among study variables

Means, standard deviations, and bivariate correlations among study variables are presented in Table 1. Social anxiety was significantly, positively correlated with the number of cannabis-related problems but unrelated to frequency of cannabis use, descriptive norms, and injunctive norms. The number of cannabis-related problems was significantly, positively correlated with cannabis use frequency, descriptive norms (friends but not students in general), and injunctive norms regarding both friends and parents. Cannabis use frequency was significantly, positively correlated with descriptive norms (friends and students in general) and injunctive norms (friends and parents). Anxiety and depression were significantly, positively correlated with social anxiety, cannabis problems, and cannabis use frequency.

A multivariate analysis of variance was conducted to examine whether gender was associated with social anxiety and cannabis-related outcome variables and thus should be included as a covariate in study analyses. The omnibus test was significant, $F(3, 225) = 304.80$, $p < .001$. Men ($M = 4.43$, $SD = 3.71$) reported more cannabis-related problems than women ($M = 2.86$, $SD = 3.00$), $F(1, 227) = 12.14$, $p = .001$, $d = 0.48$. Men ($M = 4.63$, $SD = 3.08$) reported more frequent cannabis use than women ($M = 2.83$, $SD = 2.58$), $F(1, 227) = 22.51$, $p < .001$, $d = 0.65$. Men ($M = 23.36$, $SD = 14.01$) and women ($M = 24.84$, $SD = 14.56$) did not differ on social anxiety, $F(1, 227) = 0.57$, $p = .452$, $d = 0.10$. Given observed differences in gender on outcome variables as well as the correlations of social anxiety and cannabis variables

to depression and anxiety, these variables were included as covariates in the remaining analyses.

Descriptive and injunctive norms, cannabis behaviors, and social anxiety

Hierarchical regression analyses were conducted to evaluate the moderational effects of descriptive and injunctive norms on the relationships between social anxiety and cannabis-related behaviors. Two separate models were conducted for each criterion variable (cannabis-related problems, cannabis use frequency). Predictors were standardized to address multicollinearity. For each model, predictor variables were entered into three steps: (a) covariates (gender, anxiety, depression) were entered into Step 1, (b) main effects (social anxiety, descriptive and injunctive norms) were entered into Step 2, and (c) the Social Anxiety \times Descriptive and Injunctive Norms interactions were entered into Step 3. This strategy ensured that observed effects at Step 3 could not be attributable to variance accounted for at Steps 1 and 2 (Cohen and Cohen, 1983).

The number of cannabis-related problems was the dependent variable in the first regression model (Table 2). Cannabis use frequency was included as a covariate in this model. The Social Anxiety \times Injunctive Norms (parents) interaction was the only significant interaction. Based on the recommendations of Cohen and Cohen (1983), the form of the significant interaction was examined by inserting values 1 SD above and below the means for main effects and covariates (with gender coded as 0, or “male,” and the nonsignificant injunctive norms [friends] interaction set to 0) into the regression equations associated with the described analysis (Figure 1). The interaction was probed by investigating the simple slopes (Aiken and West, 1991; Holmbeck, 2002). Covariates were retained in these models. The simple slope for the high injunctive norms (parents) regression line was significant ($\beta = .23$, $p < .001$). The direction of the slope indicates that number of cannabis-related problems tended to be greater at higher levels of social anxiety when norms endorsement was also higher. The simple slope for the low injunctive norms (parents) regression line was not significant ($\beta = -.24$, $p = .808$).

TABLE 2. Hierarchical linear regression of the Social Anxiety \times Social Norms interaction in the prediction of cannabis-related problems

Variable	ΔR^2	ΔF	β	t	p	sr
Step 1	.242	17.85			<.001	
Gender			-.14	-2.24	.026	-.131
Depression			.20	2.48	.014	.145
Anxiety			.14	1.68	.094	.098
Cannabis use frequency			.25	4.02	<.001	.235
Descriptive norms						
Step 2	.040	4.07			.008	
Social anxiety			.15	2.15	.033	.123
Norms (friends)			-.19	-2.48	.014	-.142
Norms (students)			.07	1.08	.282	.062
Step 3	.004	0.54			.583	
Social Anxiety \times Norms (friends)			-.02	-0.31	.752	-.018
Social Anxiety \times Norms (students)			-.05	-0.78	.438	-.044
Injunctive norms						
Step 2	.029	2.93			.034	
Social anxiety			.17	2.45	.015	.141
Norms (friends)			.07	0.92	.360	.053
Norms (parents)			.08	1.18	.241	.068
Step 3	.042	6.60			.002	
Social Anxiety \times Norms (friends)			.04	0.63	.532	.035
Social Anxiety \times Norms (parents)			.19	3.10	.002	.174

Notes: Cannabis-related problem severity assessed with the Marijuana Problems Scale (Stephens et al., 2000). sr = semi-partial correlation.

Cannabis use frequency was the dependent variable in the second regression model (Table 3). Again, the Social Anxiety \times Injunctive Norms (parents) interaction was the only significant interaction (Figure 2). Post hoc probing indicated that the simple slope was not significant for either the high ($\beta = -.003$, $p = .965$) or the low ($\beta = -.13$, $p = .150$) injunctive norms (parents) regression line. Examination of Figure 2 suggests that cannabis use frequency tended to be lower at higher levels of social anxiety when norms endorsement was lower.

Discussion

The present study is the first known examination of the role of specific types of social norms in the relationship between social anxiety and cannabis use behaviors. Findings contribute to understanding of the high rates of cannabis-related impairment among those with social anxiety in several ways. First, results support the growing body of research finding social anxiety to be significantly, positively related to cannabis-related problems (e.g., Agosti et al., 2002; Buck-

TABLE 3. Hierarchical linear regression of the Social Anxiety \times Social Norms interaction in the prediction of cannabis use frequency

Variable	ΔR^2	ΔF	β	t	p	sr
Step 1	.134	11.55			<.001	
Gender			-.29	-4.71	<.001	-.291
Depression			.08	0.94	.348	.058
Anxiety			.15	1.69	.092	.104
Descriptive norms						
Step 2	.256	31.23			<.001	
Social anxiety			-.09	-1.39	.167	-.073
Norms (friends)			.55	9.49	<.001	.496
Norms (students)			-.10	-1.81	.071	-.095
Step 3	.001	0.23			.796	
Social Anxiety \times Norms (friends)			-.04	-0.67	.506	
Social Anxiety \times Norms (students)			.01	0.16	.872	
Injunctive norms						
Step 2	.257	31.14			<.001	
Social anxiety			-.02	-0.36	.719	-.019
Norms (friends)			.45	7.83	<.001	.409
Norms (parents)			.15	2.54	.012	.133
Step 3	.015	2.68			.071	
Social Anxiety \times Norms (friends)			.03	0.42	.673	.022
Social Anxiety \times Norms (parents)			.11	1.96	.051	.102

Note: sr = semi-partial correlation.

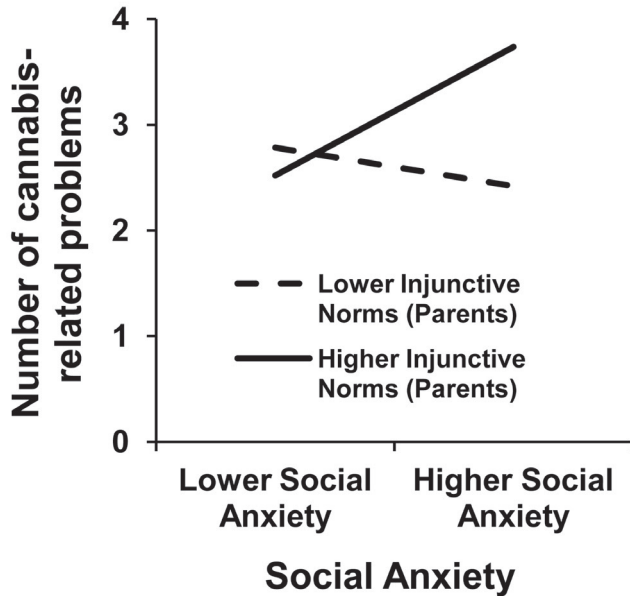


FIGURE 1. Interaction of social anxiety and injunctive norms (parents) with the number of cannabis-related problems. *Note:* Higher and lower social anxiety represent 1 *SD* above and below the mean, respectively.

ner and Schmidt, 2008, 2009; Buckner et al., 2006a, 2007, 2011b, 2012c, 2012e; Marmorstein et al., 2010; Stinson et al., 2006). Second, data are consistent with prior work finding no main effect of social anxiety on cannabis use frequency (e.g., Buckner and Schmidt, 2008; Buckner et al., 2007), suggesting that social anxiety in and of itself may not be related to more frequent cannabis use. Third, data are also consistent with findings from the alcohol literature indicating that there does not appear to be a direct relation between social anxiety and descriptive and injunctive norms (Bruch et al., 1992, 1997; Buckner and Turner, 2009; Buckner et al., 2006a, 2011a; Neighbors et al., 2007). Rather, findings suggest that social anxiety and social norms work synergistically to influence substance use behaviors (Buckner et al., 2011a; Ham and Hope, 2005, 2006; LaBrie et al., 2008; Neighbors et al., 2007).

The present study extends prior work in several ways. Injunctive norms regarding parents (but not friends) moderated the social anxiety–cannabis problems relationship. Specifically, the number of cannabis-related problems tended to be greater at higher levels of social anxiety when it was perceived that parents were more approving of risky cannabis use. Of importance, this moderation relationship was observed after controlling for the variance attributable to gender, depression, anxiety more broadly, cannabis use frequency, injunctive norms (friends), and the interaction between social anxiety and injunctive norms (friends). This finding contributes to a growing literature suggesting that parents may be influential in the substance use behaviors of socially anxious young adults (Buckner and Turner, 2009).

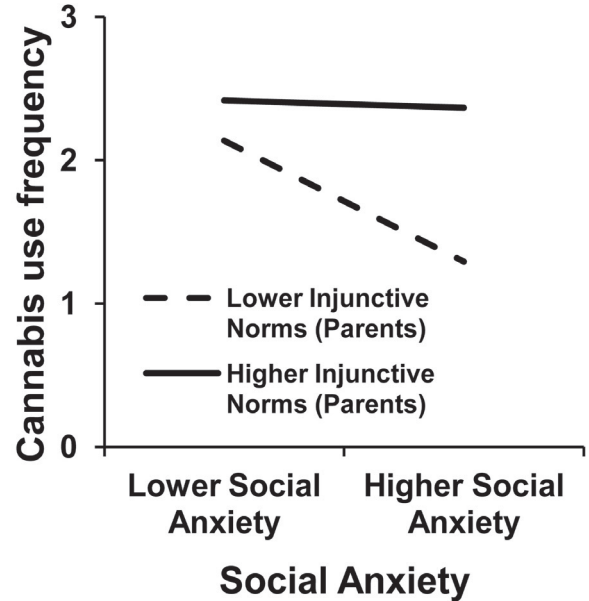


FIGURE 2. Interaction of social anxiety and injunctive norms (parents) with cannabis use frequency. *Notes:* Cannabis use frequency was assessed as follows: 0 (<1 time per month), 1 (1 time per month), 2 (2–3 times per month), 3 (1 time per week), 4 (2 times per week), 5 (3–4 times per week), 6 (5–6 times per week), 7 (7–8 times per week), 8 (9–13 times per week), 9 (14–20 times per week), and 10 (≥ 21 times per week). Higher and lower social anxiety represent 1 *SD* above and below the mean, respectively.

Given that adults with social anxiety report that their parents isolated them from others and did not encourage socialization (Bruch and Heimberg, 1994), beliefs regarding parental approval of behaviors may play an especially important role in socially anxious students' behaviors because of less socialization with other people. Thus, if their parents are more approving of risky cannabis use, socially anxious young people may believe that risky use is socially acceptable, perhaps even common. They may therefore engage in risky use to conform to what they believe is socially acceptable or normal cannabis use. However, more work is needed to understand how parental approval of risky cannabis use is related to the greater number of cannabis problems experienced by socially anxious students.

Among students who reported that their parents were less approving of risky cannabis use, cannabis was used less frequently among those with higher levels of social anxiety. This finding suggests that perceiving that parents are less approving of risky cannabis use may be a protective factor among socially anxious young adults. Parents of socially anxious persons tend to be overprotective and overcontrolling (see Ollendick and Benoit, 2012). Thus, it may be that if such parents are perceived to disapprove of particular behaviors (in this case, risky cannabis use), socially anxious young people may be less likely to engage in such behaviors for fear of disappointing their parents. Taken together, the two moderation effects observed in this study suggest that

perceived parental approval or disapproval of risky cannabis use may act as a potential risk or protective factor for cannabis use behaviors among socially anxious young adults. Additional work is necessary to delineate the ways in which parental factors influence socially anxious users' substance-related behaviors.

Contrary to expectation, normative beliefs regarding friends did not play a role in social anxiety's relationship to cannabis use behaviors. This finding is somewhat in contrast to prior work finding descriptive norms regarding friend substance use to moderate the social anxiety–cannabis problem relationship (Buckner et al., 2006a). Methodological differences between the two studies may at least partially account for differential findings. In the 2006 study, descriptive norms were assessed by the number of friends who used substances, whereas the current study assessed frequency of friends' cannabis use. Thus, having more friends who use substances, rather than having friends who use more frequently, may affect cannabis use behaviors among socially anxious individuals. As an alternative, it may be that students in general (regardless of social anxiety level) are influenced by beliefs about friends' frequency of cannabis use and that socially anxious students are not differentially influenced by their beliefs about friends' frequency of use. In partial support of this hypothesis, cannabis users in the current sample (regardless of level of social anxiety) reported high descriptive and injunctive norms. Future work could benefit from determining whether socially anxious users are more likely to believe they will be judged negatively by their cannabis-using peers for not engaging in risky cannabis use behaviors.

Elucidation of the nature of social norms on socially anxious students' cannabis use has important clinical implications. Although perceived social norms have been shown to be malleable among college students generally (Prince and Carey, 2010), social anxiety was negatively correlated with change in normative beliefs during a brief motivational intervention for risky college drinking (Terlecki et al., 2012). Of importance, change in normative beliefs moderated the relationship between social anxiety and outcomes such that socially anxious students with less change in normative beliefs demonstrated the poorest outcomes. These data highlight the powerful role normative beliefs can play in substance-related behaviors among socially anxious students. Given the observed differential impact of type of norms and type of reference group on the relationships between social anxiety and cannabis use behaviors, clinicians treating socially anxious students may consider assessing and targeting specific beliefs regarding the role that parental approval may play in risky cannabis use.

Limitations and future directions

The present study should be considered in light of limitations that suggest a need for additional work in this area.

First, given that all data were collected via self-report, future studies could benefit from a multi-method approach. Second, data were cross-sectional, thereby limiting causal inferences. Future work examining temporal relations will be an important next step. Third, the current study examined perceived descriptive and injunctive norms, and future work could benefit from investigating actual descriptive and injunctive norms. Fourth, the current study focused on college students, a group particularly vulnerable to cannabis-related impairment linked to social anxiety (Buckner and Schmidt, 2008; Buckner et al., 2006a, 2006b, 2007, 2011b, 2012b; Najolia et al., 2012). Yet future work could benefit from replication with more diverse samples. Fifth, the reference groups for perceived norms assessed in this study were not the same across injunctive and descriptive norms. This methodology does not allow for the comparison between descriptive and injunctive norms for norms regarding parents or students in general. Future studies could benefit from consistent assessment of reference group across norm types.

In conclusion, the current study sheds light on mechanisms that underlie the relationship between social anxiety and cannabis use behaviors. Specifically, perceived parental approval of risky cannabis use appears to play an important role in cannabis use behaviors among socially anxious college students. Thus, future work could benefit from determining whether targeting these beliefs in treatment improves outcomes among these high-risk students.

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