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Cannabis Use and Suicidal Ideation: Test of the Utility of the Interpersonal-Psychological Theory of Suicide

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Abstract

Despite a documented relationship between cannabis use and suicidality, little is known about psychological vulnerability factors that may increase suicidality among this high-risk group. The Interpersonal-Psychological Theory of Suicide (IPTS; Joiner, 2005) proposes that people are vulnerable to wanting to die by suicide if they experience both perceived burdensomeness and thwarted belongingness. Daily cannabis users may be especially vulnerable to these factors. The current study used moderated mediation to test whether the relation between daily cannabis use status and suicidal ideation (SI) occurred indirectly via higher levels of both perceived burdensomeness and thwarted belongingness among 209 (76.1% female) current cannabis using undergraduates who used cannabis daily ($n = 39$) or less frequently ($n = 160$). The direct effect of cannabis use status on SI was no longer significant after controlling for thwarted belongingness, perceived burdensomeness, and the thwarted belongingness $\times$ perceived burdensomeness interaction. Cannabis use status was predictive of greater SI indirectly through perceived burdensomeness only at higher levels of thwarted belongingness. Findings support the utility of the IPTS in regard to SI among daily cannabis users, indicating that difficulties in interpersonal functioning may serve as potential pathways through which daily cannabis use may lead to greater suicide risk.

1. Introduction

According to the Centers for Disease Control and Prevention (CDC), suicide was the 10th leading cause of death in the U.S., with an average of 113 people dying by suicide per day, totaling over 40,000 suicides per year (CDC, 2015). Further, 9.3 million adults reported past-year suicidal ideation (SI), 2.7 million reported past-year suicide plans, and 1.3 million reported making a past-year suicide attempt (CDC, 2015). Identification of at-risk individuals can inform prevention efforts.

Cannabis users appear to be at elevated risk for SI and suicide. To illustrate, among male cannabis users, using at least several times per week is related to subsequent SI and this is

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especially true for daily use (van Ours et al., 2013). Other prospective work supports that more frequent cannabis use is related to greater odds of SI and suicide attempt from age 14 to 21 (Fergusson et al., 2002) and from age 21 to 27 (Pedersen, 2008). The relation between cannabis use and SI remains after controlling for co-occurring psychopathology and other relevant variables (e.g., adverse events) (Delforterie et al., 2015; Fergusson et al., 2002; Pedersen, 2008; van Ours et al., 2013). Notably, SI does not prospectively predict cannabis use (van Ours et al., 2013). Individuals who died by suicide were two-four times more likely to have used cannabis than those who died of natural causes (Kung et al., 2003; Kung et al., 2005). In fact, toxicology screens among those who died by suicide were more likely to be positive for cannabis than for all other illicit substances combined (e.g., Eksborg and Rajs, 2008) and the rate of positive cannabis toxicology screens among people who died by suicide nearly doubled between 1997–2006 (Darke et al., 2009).

Despite the documented relationship between cannabis use and suicidality (i.e., SI and suicide attempts), there remain several limitations to our understanding of this relationship. Although data suggesting that more frequent use is related to greater suicidality (e.g., Fergusson et al., 2002; Pedersen, 2008), few studies have examined whether daily users are especially vulnerable to suicidality and those that have (van Ours et al., 2013) have not identified factors that increase risk of suicidality among daily users. This is concerning given that the percentages of cannabis use and of users that are daily users are rising (Substance Abuse and Mental Health Services Administration, 2013).

The Interpersonal-Psychological Theory of Suicide (IPTS; Joiner, 2005) proposes that two factors in particular appear related to the desire to die by suicide: perceived burdensomeness (i.e., sense that one is a burden to others) and thwarted belongingness (i.e., a greater sense of alienation from others). Perceived burdensomeness and thwarted belongingness are robustly related to SI (see Van Orden et al., 2010). Daily cannabis users may be especially vulnerable to these interpersonal IPTS factors. Frequency and quantity of cannabis use are related to social problems such as losing friends (Walden and Earleywine, 2008), frequent users reported more problems with family and neglecting family as a result of cannabis use compared to less frequent users (Buckner et al., 2010), and more frequent use is associated with greater rates of continued use despite problems with family or friends (Caldeira et al., 2008). Notably, the only known study of the relation of cannabis to IPTS factors suggests that specific illicit substances may be differentially related to IPTS factors – among adult outpatients, those with CUD reported more thwarted belongingness than patients with amphetamine or opioid use disorders, although they reported less perceived burdensomeness than patients with other substance use disorders (Silva et al., 2015). It is important to further examine the relation of cannabis with IPTS factors for several reasons including (1) although daily use is related to CUD (Grant and Pickering, 1998), not all daily users meet criteria for a CUD (Substance Abuse and Mental Health Services Administration, 2013) and (2) the vast majority of cannabis users (including those with CUD) do not seek psychosocial treatment (Stinson et al., 2006) and the majority of those that do seek treatment at self-help groups (Substance Abuse and Mental Health Services Administration, 2013), suggesting that the results from the Silva et al. study may not generalize to majority of cannabis users (e.g., non-treatment seekers).

The current study is the first known test of the utility of the IPTS in understanding SI among high-risk daily cannabis users. Given that the IPTS model theorizes that it is not the IPTS components in isolation, but rather their combination, that predict SI (Joiner, 2005; Van Orden et al., 2010), the current study tested whether the combination of perceived burdensomeness and thwarted belongingness mediates the relation between frequency of cannabis use (daily vs. less frequent use) and SI, even after controlling for variance attributable to alcohol use frequency (given that alcohol is the most commonly used substance among college students; Substance Abuse and Mental Health Services Administration, 2014) and history of prior suicide attempt. This hypothesis was examined among undergraduate students given that suicide is the second leading cause of death for this age group (Centers for Disease Control and Prevention, 2015) and cannabis is the most commonly used illicit substance among this age group (Substance Abuse and Mental Health Services Administration, 2014).

2. Methods

2.1 Participants and Procedures

Participants were recruited through the psychology participant pool from a large state university in the southern United States. This study was carried out in accordance with the 2013 Declaration of Helsinki. The university's Institutional Review Board approved the study and participants provided informed consent prior to data collection. The consent form explained that participants' names would not be linked to their responses, assuring confidentiality of responses. Further, the consent form detailed that a certificate of confidentiality was obtained from the National Institute on Drug Abuse to further protect confidentiality. Participants completed computerized self-report measures using a secure, on-line data collection website ([surveymonkey.com](https://www.surveymonkey.com)). All participants received referrals to university-affiliated psychological outpatient clinics and the telephone number for the local crisis intervention hotline as well as research credit for completion of the survey.

Of the 1055 students who completed the survey, 215 (20.4%) endorsed current (past month) cannabis use. Of those, six were excluded (five for questionable validity of their responses as described below and one for being under 18 years of age). The final sample of 209 was predominately female (76.1%) and the racial/ethnic composition was 13.4% non-Hispanic African American, 3.3% Asian American, 71.8% Non-Hispanic Caucasian, 5.3% Hispanic Caucasian, 0.5% Native American, 3.3% multiracial, and 2.4% "other". The mean age was 20.0 ($SD=2.0$). The majority (88.0%) endorsed lifetime alcohol use, with 10.0% drinking monthly or less, 28.2% drinking 2–4 times per month, 43.5% drinking 2–3 times per week, and 4.8% drinking four or more times per week. Regarding suicidality, 49.3% endorsed lifetime SI, 37.8% endorsed past-year SI, 13.4% endorsed past-two-week SI, and 5.7% endorsed lifetime suicide attempt.

2.2 Measures

The *Marijuana Use Form* (MUF; (Buckner et al., 2007) assessed cannabis use frequency in the past three months on a scale ranging from 0 (*never*) to 10 (*21 or more times each week*). Participants endorsing cannabis use at least 5–6 times per week were classified as daily users

($n = 39$). The MUF has shown convergent validity with ecological momentary assessments of cannabis use (Buckner et al., 2012).

The *Interpersonal Needs Questionnaire* (INQ; Van Orden et al., 2012) was used to assess perceived burdensomeness and thwarted belongingness. The measure contains 15 items (6 assessing perceived burdensomeness, 9 assessing thwarted belongingness) scored from 1 (*not at all true for me*) to 7 (*very true for me*). Internal consistency for the perceived burdensomeness ($D=.93$) and thwarted belongingness ($D=.87$) subscales were good in the current sample.

The *Inventory of Depression and Anxiety Symptoms* (IDAS; Watson et al., 2007) was used to assess SI in the past two weeks with the question, “I had thoughts of suicide” from 1 (*not at all*) to 5 (*extremely*).

Covariates were assessed such that drinking frequency was assessed by asking participants to rate from 0 (*Never*) to 4 (*4 or more times a week*) how often they have a drink containing alcohol (per Babor et al., 2001) and history of suicide attempt was determined by asking participants whether they ever attempted to kill themselves per the *Suicide Behaviors Questionnaire-Revised* (Osman et al., 2001).

Four questions from the *Infrequency Scale* (IS; Chapman and Chapman, 1983) were used to identify random responders who provided random or grossly invalid responses. As in prior online studies (Cohen et al., 2009), individuals who endorsed three or more items were to be excluded ($n = 5$).

2.3 Data Analyses

Data were not significantly skewed or kurtotic (per Kline, 2005). Thus, we first tested whether daily cannabis use status was related to SI, thwarted belongingness, or perceived burdensomeness using analysis of variance (ANOVA). Second, we tested whether cannabis use status (daily use vs less frequent) was indirectly related to SI via the combination of thwarted belongingness and perceived burdensomeness via moderated mediation analyses (i.e., whether perceived burdensomeness only mediates this relation at higher levels of thwarted belongingness) (see Figure 1 for hypothesized model). Prior suicide attempt status (no vs yes) and alcohol use frequency were included as covariates. This hypothesis was testing using PROCESS, a macro used with SPSS 22.0 (IBM Corp., 2013) that utilizes an ordinary least squares regression-based path analytical framework to test for both direct and indirect effects (Hayes, 2013) using bootstrap analyses with 10,000 resamples from which bias-corrected 95-percentile confidence intervals (CI) were estimated (Hayes, 2009; Preacher and Hayes, 2004, 2008).

3. Results

Table 1 presents differences between daily and less frequent cannabis users on suicide-related variables. Daily users reported significantly greater SI as well as more thwarted belongingness and perceived burdensomeness. Given some data suggesting that the relation between more intense cannabis use and SI is greater among men than women (van Ours et

al., 2013), we tested whether gender moderated the relation of cannabis use group with SI; this interaction was not significant, $F(1, 208) = 0.57, p = .450$. Correlations among study independent variables, covariates, and SI appear in Table 2. SI was significantly related to both thwarted belongingness and perceived burdensomeness.

The full model of moderated mediation accounted for significant variance ($R^2 = .187, df = 6, 177, F = 6.80, p < .0001$). The direct effect of cannabis use status on SI was no longer significant after controlling for thwarted belongingness, perceived burdensomeness, and the thwarted belongingness $\times$ perceived burdensomeness interaction, $b = .143, SE = .117, 95\% \text{ CI} = -.087, .373$. The thwarted belongingness $\times$ perceived burdensomeness interaction was significantly related to SI even after accounting for variance attributable to main effects and to cannabis use status, $b = .003, SE = .001, 95\% \text{ CI} = .001, .006$. Cannabis use status was predictive of greater SI indirectly through perceived burdensomeness only at higher levels of thwarted belongingness ($b = .072, SE = .049, 95\% \text{ CI} = .005, .212$), not at moderate ($b = .026, SE = .057, 95\% \text{ CI} = -.194, .055$) or lower levels ($b = -.124, SE = .118, 95\% \text{ CI} = -.479, .022$) of thwarted belongingness.

4. Discussion

The current study adds to our understanding of factors related to SI in at least three important ways. First, among current cannabis users, daily users reported significantly greater current SI than less frequent cannabis users. Second, daily users reported greater thwarted belongingness and perceived burdensomeness. Third, moderated mediational analyses indicated that greater SI among daily users may be at least in part due to higher levels of both thwarted belongingness and perceived burdensomeness. This is an important test of IPTS (Joiner, 2005), which posits that it is the combination of thwarted belongingness and perceived burdensomeness that increases the likelihood that one may desire to die by suicide.

When considered in light of findings from the only other known study of cannabis and IPTS in which outpatients with CUD reported more thwarted belongingness but less perceived burdensomeness than patients with other types of substance use disorders (Silva et al., 2015), results suggest that daily users, regardless of CUD status, are vulnerable to experiencing interpersonal dysfunction and the experience of two types of dysfunction (i.e., perceived burdensomeness, thwarted belongingness) appears to work synergistically to contribute to SI. Although SI does not prospectively predict cannabis use (van Ours et al., 2013), prospective work will be an important next step in disentangling temporal sequencing of cannabis use frequency to thwarted belongingness and perceived burdensomeness and from thwarted belongingness and perceived burdensomeness to SI. Further, prospective work is necessary to delineate the impact of acute emotional factors implicated in suicide risk (e.g., agitation, irritability, social withdrawal, severe affective states; for review see Chu et al., 2015) to determine whether acute increases in these states leads to greater cannabis use which in turn increases SI or whether cannabis use increases these states (e.g., via withdrawal) which increases SI.

Findings from the current study have important clinical implications. Universities may consider identifying daily cannabis users for prevention interventions geared toward decreasing suicide risk among undergraduates. Given that the vast majority of cannabis using students (even those experiencing cannabis-related problems) are not interested in receiving treatment for their cannabis use (e.g., Buckner et al., 2010), one opportunity to intervene with these students is when they are identified by universities when caught violating campus drug and alcohol policies. Thus, university officials are encouraged to train campus police and administrators who will interact with these students on suicide risk assessment (such as Chu et al., 2015). These students are often referred for brief motivation enhancement therapies to resolve ambivalence about changing risky cannabis use (e.g., White et al., 2006) that are based on *Brief Alcohol Screening and Intervention for College Students* (BASICS; Dimeff et al., 1999). BASICS-type interventions, however, tend to not attend to SI and our data suggest that cannabis users, especially daily users, may benefit from including SI assessment and treatment when appropriate with these students. Further, it is suggested that those assessing suicide risk factors among daily cannabis users utilize empirically informed criteria that include assessment of users' perceptions of burdensomeness and thwarted belongingness (Chu et al., 2015). Clinicians may consider including therapeutic techniques that promote the importance of maintaining social connections and social contributions among daily cannabis users.

Findings must be considered in light of limitations that can inform future work in this area. First, the sample consisted largely of non-Hispanic White female undergraduates and it will be important to test whether results replicate in more diverse samples. Second, the study was cross-sectional in nature, permitting an initial test of mediation (Hayes, 2013), and prospective and experimental work (e.g., ecological momentary assessment of momentary predictors of SI; see Davidson et al., in press) will be an important next step to test whether daily cannabis use leads to perceived burdensomeness and/or thwarted belongingness or whether these IPTS components lead to daily cannabis use (or whether there are bidirectional relations among these variables).

Despite these limitations, the current study adds to a growing corpus of work finding IPTS components to at least partially account for the relations between psychosocial vulnerability factors and suicidality (e.g., Chu et al., 2016; Nsamenang et al., 2013). Future research testing whether improving interpersonal functioning (including perceptions of interpersonal function) among daily cannabis users decreases their suicide risk will be an important next step.

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Highlights

- Perceived burdensomeness and thwarted belongingness increase suicide ideation (SI)
- Daily users had more SI, more thwarted belongingness, and perceived burdensomeness
- Daily cannabis use was indirectly related to SI via these factors

Figure 1. Hypothesized moderated mediation model of the conditional indirect effect of cannabis use group on suicidal ideation through both perceived burdensomeness and thwarted belongingness.

Table 1
Differences between daily users (n = 39) and less frequent cannabis users (n = 160) on recent suicidal ideation and components of the Interpersonal-Psychological Theory of Suicide

	Daily cannabis users <i>M (SD)</i>	Less frequent users <i>M (SD)</i>	<i>F</i>	<i>p</i>	<i>d</i>
Past 2 week suicidal ideation	1.47 (.92)	1.15 (.54)	9.15	.003	.50
Perceived burdensomeness	10.12 (6.25)	7.51 (3.62)	13.41	<.001	.60
Thwarted belongingness	26.88 (11.71)	22.21 (12.19)	5.59	.019	.39

Table 2

Intercorrelations among study variables

	1	2	3	4	5	6
1. Suicidal ideation						
2. Thwarted belongingness	.30**					
3. Perceived burdensomeness	.29**	.41**				
4. Drinking frequency	.08	.13	.01			
5. Suicide attempt history	.13	.02	.16*	.04		
6. Gender	.02	.06	.01	-.06	.09	

* $p < .05$;

** $p < .01$

Note. The following variables were dummy coded: suicide attempt history (0 = no attempt, 1 = attempt) and gender (0 = male, 1 = female).