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Marijuana Use and Panic Psychopathology Among a Representative Sample of Adults

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Abstract

This study examined the relations between marijuana use and panic attacks and panic disorder using a large representative survey of adults (N = 5,672; 53% women; M_{age} = 45.05 years, SD = 17.9) conducted in the United States (Kessler et al., 2004). After adjusting for sociodemographic variables (age, marital status, income, education, race, and sex) and the presence of a lifetime substance use disorder, lifetime marijuana use was significantly associated with increased odds of a lifetime panic attack history. Lifetime marijuana use also was significantly associated with an increased risk of current (past-year) panic attacks; however, this relation was not significant when controlling for nicotine dependence. Lifetime marijuana use was significantly associated with increased odds of a lifetime diagnosis of panic disorder as well as a current (past-year) diagnosis of panic disorder. Current (past-year) marijuana use was significantly associated with both lifetime and current panic attacks, but not current or lifetime panic disorder. Results are discussed in relation to the novel information they offer in regard to understanding the putative marijuana use–panic psychopathology association(s).

Keywords

marijuana; cannabis; panic disorder; anxiety; comorbidity

Empirical work has revealed some intriguing, but as of yet not fully conclusive, findings regarding a putative association between marijuana use and panic psychopathology (Hathaway, 2003). For example, Zvolensky, Bernstein, Sachs-Ericsson, et al. and colleagues (2006) found, among a representative sample of adults (N = 4,745) from the State of Colorado, that a lifetime history of marijuana dependence was significantly related to an increased risk of meeting lifetime diagnostic criteria for panic attacks. In another investigation, adolescent marijuana use and dependence - were significantly prospectively

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associated with increased odds for the development of panic attacks and panic disorder in adulthood (Zvolensky et al., 2008). However, the marijuana use and dependence effects in relation to the onset of panic psychopathology were not evident after controlling for daily cigarette smoking. In the most recent test, Bonn-Miller and Zvolensky (in press) found marijuana-dependent adults without preexisting psychopathology to be significantly more likely to report greater postchallenge panic attack symptoms in response to a carbon dioxide-enriched air laboratory challenge task (Zvolensky & Eifert, 2000) compared with persons abusing marijuana. In this same study, however, marijuana-dependent adults did not differ from the marijuana-use group in terms of postchallenge panic attacks symptoms (Bonn-Miller & Zvolensky, in press).

A number of substantive limitations characterize the - study of marijuana–panic psychopathology relations at the present time. First, findings have not been uniformly consistent. Some studies have reported an association between certain types of marijuana use (e.g., marijuana dependence) and panic attack symptoms (e.g., Bonn-Miller & Zvolensky, in press), but others have suggested such an association is accounted for by other forms of substance use behavior (e.g., co-occurring cigarette smoking; Zvolensky et al., 2008). Second, there has been only one study addressing marijuana–panic psychopathology relations employing a representative sample, and this investigation comprised persons exclusively from the State of Colorado (Zvolensky et al., 2006). Moreover, the data used in the Colorado study did not allow for the diagnosis of panic disorder. Thus, generalizable knowledge to the U.S. population as a whole pertaining to marijuana use and panic attacks and panic disorder relations is not presently available. Finally, previous work has often focused on *either* lifetime or current indices of marijuana use and panic psychopathology. However, research has not yet sought to evaluate, in one overarching test, both current and lifetime indices of marijuana use and panic attacks and panic disorder while adjusting for a wide range of sociodemographic factors and nonmarijuana substance use dependence.

Together, the purpose of the present study was to examine the relations between marijuana use and panic attacks and panic disorder using a large representative survey (National Comorbidity Survey [NCS-R]; Kessler et al., 2004) of adults conducted in the United States. The relation between marijuana and panic psychopathology, specifically, was modeled given that it was (a) driven conceptually by an overarching theoretical perspective, and (b) to clarify past findings from extant work focused on marijuana–panic relations. It was hypothesized that, after adjusting for socio-demographic variables (age, marital status, income, education, race, and sex) and the presence of lifetime (nonmarijuana) substance abuse or dependence, both lifetime and current marijuana use would be significantly associated with elevated risk for lifetime and current panic attacks and panic disorder. These hypotheses were guided by the emerging empirical literature documenting possible risk for panic psychopathology as a function of marijuana use (Hathaway, 2003; Zvolensky et al., 2008).

Method

Sample

The NCS-R is composed of a representative sample of English-speaking adults from the contiguous United States. Participants were interviewed in person at their place of residence between February 2001 and April 2003. A detailed description of the methodology, weighting, and sampling procedures used in the NCS-R has been provided by Kessler and colleagues (2004).

The current investigation was based on individuals from the NCS-R (n = 5,672) who reported data on both panic psychopathology and history of marijuana use. The sample was

53% women, with an average age of 45.05 years (*SD* = 17.9). The racial and ethnic representation of the study participants was 72.8% Caucasian, 11.6% African American, 11.1% Hispanic, and 4.5% from other ethnicities. The average income among respondents was $59,277 (*SD* = $48,788), and the average years of education completed was 13.08 (*SD* = 2.5).

Procedure

A stratified, multistage probability sample was created on the basis of the 2000 U.S. Census. Respondents received a letter describing the survey and their potential participation several days before in-person contact was made. Interviews were conducted by professional interviewers who had obtained extensive training and were closely supervised by the Institute for Social Research. The administration of the interview was completed face-to-face with the assistance of a laptop computer. The overall response rate was 70.9%. The data were weighted to adjust for discrepancies between the sample and the U.S. Census in terms of geographic and sociodemographic variables (Kessler et al., 2004).

The interview included an extensive demographic section that assessed sex, age, education, marital status, and current household income. Lifetime and 12-month panic disorder, panic attacks, and substance use disorders (including nicotine dependence) were assessed using the World Mental Health Survey Initiative version of the World Health Organization Composite International Diagnostic Interview (WMH-CIDI; Kessler & Ustun, 2004). This is a structured diagnostic interview from which *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) Axis I diagnoses are derived. The CIDI is designed for use by trained, nonclinician interviewers and allows for the generation of diagnoses based on either International Classification of Disease (ICD)-10 or *DSM–IV* criteria, the latter of which was used in this study. The CIDI has been found to have good validity and reliability for anxiety, mood, and substance use disorders (First, Spitzer, Gibbon, & Williams, 2002). In the present study, the panic psychopathology variables were coded dichotomously (0 = no diagnosis, 1 = diagnosis).

Respondents also answered questions related to lifetime and 12-month marijuana use. Lifetime history was coded based on response to the question, “Have you ever used either marijuana or hashish, even once?” In addition, respondents reported frequency of marijuana use over the past 12 months (see Table 1 for marijuana use frequency range employed).

Data Analytic Approach

Analyses were conducted using Statistical Analysis Software (SAS) Version 9.1 and employed the appropriate NCS-R statistical weights to ensure that the sample was representative of the general U.S. population. Cross-tabulations were calculated to determine (a) the prevalence of current and lifetime panic psychopathology among participants who are and are not marijuana users and (b) the prevalence of current and lifetime marijuana use among participants with or without lifetime or current (past-year) panic attacks or panic disorder. Subsequently, multiple logistic regressions were performed with the marijuana and panic psychopathology variables after adjusting for sociodemographic variables of age, sex (0 = male, 1 = female), race (0 = non-Caucasian, 1 = Caucasian), education (number of years of formal schooling), income, and marital status, as well as lifetime (non-marijuana) alcohol and drug abuse/dependence (coded continuously for all nonmarijuana drugs listed in CIDI). These covariates were specified a priori on theoretical grounds and to facilitate comparability with past research (Zvolensky et al., 2006). Additional analyses were conducted that controlled for lifetime nicotine dependence in addition to the aforementioned covariates given recent findings indicating that marijuana–panic psychopathology

associations may be influenced, or explained by, tobacco use (Bonn-Miller, Zvolensky, & Johnson, in press; Zvolensky et al., 2008).

Results

Observed Lifetime and 12-Month Prevalence

Observed prevalence rates for marijuana use and panic psychopathology were first computed. In terms of lifetime prevalence, the observed base rates were 42.5% (2,411/5,672), 28.3% (1,609/5,692), and 6.1% (347/5,692) for marijuana use, panic attacks, and panic disorder, respectively. The prevalence rates for 12-month marijuana use, panic attacks, and panic disorder were 9.5% (538/5,670), 11.2% (639/5,692), and 3.7% (208/5,692), respectively.

Current and Lifetime Panic Attacks and Panic Disorder as a Function of Lifetime Marijuana Use Status

Lifetime marijuana use was significantly associated with elevated risk for a lifetime history of panic attacks after adjusting for sociodemographic variables (age, marital status, income, education, race, and sex) and the presence of lifetime alcohol or drug (nonmarijuana) abuse/dependence (OR = 1.6, 95% CI [1.4, 1.9], $p < .01$) as well as nicotine dependence (OR = 1.6, 95% CI [1.3, 1.8], $p < .01$; see Table 1). An identical pattern of results was evident between a lifetime history of marijuana use in relation to risk for a lifetime history of panic disorder after adjusting for the covariates (see Table 1).

Lifetime marijuana use also was significantly related to elevated risk for current (past-year) history of panic attacks after controlling for sociodemographic variables and the presence of lifetime alcohol or drug (nonmarijuana) abuse/dependence (OR = 1.3, 95% CI [1.0, 1.7], $p < .05$). However, this relation was not significant after controlling for nicotine dependence (see Table 1). Lifetime marijuana use was significantly related to elevated risk for current (past-year) panic disorder after adjusting for the covariates (OR = 1.5, 95% CI [1.0, 2.1], $p < .05$), including nicotine dependence (OR = 1.4, 95% CI [1.0, 2.0], $p < .05$; see Table 1).

Current and Lifetime Panic Attacks and Panic Disorder as a Function of Current Marijuana Use Status

Current marijuana use was significantly associated with elevated risk for lifetime history of panic attacks after adjusting for sociodemographic variables and the presence of lifetime alcohol or drug (nonmarijuana) abuse/dependence (OR = 1.3, 95% CI [1.0, 1.6], $p < .01$) as well as nicotine dependence (OR = 1.2, 95% CI [1.0, 1.5], $p < .05$; see Table 1). There was no significant association between current marijuana use and lifetime history of panic disorder (see Table 1).

Current marijuana use was significantly associated with increased odds of current (past-year) panic attacks after adjusting for the covariates (OR = 1.7, 95% CI [1.3, 2.2], $p < .01$) as well as nicotine dependence (OR = 1.6, 95% CI [1.2, 1.6], $p < .01$; see Table 1). There was no significant association between current marijuana use and current diagnosis of panic disorder (see Table 1).

Frequency of Current (12-Month) Marijuana Use in Terms of Panic Psychopathology

An additional set of logistic analyses was conducted to examine whether 12-month marijuana use *frequency* (modeled continuously) is associated with degree of risk for panic attacks or panic disorder. Only those reporting at least one marijuana use during the past 12 months were used for these analyses. Overall, among those who used marijuana in the past year, 12-month marijuana use frequency was not significantly associated with degree of risk

for lifetime panic disorder (OR = 1.14, 95% CI [0.96, 1.35], p = .15) or panic attacks (OR = 1.09, 95% CI [0.95, 1.25], p = .20), as well as current panic disorder (OR = 1.18, 95% CI [0.97, 1.44], p = .095) or panic attacks (OR = 1.08, 95% CI [0.95, 1.24], p = .25).

Discussion

Consistent with prediction, after adjusting for sociodemographic variables (age, marital status, income, education, race, and sex) and the presence of lifetime alcohol or drug (nonmarijuana) abuse/dependence, lifetime marijuana use was significantly associated with a lifetime panic attack and panic disorder history. This lifetime marijuana use–panic attack and marijuana use–panic disorder association was similarly evident (in pattern and magnitude) when nicotine dependence was included as an additional covariate (see Table 1). These findings replicate past work indicating a lifetime marijuana use–panic attack association (Zvolensky et al., 2006), and uniquely extend it to a lifetime history of panic disorder. When current (past-year) panic attacks and panic disorder were examined, a slightly different pattern was evident. Specifically, lifetime marijuana use was significantly associated with risk of current (past-year) panic attacks and panic disorder when adjusting for sociodemographic factors and nonmarijuana substance use dependence as well as nicotine dependence. The one exception to this pattern of findings pertained to the association between lifetime marijuana use and current panic attack history. Here, the relation between lifetime marijuana use and current panic attack was not statistically significant when nicotine dependence was included as an additional covariate. This finding is consistent with a prospective test of a marijuana–panic attack association that indicated that tobacco use may account for the observed association between marijuana dependence and the onset of panic attacks (Zvolensky et al., 2008). Overall, the present data indicate that lifetime marijuana use is related to lifetime and some, but not all, forms of current (past-year) panic psychopathology. It is important to note that the observed findings do not appear to be accounted for by a wide variety of variables known to co-occur with both marijuana use and panic psychopathology.

The present investigation also involved tests focused on current (past-year) marijuana use in relation to lifetime and current indices of panic psychopathology. Results indicated a consistent association between current (past-year) marijuana use and lifetime as well as current panic attacks. Specifically, after adjusting for sociodemographic variables and lifetime alcohol or drug abuse/dependence as well as nicotine dependence, current marijuana use was significantly associated with a lifetime and current history of panic attacks. These results add uniquely to the present empirical literature regarding marijuana–panic associations by indicating that current (past-year) marijuana use is consistently related to panic attacks when considered from either a lifetime or current (past-year) timeframe. It is interesting that a different pattern of results emerged between current (past-year) marijuana use and lifetime and current indices of panic disorder. Here, no significant relation was observed between current marijuana use and a lifetime or current panic disorder history (see Table 1). One possible explanation for such findings is that certain subsets of “emotionally vulnerable” current marijuana users may discontinue use of the drug if they start to develop anxious apprehension about experiencing panic attacks in the future (i.e., a marijuana user who experiences a panic attack related to such use may discontinue marijuana use because of a specific fear that it could elicit a panic attack in the future). Thus, there may theoretically be a stronger relation between current marijuana use and panic attacks relative to panic disorder.

Although not a primary aim of the investigation, exploratory analyses were completed that evaluated the frequency of marijuana use among current users in regard to risk for panic attacks and panic disorder. These tests were completed given some empirical evidence that

more severe problems related to such use may demonstrate a stronger association with panic psychopathology (Zvolensky et al., 2006). To the extent that greater rates of marijuana use are related to more severe marijuana use problems, then, frequency of marijuana use could potentially be related to panic psychopathology among current users of the drug. The current data, although limited in statistical power, did not fully support such a perspective, as frequency of marijuana use was not predictive of panic psychopathology. Thus, considering past work (Zvolensky et al., 2008), severity of marijuana use problem(s) may perhaps be a better index of putative panic vulnerability than frequency of marijuana use.

One emerging insight into the marijuana–panic relation is that it does not compare fully or similarly with that observed for cigarette use. Specifically, work has indicated that smoking rate for tobacco (cigarette use) is often significantly and robustly related to panic psychopathology (Zvolensky & Bernstein, 2005). The relation between marijuana use and panic psychopathology, on the other hand, is less robust and consistent (Bonn-Miller et al., in press). Moreover, the associations between the two forms of substance use in terms of panic psychopathology likely involve different mechanisms. It is difficult to draw firm conclusions in this domain, as work has emerged only in the past few years One important area of future work, especially considering the high rates of co-occurrence between marijuana and tobacco use (Fergusson, Horwood, & Swain-Campbell, 2002), will be to compare in one model the individual and interactive effects of marijuana and tobacco use in relation to panic psychopathology across time and the mechanisms underlying each association.

The current findings add uniquely to extant scientific knowledge concerning marijuana use and panic psychopathology by addressing three key limitations of past work (see introduction). Such relations invite theorizing as to why such an association may exist by exploring the role of (a) marijuana in the onset and course of panic attacks and panic disorder and (b) panic psychopathology in the onset and course of marijuana use. That is, there may be distinct, but not mutually exclusive, pathways in the observed marijuana–panic psychopathology association (e.g., marijuana use leading to panic psychopathology or panic psychopathology leading to marijuana use). Although the present data cannot be used to disentangle or explicate such intriguing questions, it is striking that marijuana use can serve important affect regulatory functions (Bonn-Miller, Zvolensky, & Bernstein, 2007; Comeau, Stewart, & Loba, 2001; Zvolensky et al., 2009). Extrapolating from such work, it is possible that these marijuana-using individuals, such as those with panic attacks, may expect marijuana use to help alleviate aversive mood and somatosensory states and be particularly motivated to use for perceived or objective affect regulation purposes. At the same time, panic psychopathology may be related to marijuana maintenance or relapse through enhanced emotional reactivity to interoceptive stimuli or the use of the drug to cope with life stressors.

Limitations of the present study warrant comment. First, the cross-sectional design of this study does not permit causal inferences regarding the directionality of the ob served associations. Future prospective work using longitudinal data may be a useful next step for work directed at isolating onset and developmental patterns between marijuana use and panic psychopathology. Similarly, research could usefully build on such work by attempting to explicate the patterning between age of onset for marijuana use and panic psychopathology. Second, whereas these results are generalizable to the adult U.S. population, it is not clear whether they are applicable cross-nationally. In light of the global health implications of panic psychopathology and marijuana use problems (e.g., Vega et al., 2002), future studies examining the cross-national stability of the current findings are, therefore, an important next scientific step Finally, the NCS-R survey does not permit a categorization of marijuana abuse or dependence. Thus, future work may benefit by

exploring marijuana–panic psychopathology relations using abuse and dependence diagnostic criteria rather than relying exclusively on "marijuana use." In related fashion, the use of marijuana use history does not adequately titrate the degree of use or severity of use. Thus, future research should clarify how and in what ways marijuana use relates to panic psychopathology.

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Table 1

Prevalence of Lifetime and 12-Month Panic Disorder and Panic Attacks Among Those With and Without Marijuana Use

	Lifetime marijuana use								12-month marijuana use							
	Yes (*n* = 2,411)		No (*n* = 3,262)		AOR-1[a]		AOR-2[b]		Yes (*n* = 538)		No (*n* = 5,132)		AOR-1[a]		AOR-2[b]	
Variable	***n***	**%**	***n***	**%**	**OR**	**95% CI**	**OR**	**95% CI**	***n***	**%**	***n***	**%**	**OR**	**95% CI**	**OR**	**95% CI**
Lifetime panic attacks	888	36.8	717	22.0	1.69**	[1.46, 1.97]	1.62**	[1.39, 1.87]	219	40.7	1,386	27.0	1.32**	[1.08, 1.63]	1.27*	[1.04, 1.56]
12-month panic attacks	358	14.9	280	8.6	1.34*	[1.06, 1.70]	1.27	[0.99, 1.10]	125	23.2	512	10.0	1.71**	[1.30, 2.24]	1.65**	[1.27, 2.15]
Lifetime panic disorder	204	8.5	143	4.4	1.78**	[1.39, 2.28]	1.70**	[1.33, 2.17]	45	8.4	301	5.9	1.00	[0.75, 1.33]	0.97	[0.72, 1.30]
12-month panic disorder	120	5.0	87	2.7	1.51*	[1.08, 2.12]	1.44*	[1.02, 2.05]	34	6.3	173	3.4	1.14	[0.81, 1.60]	1.10	[0.78, 1.57]

[a] Adjusted odds ratios (AOR-1) were adjusted for age, sex, ethnicity, education, income, marital status, and lifetime alcohol and drug abuse/dependence.

[b] Adjusted odds ratios (AOR-2) included the covariates used for AOR-1 as well as lifetime nicotine dependence.

* $p < .05$.

** $p < .01$.