Problems Associated with Using Cannabis to Cope with Stress

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ABSTRACT

Previous research has uncovered a link between stress and cannabis. The overall goal of the present study was to further elucidate the nature of this link by examining whether cannabis use motives (e.g., using cannabis to cope with negative affect) mediate the putative associations between stress (early life stress, chronic stress) and cannabis (frequency of cannabis use, problematic cannabis use). A sample of 578 cannabis-using college students completed an anonymous online survey designed to measure early life stress, chronic stress, frequency of cannabis use, and problematic cannabis use. The results indicated that early life stress was significantly associated with more frequent cannabis use and that both early life stress and chronic stress were significantly associated with more problematic cannabis use. The results of a series of parallel multiple mediation models further revealed that cannabis coping motives (i.e., using cannabis to cope with negative affect and other problems) was a significant mediator of all three of these relationships. These findings suggest that both early life stress and chronic stress may lead to the use of cannabis to cope with stress, and that the use of cannabis for this purpose may, in turn, increase problematic cannabis use. We propose that enhancing cannabis users' coping skills, so that they are not reliant on cannabis for coping, may help sever the connection between stress and problematic cannabis use.

Key words: cannabis, coping, chronic stress, early life stress, motives

According to a recent survey, 63% of Americans do not believe they can manage their stress adequately (American Psychological Association [APA], 2013), and young adults (particularly college students) report some of the highest levels of stress and stress-related symptoms (APA, 2015). For example, students surveyed at one major US university felt "more than average" or "tremendous" levels of stress at some point in the past 12 months, and 86% felt overwhelmed by all they had to do (American College Health Association, 2015). This is particularly concerning because unmanaged stress can lead to a broad array of negative outcomes (e.g., depressed mood, digestive problems, viral infections; National Institute of Mental Health, n.d.) as well as to substance abuse and substance-related problems (e.g., Fishbein et al., 2007; Labouvie, 1986; Sinha, 2001; Sinha, 2008; Windle & Wiesner, 2004).

Many people turn to cannabis to cope with their stress. Indeed, one of the most commonly reported reasons for cannabis consumption is for relaxation and tension reduction (Copeland, Swift, & Rees, 2001; Green, Kavanaugh, & Young, 2003; Hathaway, 2003; Reilly, Didcott, Swift, & Hall, 1998). Further, cannabis is cited as a coping tool for dealing with negative affect and problems in life more than any other drug (Green, Kavanaugh, & Young, 2003). While recent research suggests that sober cannabis users demonstrate a blunted stress response compared

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to non-users (Cuttler et al., 2017), the acute effects of cannabis on stress and the long-term consequences of using cannabis to cope with stress are not well understood.

Previous research has highlighted the role of coping motives (i.e., using cannabis to cope with negative affect and other problems) in the relationship between various states of negative affect and cannabis. For example, Bujarski and colleagues (2012) discovered a relationship between distress intolerance and problematic cannabis use that was mediated by coping motives. Similarly, Brodbeck and colleagues (2007) found significantly higher psychosocial distress (i.e., unpleasant feelings that occur in response to stress) in young adults who used cannabis primarily for coping motives but not in those who used cannabis primarily for social reasons. Johnson and colleagues (2009) found that coping motives mediated the relationship between anxious arousal (i.e., somatic tension and arousal) and cannabis use. Finally, Spradlin, Mauzay, and Cuttler (2017) provided evidence that coping motives mediate the relationship between symptoms of obsessive-compulsive disorder and cannabis misuse.

To our knowledge, only one previous study has attempted to model mediators of the link between stress and cannabis. Specifically, Ketcherside and Filbey (2015) found that both early life stress and chronic stress were linked to increased problematic cannabis use, and these relationships were mediated by negative affect. No known research has examined the role of cannabis use motives in the link between stress and cannabis. As such, there are significant gaps in our understanding of the nature of the link between stress and cannabis and the mechanisms that may be driving that link. Therefore, the primary aim of the present study was to test the role of various cannabis use motives as mediators of the stress-cannabis link. In order to provide a thorough examination of this link, we assessed two forms of stress (early life stress and chronic stress) and two cannabis outcome variables (frequency of cannabis use and problematic cannabis use). We hypothesized that both early life stress and chronic stress would be related to increased frequency of cannabis use and to problematic cannabis use and that coping motives would mediate these links.

METHOD

Participants

A total of 1,334 undergraduate students participated in the present study. After data collection was completed, the data were filtered to ensure the sample met several criteria. First, the 10 items of the deviant responding validity subscale of the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) were randomly interspersed throughout our survey to detect random responders, and 80 participants who endorsed more than four PPI items in an aberrant manner were excluded from all analyses. Second, participants must have used cannabis within the past 30 days. This criterion was chosen to ensure that a wide range of cannabis use was available for analysis while also removing the influence of the large percentage of non-users who completed the study.

A final sample of 578 undergraduate students was included in the analyses. This sample comprised primarily females (65.6%) and individuals who identified as White (68.2%), followed by Hispanic or Latino (11.9%), Black (6.9%), Asian (5%), Pacific Islander (2.8%), and Native American (1.4%). Approximately 3.6% of participants indicated their ethnicity was something other than the answer choices available. Among the participants, the average age was approximately 20 years old (SD = 1.71). Participants reported using cannabis, on average, 10.1 days (SD= 6.51) of the past month, and 18.7% of the participants reported using cannabis once a day or more. The average age of first cannabis use among participants was approximately 16.4 (SD= 2.12).

Materials

Demographic information. A short demographics questionnaire was included in the survey to assess age, sex, ethnicity, and other demographic characteristics.

Early Life Stress Questionnaire (ELSQ). Early life stress was assessed using the ELSQ. The ELSQ is a self-report inventory used to measure exposure to potentially traumatic events before the age of 18 (Cohen et al., 2006). Participants use a yes/no scale to respond to 19 items to indicate whether they experienced each specific event

during their childhood (e.g., sexual abuse, the death of a sibling, premature birth or other birth complications). The initial version of the questionnaire has shown high internal consistency (α = .90) and test-retest reliability at a six- to eight-week follow-up (r = .89; Sanders & Becker-Lausen, 1995). The ELSQ also has significant correlations with other measures, such as depression (r = .40) and stressful life events (r = .29; Sanders & Becker-Lausen, 1995). Total scores were computed by summing the number of traumatic events each participant experienced. Scores could range from 0 to 19 with higher scores indicating more exposure to potentially traumatic events during childhood and adolescence.

Perceived Stress Scale (PSS). Chronic stress was measured using the PSS, a 10-item self-report inventory for measuring the severity of symptoms of stress in the last month (i.e., levels of chronic stress; Cohen, 1988). Participants rate how often they have experienced stress (e.g., "how often have you been upset because of something that happened unexpectedly") on a 5-point scale with anchors as follows: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often. The psychometric properties of the measure are sound among college students and include high internal consistency (α ≥ .70) and high test-retest reliability (r ≥ .70; see Lee, 2012 for review). Scores for each participant were computed by summing all 10 items of the measure. Scores could range from 0 to 40, with higher scores indicating more chronic stress.

Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). Cannabis use frequency was assessed using the DFAQ-CU, a 33-item self-report inventory for measuring cannabis use across six factors: number of sessions of cannabis use per day, frequency of cannabis use, age of onset of cannabis use, quantity of loose-leaf cannabis typically consumed, quantity of cannabis concentrates typically consumed, and quantity of cannabis-infused edibles typically consumed (Cuttler & Spradlin, 2017). Only the frequency subscale was utilized in the present study. This subscale has demonstrated excellent reliability (α = .87) and good predictive validity with measures of cannabis use disorders (r = .59), cannabis abuse (r = .60), cannabis dependence (r = .21), and problems associated with cannabis use (r = .74; Cuttler & Spradlin, 2017). The frequency subscale has also shown sound concurrent validity with other measures of cannabis consumption (e.g., r = .81 for the DFAQ-CU frequency subscale with the Marijuana Smoking History Questionnaire frequency subscale; Cuttler & Spradlin, 2017). Total scores were computed by summing the items of the frequency subscale of the DFAQ-CU after standardizing those items and adjusting outliers to the highest non-outlying value (Cuttler & Spradlin, 2017). Because all items were standardized, there were no limits to the potential range of scores. Higher scores on the frequency subscale indicate more frequent cannabis use.

Marijuana Problems Scale (MPS). Problematic cannabis use was measured using the MPS, a self-report measure of the manner and degree to which marijuana use interferes with day-to-day functioning (e.g., by causing problems with one's partner, by causing one to procrastinate; Stephens, Roffman, & Curtin, 2000). Participants respond to 19 items based on whether the statement represents a problem they have experienced in the last month, with 0 = no problem, 1 = minor problem, and 2 = serious problem. Previous research has shown that the MPS has high internal consistency (α = .86) and significant correlations with depression (r = .26) and distress tolerance (r = -.18; Buckner, Keough, & Schmidt, 2007). A total MPS score was computed for all participants. Scores could range from 0 to 38, with higher scores indicative of more problems caused by marijuana use.

Marijuana Motives Measure (MMM). Cannabis use motives were assessed using the MMM. The MMM is a self-report measure designed to assess the reasons people use cannabis (Simons, Correia, Carey, & Borsari, 1998). It measures five distinct motives to use cannabis: coping motives (e.g., "to forget my worries"), enhancement motives (e.g., "because it's fun"), social motives (e.g., "because it helps me enjoy a party"), conformity motives (e.g., "because my friends pressure me to use marijuana"), and expansion motives (e.g., "to know myself better"). Participants respond to 25 items using a 5-point response scale with anchors as follows: 1 = almost never/never, 2 = some of the time, 3 = half of the time, 4 = most of the time, and 5 = almost always/always. The factor structure of the MMM has been evaluated and confirmed in both student (e.g., Chabrol, Ducongé, Casas, Roura, & Carey, 2005; Simons, Correia, Carey, & Borsari, 1998;

Table 1. *Descriptive Statistics and Reliability for All Measures*

Measure	*M*	*SD*	Range	Skew	*α*
Early Life Stress	2.86	2.66	0 – 11.61	1.03	.72
Chronic Stress	17.24	5.98	0 – 36.91	0.09	.82
Cannabis Use Frequency	0.00	0.72	-1.21 – 2.25	0.46	.91
Problematic Cannabis Use	3.18	4.13	0 – 16.77	1.71	.88
Conformity Motives	6.59	3.06	5 – 16.66	2.27	.88
Coping Motives	7.79	3.81	4 – 20	1.13	.86
Enhancement Motives	16.53	5.31	5 – 25	-0.37	.86
Expansion Motives	9.33	4.88	5 – 25	1.22	.92
Social Motives	9.38	4.56	5 – 24.38	1.03	.87

Zvolensky et al., 2007) and broader young adult samples (Benschop et al., 2015). The factors have shown good internal consistency in previous research (e.g., α = .85 for coping motives; Benschop et al., 2015). Total scores for each factor were computed. Scores could range from 5 to 25 for each motive, with higher scores representing stronger endorsement of that particular motive for cannabis use.

Procedure

Participants completed an anonymous online survey that included the measures described above. The survey required 40-50 minutes to complete, on average, and participants were compensated with one credit that they could apply to an eligible psychology course.

Prior to analysis, the data were screened per the inclusion/exclusion criteria described in the participants section above. All variables were standardized and screened for outliers, defined as scores falling more than 3.29 standard deviations (*SD*s) from the sample mean. The small number detected (< 1%) were converted to a score equivalent to 3.29 *SD*s from the mean (Tabachnick, Fidell, & Osterlind, 2001). All data screening and cleaning took place in IBM SPSS (version 24), and all analyses were run using this same software program. A conservative alpha of .01 was used to determine statistical significance in all analyses. This more conservative level was selected to reduce inflation in Type I error rate as a result of the robust sample size and multiple analyses.

All mediation models were tested in IBM SPSS using the PROCESS macro (version 2.15; Hayes, 2013). All scores were standardized prior to entry into the models. The significance of indirect effects was tested using 99% bias-corrected confidence intervals (CIs). These confidence intervals were generated via bootstrapping with 10,000 iterations (see Hayes, 2013; Jose, 2013).

RESULTS

Descriptive Statistics and Bivariate Correlations

The means (*M*) and standard deviations (*SD*) for all measures are provided in Table 1, and the bivariate correlations between these variables are provided in Table 2. As shown in the table, early life stress was significantly associated with frequency of cannabis use and problematic cannabis use. Chronic stress was significantly correlated with problematic cannabis use but not with frequency of cannabis use.

Mediation Analyses

Several parallel multiple mediation models were tested to determine if (and which) cannabis use motives mediate the relationships between early life stress and cannabis use frequency, early life stress and problematic cannabis use, and chronic stress and problematic cannabis use. All cannabis use motives were entered into the models simultaneously to determine which specific indirect pathway(s) best accounted for the observed relationships between our variables. A mediation model of the relationship between chronic stress and frequency of cannabis use was not tested because chronic stress and cannabis use frequency were not significantly correlated with each other.

Table 2. Correlations Among All Measures

Measure	1	2	3	4	5	6	7	8
1. Early Life Stress	--							
2. Chronic Stress	.18**	--						
3. Cannabis Use Frequency	.14*	-.09	--					
4. Problematic Cannabis Use	.22**	.18**	.31**	--				
5. Conformity Motives	-.05	.09	-.001	.19**	--			
6. Coping Motives	.20**	.27**	.42**	.37**	.20**	--		
7. Enhancement Motives	.15*	-.02	.39**	.19**	-.04	.35**	--	
8. Expansion Motives	.21**	.05	.39**	.28**	.32**	.47**	.40**	--
9. Social Motives	.16**	.13*	.29**	.25**	.34**	.43**	.47**	.51**

Note: * = $p < .01$, ** = $p < .001$.

In the first mediation analysis, cannabis use motives were tested as mediators of the relationship between early life stress and frequency of cannabis use. Results revealed significant indirect effects of early life stress on frequency of cannabis use via coping motives (ß = .06), via enhancement motives (β = .03), and via expansion motives (β = .04; see Figure 1, Model A). Confidence intervals generated for pairwise contrasts of the significant indirect pathways revealed no significant differences in their sizes.

In the second mediation analysis, cannabis use motives were modeled as mediators of the relationship between early life stress and problematic cannabis use. Results revealed a significant indirect pathway from early life stress to problematic cannabis use via coping motives only (β = .07; see Figure 1, Model B). We also tested this model while controlling for frequency of cannabis use and found the same pattern of results: the only significant indirect pathway was through coping motives, β = .07, CI = .02 to .17.

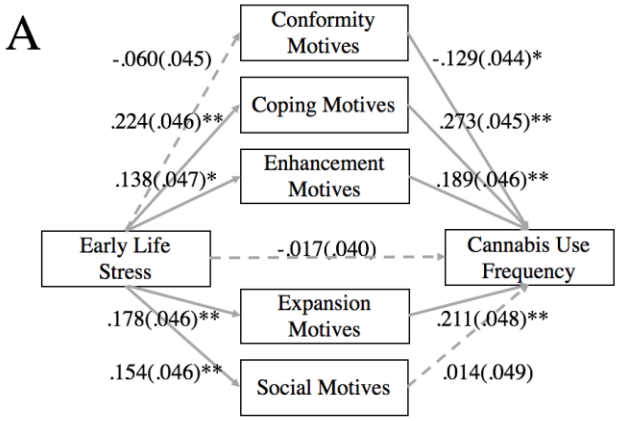
For the third and final mediation analysis, all cannabis use motives were once again tested as mediators in parallel, this time in the relationship between chronic stress and problematic cannabis use. In this path model, there was only a significant indirect effect of chronic stress on problematic cannabis use through coping motives (β = .07; see Figure 2). We also tested this model while controlling for frequency of cannabis use and found the same pattern of results: the only significant indirect pathway was through coping motives, β = .06, CI = .01 to .15.

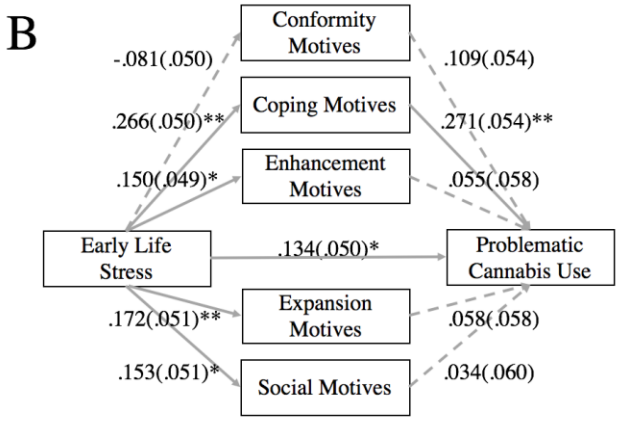
DISCUSSION

The goal of the present study was to elucidate the nature of the relationship between cannabis and stress by testing the role of cannabis use motives as mediators of the relationships between multiple aspects of stress and cannabis use. Findings revealed small but significant positive associations between early life stress and frequency of cannabis use, early life stress and problematic cannabis use, and chronic stress and problematic cannabis use. Mediation analyses further revealed a consistent mediating role of coping motives in the stress-cannabis link, largely supporting our hypotheses.

Findings from the present study build upon previous research in several ways. First, the present study examined the stress-cannabis link in a comprehensive manner by evaluating both early life stress and chronic stress, as well as both frequency of cannabis use and problematic cannabis use. While the observed effects were small, they suggest that experiencing more early life stressors is related to using cannabis more and having more long-term problems from use, and that experiencing more chronic stress is related to having more long-term problems from cannabis use. These results are consistent with previous research describing a link between stress and cannabis more broadly (see Hyman & Sinha, 2009 and Scholssarek, Kempkensteffen, Reimer, & Verthein, 2016 for review), as well as between chronic stress, early life stress, and problematic cannabis use specifically (Ketcherside & Filbey, 2015). There are many factors that may contribute to problematic cannabis use in particular (e.g., affect dysregulation [Simons & Carey, 2002]; social anxiety [Buckner, Heimberg,

Figure 1. Effects of Early Life Stress on Cannabis Use Frequency (A) and Problematic Cannabis Use (B) via Cannabis Use Motives.



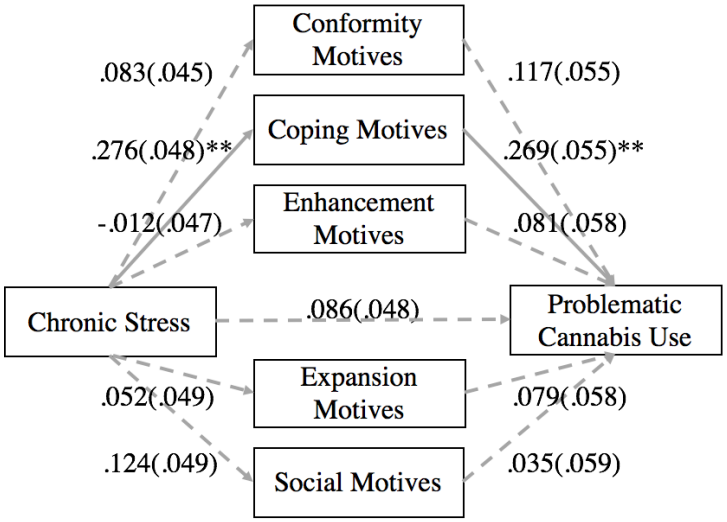


R^2 = .014
Total effect: β = .118 (.045), p = .009
Indirect effect via Conformity Motives: β = .008 (.007), *CI* = -.006 to .031
Indirect effect via Coping Motives: β = .061 (.017), *CI* = .025 to .112
Indirect effect via Enhancement Motives: β = .026 (.011), *CI* = .005 to .063
Indirect effect via Expansion Motives: β = .038 (.014), *CI* = .010 to .084
Indirect effect via Social Motives: β = .002 (.008), *CI* = -.018 to .024

R^2 = .043
Total effect: β = .221 (.051), p < .001
Indirect effect via Conformity Motives: β = -.009 (.008), *CI* = -.041 to .006
Indirect effect via Coping Motives: β = .072 (.027), *CI* = .023 to .167
Indirect effect via Enhancement Motives: β = .008 (.009), *CI* = -.013 to .040
Indirect effect via Expansion Motives: β = .010 (.011), *CI* = -.018 to .043
Indirect effect via Social Motives: β = .005 (.010), *CI* = -.018 to .038

Note. All effects are standardized with standard errors in parentheses; CI = 99% confidence interval with significant indirect paths bolded; * p < .01, ** p < .001.

Figure 2. Effects of Chronic Stress on Problematic Cannabis Use via Cannabis Use Motives.



R^2 = .030
Total effect: β = .177 (.049), p < .001
Indirect effect via Conformity Motives: β = .010 (.009), *CI* = -.005 to .044
Indirect effect via Coping Motives: β = .074 (.027), *CI* = .025 to .171
Indirect effect via Enhancement Motives: β = -.001 (.005), *CI* = -.024 to .011
Indirect effect via Expansion Motives: β = .004 (.006), *CI* = -.007 to .032
Indirect effect via Social Motives: β = .004 (.008), *CI* = -.015 to .035

Note. All effects are standardized with standard errors in parentheses; CI = 99% confidence interval with significant indirect paths bolded; * p < .01, ** p < .001

& Schmidt, 2011]), and the results of the present study provide evidence that chronic stress and early life stress may also contribute.

Our results also provide novel evidence that cannabis use for coping with negative affect and other problems in life is one of the driving factors behind the link between cannabis and stress. For all significant relationships between stress and cannabis, an indirect pathway through coping motives accounted for a significant amount of that relationship. These findings indicate that experiencing either chronic stress or early life stress may increase the use of cannabis to cope with problems, and using cannabis for that purpose may contribute to more negative outcomes from cannabis use. This finding adds to a growing body of literature that points to cannabis coping motives as a significant explanatory factor behind a variety of cannabis-related outcomes, such as mediating the relationship between negative attitudes toward mental health and cannabis use (Fanale, Maarhuis, Wright, & Caffrey, 2017) between distress intolerance and problematic cannabis use (Bujarski et al., 2012) and between symptoms of obsessive-compulsive disorder and problematic cannabis use (Spradlin, Mauzay, & Cuttler, 2017). Together, these studies indicate that the motives for using cannabis are important to consider when working with people who are showing signs of cannabis misuse.

There are several limitations of the present study that should be considered when interpreting the findings. First, all measures were exclusively self-report instruments, which are subject to retrospective recall and other biases. Second, a cross-sectional design was used, meaning that inferences regarding the causal order of the variables in all models (i.e., their directionality) should be made with caution. While the temporal order of early life stress and problematic cannabis use supports the hypothesis that early life stress leads to problematic cannabis use, the direction of the relationship between chronic stress and problematic cannabis use is more difficult to ascertain. It is possible, for example, that chronic stress leads to increased coping motives, and then to more problematic cannabis use. Alternatively, cannabis-related problems may lead to increased coping motives and then increased chronic stress. There may also be a feedback loop between the variables such that chronic stress leads to using cannabis to cope, which then leads to increased problematic cannabis use, which contributes to further increases in chronic stress. Though the present study represents an important step toward elucidating the nature of the relationship between stress and cannabis, longitudinal studies are needed to provide more clarity regarding the direction of the observed effects.

A third limitation is that the sample comprised college students who used cannabis occasionally. Though the entire sample endorsed using cannabis at least once within the past 30 days, it is important to investigate samples with different usage rates (e.g., strictly daily users, medical cannabis users) to establish whether the pattern of results from the present study generalizes to other populations. Nonetheless, we intentionally sought a sample of college students for the present study because college-aged individuals are particularly vulnerable to stress (APA, 2015), and they are also more likely to use cannabis than other age groups (Johnston, O'Malley, Bachman, & Schulenberg, 2013). As such, understanding the link between stress and cannabis in this population is of particular importance.

In conclusion, the results of the present study provide novel insights into the nature of the link between stress and cannabis. Overall, the findings suggest that the use of cannabis to cope with negative affect and other problems explains a substantial portion of the relationship between stress and cannabis. From a health standpoint, these findings have important implications. Stress is a pervasive aspect of life, and in many cases, stress is unpredictable and unavoidable. Therefore, targeting the stress component of the cannabis-stress link may be difficult. For example, quitting school may reduce stress in the short-term, but it may cause long-term issues (such as an inability to find work, advance in one's career, etc.). Further, there is no way to reverse the effects of early life stress on development. In both cases, other variables in the chain between stress and cannabis could be addressed instead. Based on the results of the present study, targeting the use of cannabis to cope may be a viable option for breaking the link between stress and problematic cannabis use. For example, teaching people to use alternative coping mechanisms (e.g., meditation, exercise, problem-

focused coping strategies) may help to decrease problematic cannabis use.

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