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Marijuana and self-regulation: Examining likelihood and intensity of use and problems

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Abstract

It is important to understand the individual differences that contribute to greater frequency or intensity of marijuana use, or greater frequency of experiencing marijuana-related problems. The current study examined several elements of behavioral and emotional self-regulation as predictors of the likelihood and intensity of both marijuana use and marijuana-related problems. As predicted, indices of behavioral self-regulation (self-control, sensation seeking) were better predictors of marijuana use, while indices of emotional self-regulation (affect, distress tolerance, and emotional instability) better predicted marijuana-related problems. Surprisingly, urgency was not related to use but was predictive of problems, and there were no significant interactions between behavioral and emotional self-regulation in predicting either use or problems. From these findings we conclude that while behavioral dysregulation may put individuals at risk for using marijuana, or using it more frequently, it is those individuals with difficulty in emotional self-regulation that are at risk for experiencing negative consequences as a result of their marijuana use. Clinically, these data are relevant; clinicians might focus more on addressing emotional regulation in order to lessen or eliminate the consequences of marijuana use.

Keywords

Marijuana use; Marijuana problems; Self-regulation

1. Introduction

Marijuana is the most commonly used illicit substance in the US (SAMHSA, 2010), and the level of involvement with marijuana has been shown to predict greater academic, occupational, psychological, and health-related problems (Brook, Stimmel, Zhang, & Brook,

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Contributors

RDD provided the data; developed the primary hypotheses; conducted the analyses; and wrote the majority of the introduction, methods, and results.

AMD assisted in the development of the hypotheses, assisted in the writing of the introduction, and wrote the majority of the discussion.

Conflict of interest

The authors have no conflicts of interest.

2008). Understanding individual differences that contribute to marijuana use and marijuana-related problems is an important area of research. Studies have shown that various aspects of self-regulation predict indices of marijuana involvement (Simons & Arens, 2007; Simons, Dvorak, & Lau-Barraco, 2009).

Carver (2003) has proposed that self-regulation broadly involves the regulation of affective experiences and behavioral actions. Both behavioral self-regulation and emotional self-regulation have been used effectively as predictors of substance use behavior (Wills, Pokhrel, Morehouse, & Fenster, 2011). Behavioral self-regulation involves processes associated with the initiation or inhibition of pre-potent patterns of behavioral responses (see Carver, 2005). These processes are frequently referred to as impulsivity, effortful/self-control, (dis)inhibition, and constraint. Research has shown that these processes form two separate, but related, systems. The first system, often referred to as the “hot” or “impulsive” system, is heuristic in nature and influenced by emotional states. Recent theory suggests that this system is comprised of two separate processes: an appetitive process linked to reward drive or sensation seeking, and an impulsive process linked to emotion-based rash action, what has been termed “urgency” (Dawe, Gullo, & Loxton, 2004). Interestingly, the two processes appear to be differentially related to marijuana use (Xiao, 2008). The second system, frequently referred to as the “cool” or “effortful” system, is slower and relatively uninfluenced by emotion. Research indicates that the effortful system is associated with decreased marijuana use (Creemers et al., 2010). In contrast, the impulsive system appears to have associations with marijuana use, although associations with marijuana problems have been more complex, with both positive (Day, Metrik, Spillane, & Kahler, 2013) and negative (Simons & Carey, 2006) relationships. This may be related to the conceptualization of the impulsive mode as a single factor model.

Emotional self-regulation involves a set of complex skills or affective processes which serve to influence emotional experience, timing, and expression (Gross, 1998). Previous research has linked negative emotional functioning to various indices of marijuana involvement (Simons & Carey, 2002; Zvolensky et al., 2009). Emotional self-regulation has several components, including tonic or trait levels of affect, the degree and magnitude of emotional instability, and individual differences in one’s ability to endure, tolerate, or cope with negative emotions. Previous research supports associations between problematic marijuana use and these sub-components of emotional self-regulation (Buckner, Keough, & Schmidt, 2007; Simons, Gaher, Correia, Hansen, & Christopher, 2005; Zvolensky et al., 2009). The current study examines associations between indices of behavioral and emotional self-regulation in the prediction of marijuana use and marijuana-related problems.

2. Methods

2.1. Participants

Participants ($n = 817$; 64.50% female) ranged in age from 18 to 33 ($M = 20.14$, $SD = 2.36$). Participants were 92.04% Caucasian, 3.79% Asian, 1.22% African American, and 2.95% other. All participants were treated in accordance with the APA ethical guidelines for research.

2.2. Measures

2.2.1. Marijuana use intensity—Marijuana use intensity over the last 6 months was assessed via a grid containing four time periods per day for each day of the week. Participants indicated if they typically used marijuana during each time period. Previous research supports the validity and test–retest reliability of this measure of use intensity (Williams, Adams, Stephens, & Roffman, 2000).

2.2.2. Marijuana problems—Marijuana problems were assessed by the Marijuana Adult Consequences Questionnaire (MACQ; Simons, Dvorak, Merrill, & Read, 2012). The MACQ is a 50-item, dichotomously scored (i.e., yes/no) measure that assesses 8 dimensions of marijuana consequences. Participants endorse items they have experienced in the last 6 months. The MACQ has shown high convergent validity, good internal consistency, and test–retest reliability (Simons et al., 2012).

2.2.3. UPPS-P impulsive behavior scale—UPPS-P impulsive behavior scale is a 59-item measure assessing 5 facets of behavioral self-regulation: negative urgency (12 items, $\alpha = .88$), positive urgency (14 items, $\alpha = .93$), premeditation (11 items, $\alpha = .85$), perseverance (10 items, $\alpha = .81$), and sensation seeking (12 items, $\alpha = .86$). Participants respond on a 4-point Likert-type scale ranging from *strongly agree* to *strongly disagree*. The UPPS-P has shown adequate reliability as well as convergent, discriminant, and predictive validity (Cyders, Flory, Rainer, & Smith, 2009; Cyders & Smith, 2007; Cyders et al., 2007). Previous research indicates that the five facets load on three higher order constructs: conscientiousness (i.e., self-control), urgency, and sensation seeking (Cyders & Smith, 2007). In the present study, three higher-order factors were formed to serve as measures of behavioral self-regulation. Positive and negative urgency formed a mean standardized “urgency” indicator ($\alpha = .82$); perseverance and premeditation formed a mean standardized “self-control” indicator ($\alpha = .68$); the sensation seeking facet served as the final indicator.

2.2.4. Positive and negative affect—Positive affect and negative affect were assessed by the 20-item positive and negative affect scales of the Positive and Negative Affective Schedules — X (PANAS-X; Watson & Clark, 1999). The PANAS was administered using the “in general” instructions to assess trait level positive and negative affective functioning. Participants rate the extent to which they generally experience each positive and negative affect item on a 4-point Likert-type scale (1 = *very slightly or not at all* to 5 = *extremely*). Considerable research supports the use of the PANAS to assess trait affectivity (Watson & Clark, 1999).

2.2.5. Emotional instability—Emotional instability was measured by the 18-item Affect Lability Scale — Short Form (ALS-SF; Oliver & Simons, 2004). All items were measured on a 4-point Likert-type scale ranging from *very undescriptive* to *very descriptive*. The ALS-SF has shown adequate validity, internal consistency, and 30-day test–retest reliability (Oliver & Simons, 2004).

2.2.6. Distress tolerance—Distress tolerance was assessed by the 15-item Distress Tolerance Scale (DTS; Simons & Gaher, 2005). This measure is rated on a 5-point Likert-

type scale ranging from *strongly agree* to *strongly disagree*. The DTS has shown adequate internal consistency and test–retest reliability (Simons & Gaher, 2005).

2.3. Procedures

Participants were recruited via campus wide email for a study examining “Emotion, Personality, and Risk among College Students.” Participants received course credit for participation. After completing informed consent, participants completed online questionnaires assessing basic demographics, behavioral and emotional self-regulation, and marijuana involvement. The university IRB approved this study.

3. Results

3.1. Descriptive statistics

Table 1 displays descriptive and bivariate statistics for the study variables. Only 20.69% of respondents reported marijuana use. Men were more likely to use marijuana than women, $\chi^2(1) = 14.39, p < .001$. Among marijuana users, men were no more likely to experience a problem, $\chi^2(1) = 1.26, p = .261$.

3.2. Marijuana use hurdle model

We estimated a negative binomial hurdle model using marijuana use intensity as the outcome. At Step 1, use was regressed onto age and sex, LR $\chi^2(4) = 26.38, p < .001$, Cragg–Uhler $R^2 = .03$. At Step two, the behavioral self-regulation indicators were added to the model, LR $\chi^2(10) = 77.54, p < .001$, Cragg–Uhler $R^2 = .09$. This model was a substantial improvement over the Step 1 model, LR $\chi^2(6) = 51.16, p < .001$. At Step 3, the emotional self-regulation indicators were added to the model, LR $\chi^2(18) = 86.20, p < .001$, Cragg–Uhler $R^2 = .10$. This did not increase the predictive power of the model, LR $\chi^2(8) = 9.28, p = .319$. In the final model, depicted in Table 2, self-control was inversely associated with the likelihood and intensity of marijuana use. Sensation seeking was positively associated with marijuana use likelihood but not marijuana use intensity. Urgency was not associated with likelihood or intensity of use.

3.3. Marijuana problem hurdle model

Next, we estimated a negative binomial hurdle model using frequency of marijuana problems among marijuana users. At Step 1, marijuana problems were regressed onto age, sex, and marijuana use intensity (log-transformed), LR $\chi^2(6) = 59.51, p < .001$, Cragg–Uhler $R^2 = .30$. At Step two, the emotional self-regulation indicators were added to the model, LR $\chi^2(14) = 75.93, p < .001$, Cragg–Uhler $R^2 = .36$. This model was an improvement over the Step 1 model, LR $\chi^2(8) = 16.42, p = .037$. At Step 3, self-control and sensation seeking were added to the model, LR $\chi^2(18) = 79.59, p < .001$, Cragg–Uhler $R^2 = .38$. This did not increase the predictive power of the model, LR $\chi^2(4) = 3.66, p = .454$. At Step 4, urgency was added, LR $\chi^2(20) = 88.94, p < .001$, Cragg–Uhler $R^2 = .41$. Urgency was positively associated with both the likelihood and frequency of marijuana related problems. Further, the addition of urgency resulted in a significantly better model, LR $\chi^2(2) = 9.35, p = .009$. In the final model, depicted in Table 2, distress tolerance was inversely associated with the likelihood of marijuana problems. Emotional instability was unrelated to the likelihood or

frequency of marijuana problems. Urgency was positively associated with both the likelihood and frequency of marijuana problems.

4. Discussion

The current study examined aspects of behavioral and emotional self-regulation as predictors of the likelihood and intensity of marijuana use and marijuana-related problems. Results show that individuals who are relatively higher on indices of behavioral self-regulation have a lower likelihood of using marijuana, and, among those who do use, have lower use intensity. This is consistent with previous research, which links behavioral control to a wide range of positive functional outcomes (Wills et al., 2011; Wills, Walker, Mendoza, & Ainette, 2006). The sensation-seeking component of impulsivity has been associated with a number of substance use behaviors (Malmberg et al., 2012; Nonnemaker, Crankshaw, Shive, Hussin, & Farrelly, 2011; Ramo, Grov, Delucchi, Kelly, & Parsons, 2011). Our findings add to this literature.

Consistent with previous work (e.g., Simons & Carey, 2002), aspects of emotional self-regulation were not associated with either index of marijuana use, but were associated with problem likelihood. These findings paint a complex picture of the relation between emotional self-regulation and marijuana use and problems. Although marijuana use is a necessary precursor to experiencing problems, we found that when behavioral and emotional self-regulation predictors are considered simultaneously, deficits in emotional self-regulation (specifically, distress tolerance) emerge as a potentially more negative prognostic indicator. Research shows that marijuana-related problems are more common among individuals with deficits in executive functioning, independent of use (Day et al., 2013); emotional self-regulation may be another, independent, pathway through which problems develop. It is also possible that discrete periods of emotional vulnerability (e.g., a major depressive episode) may be a time during which those who are already using marijuana without experiencing problems may be at heightened risk for developing problems. Future work might examine windows of vulnerability that may exist for developing marijuana-related problems.

Finally, urgency was not associated with marijuana use, but was positively associated with both likelihood and intensity of marijuana-related problems. Urgency has shown associations with the likelihood of experiencing alcohol-related problems (King, Karyadi, Luk, & Patock-Peckham, 2011; Martens, Pedersen, Smith, Stewart, & O'Brien, 2011), and has shown less consistent relations with alcohol use (Martens et al., 2010). It appears that, across substances, urgency may serve as a more accurate predictor of problems than of use.

4.1. Limitations

Due to the cross-sectional nature of this study, the temporal precedence self-regulatory abilities and marijuana involvement cannot be determined. Another limitation of the current study was the relatively low levels of marijuana use among the sample. A more heavily using sample, or a sample with greater variability in use frequency, might provide greater insight into the associations between these individual differences and marijuana indices.

Finally, the sample is of young, primarily Caucasian, college students; thus, generalization should be done with caution.

4.2. Conclusions

Our results are consistent with other studies, showing a relation between behavioral and emotional self-regulation and marijuana use and problems. Specifically, behavioral self-regulation is more closely linked with marijuana use, while emotional self-regulation is associated with the problems experienced as a result of use. This indicates that there are certain individuals for whom using marijuana may be more likely to lead to negative outcomes. Future studies should continue to examine personality characteristics that contribute to the experience of marijuana-related problems in a longitudinal design to clearly delineate the time course and direction of causality between temperament and problems.

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HIGHLIGHTS

- Examined likelihood and frequency of marijuana use and problems
- Behavioral self-regulation was primarily associated with use.
- Emotional self-regulation was primarily associated with problems.

Table 1

Descriptive statistics and bivariate correlations among all study variables.

Analysis variables	1	2	3	4	5	6	7	8	9	10	11	Range	Mean	SD	Skew
1. Age	–											18 to 33	20.14	2.36	2.01
2. Sex	.01	–										0 to 1	0.36	0.48	0.61
3. Urgency	.10	–.06	.82									–1.54 to 3.28	0.00	0.92	0.47
4. Self-control	–.03	.04	–.41	.68								–3.71 to 1.80	0.00	0.87	–0.51
5. Sensation seeking	.23	–.09	.24	–.02	.86							12 to 48	33.89	7.36	–0.33
6. Emotional instability	–.08	–.01	.43	–.14	.02	.86						–1.15 to 2.73	0.00	0.89	0.76
7. Distress tolerance	.06	.05	–.47	.16	.03	–.41	.89					–2.06 to 1.61	0.00	0.87	–0.34
8. Positive affect	–.02	–.06	–.22	.34	.22	–.17	.28	.89				1 to 5	3.41	0.71	–0.46
9. Negative affect	–.06	.04	.47	–.20	–.03	.46	–.46	–.16	.89			1 to 4.3	1.94	0.67	0.89
10. Mj. use intensity	.16	.03	.15	–.13	.13	.03	–.07	–.03	.12	.92		0 to 23	0.83	2.59	4.84
11. Mj. problems	.12	–.03	.24	–.18	.16	.08	–.14	–.09	.15	.62	.94	0 to 36	1.63	4.34	3.97

Note. Mj. = Marijuana. Significant correlations ($p < .05$) are in bold for emphasis. Cronbach's alphas for multi-indicator variables are listed on the diagonal. Gender was dummy-coded (0 = women, 1 = men).

Table 2

Hurdle models of the likelihood and intensity of marijuana use and problems.

Model predictors	Marijuana use hurdle model (<i>df</i> = 18)			Marijuana problem hurdle model (<i>df</i> = 20)		
	OR	95% CI	IRR	OR	95% CI	IRR
Gender	1.61	1.11–2.32	2.12	0.48	0.16–1.45	1.22
Age	0.97	0.90–1.06	1.12	0.81	0.66–0.99	0.97
Marijuana use	–	–	–	3.46	1.53–7.83	1.74
Distress tolerance	0.84	0.65–1.08	0.91	0.40	0.17–0.95	0.95
Emotional instability	0.82	0.63–1.06	0.99	0.80	0.39–1.63	1.05
Positive affect	0.95	0.71–1.25	1.17	1.26	0.57–2.82	0.89
Negative affect	1.24	0.90–1.71	1.30	0.44	0.15–1.31	1.04
Urgency	1.15	0.89–1.50	1.05	2.30	1.01–5.25	1.29
Self-control	0.74	0.58–0.93	0.71	0.88	0.43–1.81	1.09
Sensation seeking	1.06	1.03–1.09	1.00	0.99	0.90–1.08	1.02

Note. OR = Odds Ratio; IRR = Incident Rate Ratio; CI = Confidence Interval. Significant coefficients ($p < .05$) are in bold for emphasis. Gender was dummy-coded (1 = women, 0 = men).