On the Liking and Wanting of Cannabis: Examining the joint effects of Attitudes and Cue Reactivity Among Cannabis Users

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Introduction:

Past research has shown that the *wanting* and *liking* aspects of substance use are derived from separate neurobiological processes (Robinson & Berridge, 1993). However, to date research has yet to examine the relationship between these constructs and the extent to which each differentially predicts future substance use. Thus, the goal of the present study was to simultaneously examine both *liking* (as reflected in the Theory of Planned Behavior attitude measures) and *wanting* (as reflected in substance cue-reactivity) aspects of cannabis use and how each of these constructs relates to future cannabis use in a longitudinal study.

Participants

353 undergraduate students from the University of Colorado at Boulder who varied in marijuana use. Participants were recruited based on their reported average number of times they smoked marijuana per month for the past year. Participants were recruited based on three different use groups:

- Never Users (never tried cannabis)
- Infrequent Users (smoke < four times per month)
- Frequent Users (smoke > five times per week)

Design

Measures were assessed at baseline and again at a 12-month follow-up session. Cue Reactivity was assessed at baseline.

Measures

Theory of Planned Behavior (TPB).

Attitudes.

- *e.g., For me, smoking marijuana regulatory in the next 12 months would be… (bad- good).*

Norms (Peers & Expectations).

- e.g., *Most people my age have tried marijuana.*

Refusal Self-Efficacy (RSE).

- *e.g., How sure are you that you could resist using marijuana when someone offers marijuana to you?*

Intentions.

- e.g., *How likely is it that you will smoke marijuana in the next 3 months?*

Substance Use

Time-line Follow Back Calendar (TLFB)

- Participants asked to recall their daily substance use over the 30 days prior to their lab session
- *e.g., "Were any substance used on this day (Day 1, 2, …, 30)?"*

Marijuana Problems Index (MPI).

- *e.g., As a result of marijuana use, I neglected my responsibilities.*

Measures (Cont'd)

Substance Use

Marijuana Craving (MUQ).

- *e.g., All I want to do now is have a hit, I want a hit so bad I can taste it.*

Marijuana Dependence Scale (MDS).

- *e.g., When I smoked marijuana, I often smoked more or for longer periods of time than I intended*

Picture Viewing Task

A visual oddball task was used to present marijuana and exercise cues among neutral context pictures. Each trial consisted of 5 images displayed for 1000 ms each with an interstimulus interval (ISI) of 1000 ms. Trials were structured so that marijuana and exercise target images were separated by at least 3 neutral images. Participant's task was to categorize each image as related to either marijuana or exercise, via a right button press, or other, via a left button press.

Figure 1. *Stimulus-locked ERP waveforms as a function of Picture Type and Cannabis Use Group*

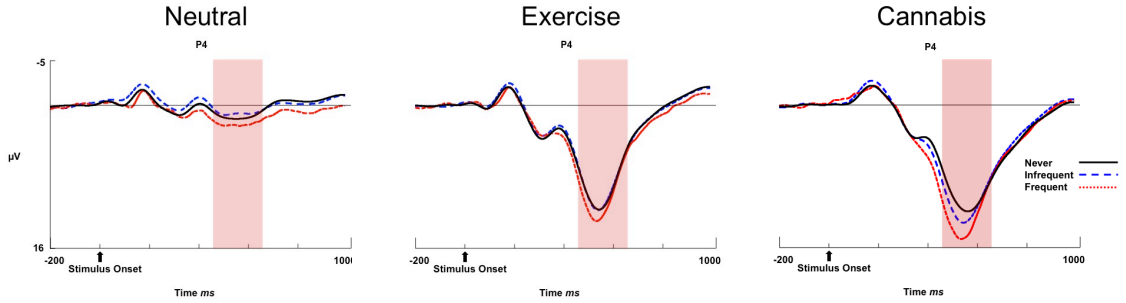


Table 1*. Mean ERP Amplitudes for the Cue Reactivity Task as a function of Smoking Group and Picture Type*

Smoking Group x Picture Type, $F(4, 680)=2.88$, $p=.03$

	Smoking Group			
	Never	Infrequent	Frequent	Grand Mean
Neutral	1.02 (0.37)$_{+}$	0.83 (0.31)$_{a}$	2.25 (0.43)$_{b+}$	1.37
Exercise	9.30 (0.46)	9.47 (0.38)	10.43 (0.53)	9.73
Marijuana	10.23 (0.52)$_{a}$	11.58 (0.43)$_{b}$	12.74 (0.60)$_{b}$	11.52

Note. Numbers in parentheses are standard deviations. Means show mean P300 amplitudes at mean levels of alcohol and tobacco use, lifetime ADHD, Externalizing, Internalizing, and Novelty Seeking. Smoking group means within the same row with different letter subscripts differ at $p \leq .05$ (i.e., different letters denote significant Smoking Group differences). Condition means within the same row differing at $p < .06$, are denoted with $^{+}$.

Cannabis Cue Reactivity

Consistent with past research, results from the ERP P300 analysis indicate that cannabis use significantly predicts cannabis cue reactivity. Specifically, cannabis images elicited larger P300 amplitudes for both Frequent and Infrequent users compared to Never Users.

Table 3*. Correlations between Cue Reactivity, Cannabis Use and Addiction Constructs*

	Cannabis Cue Reactivity	Cannabis Use	Dependence Symptoms	Cannabis Problems	Craving	Attitudes	Norms	RSE
Cannabis Use	.18**							
Cannabis Dependence	.07	.76**						
Cannabis Problems	.12*	.78**	.87**					
Craving	.16*	.73**	.70**	.71**				
Attitudes	.18**	.71**	.54**	.56**	.63**			
Norms	.14**	.60**	.48**	.47**	.47**	.70**		
Refusal Self-Efficacy	-.07	-.72**	-.69**	-.71**	-.81**	-.59**	-.44**	
Intentions	.20**	.69**	.60**	.62**	.61**	.77**	.72**	.57**

Note. Cannabis cue reactivity is represented by the difference in P300 amplitude to cannabis and exercise images. Cannabis Use = total number of days cannabis was consumed 30 days prior to session 1. RSE = Refusal Self-Efficacy. All ns = 353 except s2 craving, where n = 209. *$p < .05$, **$p < .01$

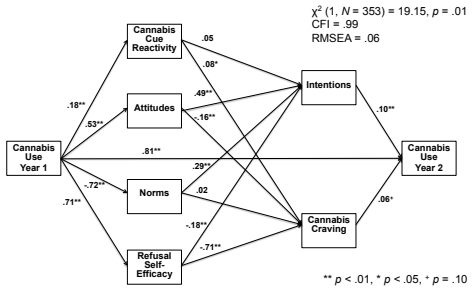
Cannabis Cue Reactivity and Cannabis Use, Dependence, & Craving

As predicted, cannabis use, problems associated with cannabis, and craving were associated with Cannabis Cue Reactivity, such that greater cannabis cue reactivity was associated with more cannabis use, problems, and craving. Of note, cannabis cue reactivity was not related to cannabis dependence symptoms.

Cannabis Cue Reactivity and TPB Constructs

Analysis confirmed hypotheses such that greater cue reactivity was associated with more positive cannabis attitudes, perceptions of more positive norms, and greater intentions to use cannabis. Interestingly, cannabis cue reactivity was not related to refusal self-efficacy.

Figure 2*. Path analysis integrating "wanting' and 'liking' aspects of cannabis use*



Model variables accounted for **68%** of the variance in intentions, and **69%** of the variance in craving. In addition, the full model accounted for **84%** of the variance in cannabis use in Year 2.

Conclusions:

In sum, the current research demonstrates that individual differences in cannabis use result in the enhanced processing of cannabis cues and this enhanced processing is related to self-reported craving, problems associated with use, as well as a number of TPB constructs. In addition, we created a model that simultaneously examined both *liking* (as reflected in the Theory of Planned Behavior attitude measures) and *wanting* (as reflected in substance cue-reactivity and craving) aspects of cannabis use. Results show that for cannabis use intentions to use cannabis and previous cannabis use were significant predictors of cannabis use 12 months later. While cannabis craving was only marginally related to Year 2 Cannabis Use, this may be due to (or the result of) the minimally addictive properties of cannabis (Anthony, 1994). Future research should investigate whether similar patterns manifest for substances with greater addictive properties.

References

Anthony JC, Warner LA, Kessler RC (1994). Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: Basic findings from the National Comorbidity Survey. *Experimental and Clinical Psychopharmacology, 2*: 244–268.
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Sobell LC, Sobell MB (1992). Timeline Follow-back: A technique for assessing self-reported ethanol consumption. In J. Allen & R. Z. Litten (Eds.), *Measuring Alcohol Consumption: Psychosocial and Biological Methods* (pp. 41-72). Totowa, NJ: Humana Press.

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