Marijuana use, craving, and academic motivation and performance among college students: An in-the-moment study

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HIGHLIGHTS

• Craving predicted use in college students who frequently use marijuana.
• Craving was negatively associated with academic effort and motivation.
• Average minutes spent smoking marijuana was negatively related to GPA.
• Greater academic self-efficacy positively predicted GPA.

ABSTRACT

Introduction: Marijuana is the most commonly used illicit substance in the U.S., with high rates among young adults in the state of Colorado. Chronic, heavy marijuana use can impact cognitive functioning, which has the potential to influence academic performance of college students. It is possible that craving for marijuana may further contribute to diminished cognitive and affective functioning, thus leading to poor outcomes for students.

Methods: College student marijuana users (n = 57) were recruited based on heavy use and completed ecological momentary assessment (EMA) via text-messaging. The association between marijuana use and craving in a college setting was explored, as well as how these variables might relate to academic motivation, effort and success. The participants were sent text messages for two weeks, three times per day at random times.

Results: A temporal association between craving and marijuana use was found, where momentary craving positively predicted greater marijuana use. Similarly, as craving levels increased, the number of minutes spent studying decreased at the next assessment point. A negative association between momentary craving for marijuana and academic motivation was found in the same moment. Greater academic self-efficacy positively predicted cumulative GPA, while average minutes spent smoking marijuana was negatively related.

Conclusions: Using EMA, marijuana craving and use were significantly related. These findings provide further evidence that heavy marijuana use is negatively associated with academic outcomes.

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1. Introduction

Marijuana is the most commonly used illicit drug in the U.S., with over 7% of the general population and 19% of 18–25 year olds reporting use of marijuana within the last month (Substance Abuse & Mental Health Services Administration [SAMHSA], 2014). In the state of Colorado, rates of marijuana use are among the highest in the nation, with 25% of 18–25 year olds reporting use within the last month (SAMHSA, 2012). Approximately one-third of college students report use of marijuana annually (Johnston, O’Malley, Bachman, Schulenberg, & Miech, 2014; Mohler-Kuo, Lee, & Wechsler, 2003) and a significant portion (25%) of past-year cannabis users meet criteria for a cannabis disorder (Caldeira, Arria, O’Grady, Vincent, & Wish, 2008).

Chronic marijuana users experience significant consequences as a result of their use, including a range of cognitive deficits. Acute intoxication effects include deficits in psychomotor functioning (e.g., speed, accuracy), attention (including sustained selective, focused and divided attention problems), pre-attentive sensory memory, and short-term/working memory (problems in verbal learning/memory, immediate and delayed free recall; see Solowij & Pesa, 2010 for a review). When examining long-term deficits, studies have consistently shown problems with attention, inhibition, working memory, executive functioning, verbal memory, and time estimation in heavy, chronic users (Solowij & Pesa, 2010).
important note, such deficits appear to persist even after waiting for in-
toxication effects to diminish. The degree of such problems appears to de-
pend on frequency and duration of use, dose, and age of onset (Solowij & Pesa, 2010).

Many of these cognitive deficits could impact college success, as a
number of specific impairments (e.g., attention, inhibition, and executive
functioning) are directly connected to self-regulation in a learning envi-
ronment (Pintrich, 2004; Tangney, Baumeister, & Boone, 2004; Zimmerman, 2008; Zimmerman, Bandura, & Martínez-Pons, 1992). It is
possible that academic problems and failure could be impacted not only
by the substance use itself, but also other addictive processes. Craving is
one such process that is often described as a strong or intense urge or de-
sire to use a particular substance. Tiffany’s Cognitive Processing Model of-
fers a way to conceptualize the impact of craving on cognitive and
describes addictive behavior as largely an automatic process, whereby be-
haviors associated with long-term substance use become regulated out-
side of consciousness, develop with practice and become difficult to
control. Craving, on the other hand, is suspected to function more at the
non-automatic level, though in parallel with the more automated behav-
iors of drug use. Because craving is demanding at the cognitive level and
requires substantial effort, it can impede other non-automatic processes.

Similar to a self-regulation model for nicotine addiction proposed by
Sayette and Griffin (2011), active marijuana users have to maintain
some degree of self-control over their use, and at times, must delay
using marijuana in circumstances where using is not acceptable (e.g.,
while at work, when in class). Such delays may lead to increased urges
or craving, which has the potential to impact one’s attentional con-
trol at the non-automatic level (Field, Munafo, & Franken, 2009).
Baumeister and colleagues (Baumeister, Heatherton, & Tice, 1994;
Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000) have
proposed a self-regulatory strategy model whereby subjects are believed
to have a limited capacity to engage in self-control, which could
influence operations controlled by the cognitive executive system.

This leads to a competition for resources and poor performance on subse-
donent self-regulatory tasks (e.g., Baumeister, Bratslavsky, Muraven, &
Tice, 1998; Muraven, Tice, & Baumeister, 1998). As an example of how
this may relate to substance use, Muraven, Collins, Shiffman, and Paty
(2005) used ecological momentary assessment (EMA) to examine
whether daily fluctuations in self-control influenced alcohol consumption
with underage drinkers. They found that when participants had greater
demands on their self-control, they were more likely to violate their per-
nonal alcohol limits.

When considering the academic environment, it is possible that heavy
users will struggle to perform at their peak academically if craving
impedes their attention and competition for cognitive re-

ources exists. Increased cognitive effort associated with craving
may interfere with other cognitively demanding tasks, such as focusing
in class, reading comprehension, and managing academic goals.
Craving may also lead to greater marijuana use, which could impact
the academic performance of college students and interfere with
their ability to fully benefit from their academic studies. The association
between craving and subsequent marijuana use has not been widely
studied. As noted by Tiffany and Wray (2009), studies examining the
association between craving and substance use have not always found the
two to be related, or if they are, often the association is not particularly
strong. Only one study (Buckner, Crosby, Silgado, Wonderlich, & Schmidt, 2012) has examined marijuana use and craving in college stu-
dents. Although academic variables were not examined, Buckner et al.
(2012) assessed 49 college student marijuana users with a 2-week EMA
protocol using personal digital assistants (PDAs). When examined tempo-
 rally, craving tended to increase in the hours before using marijuana and
decreased after use. Craving ratings were higher on days when marijuana
was used compared to days participants did not use. Further research is
needed to explore whether marijuana craving and use are related and
how.

No studies have examined the contributions of craving and marijuana
use on specific academic factors that lead to college success. Furthermore,
although some studies have found associations between marijuana use,
academic performance, college completion, and hours spent studying
(Arría et al., 2013a,b; Bell, Wechsler, & Johnston, 1997; Buckner, Ecker,
& Cohen, 2010; Fergusson, Horwood, & Beautrais, 2003; Horwood et al.,
2010), none have assessed a range of other academic components that
might influence completion of one's college degree among marijuana
users, such as academic motivation and self-efficacy. In the general col-
lege student population, these factors are well-known to influence aca-
demic performance and retention (see review by Robbins et al., 2004).
The primary aim of this study was to examine the association between
marijuana use and craving and how these variables might relate to aca-
demic motivation and academic effort when assessed in the moment
with college students. A secondary aim focused on exploring associations
between academic performance (GPA) and time spent smoking marijua-
na, time spent studying, academic self-efficacy, and consequences related
to marijuana use. It was hypothesized that craving at one instance would
predict marijuana use and time spent studying at the next time point and
that higher craving would be associated with lower academic motivation
in the moment. Finally, it was believed that academic self-efficacy, prob-
lems related to marijuana use, time spent studying, and time spent
smoking marijuana would predict academic performance (GPA).

2. Methods

2.1. Participants

Participants included 57 college students (63% female) who were
recruited through flyers and announcements made in psychology and sci-
cence courses at a mid-sized university in Colorado. Recruitment flyers ad-
vertised a study on marijuana use that specified students would be
screened for eligibility by phone or in-person before participating. Poten-
tial participants were eligible for the study if they 1) were age 18 or older,
2) were enrolled at the university for a minimum of one prior semester,

Note: Totals may not sum to 100% because of rounding.

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