Consciousness and Cognition 56 (2017) 68–76

Contents lists available at ScienceDirect

Consciousness and Cognition

journal homepage: www.elsevier.com/locate/concog

Inspired by Mary Jane? Mechanisms underlying enhanced creativity in cannabis users

Emily M. LaFrance[a,*], Carrie Cuttler[a,b]

[a] Washington State University, Department of Psychology, P.O. Box 644820, Pullman, WA 99164-4820, USA
[b] Translational Addiction Research Center, Washington State University, USA

ARTICLE INFO

Keywords:
Cannabis
Creativity
Divergent thinking
Convergent thinking
Openness to experience
Big 5 personality

ABSTRACT

Previous research suggests cannabis may enhance some aspects of creativity, although the results remain somewhat equivocal. Moreover, it is unclear whether differences in cannabis users' personalities may account for any potentially beneficial effects of cannabis on creativity. This study was designed to examine whether sober cannabis users demonstrate superior self-reported and objective creativity test performance relative to non-users, and to determine whether any of the Big 5 personality domains underlie these effects. A sample of sober cannabis users (n = 412) and non-users (n = 309) completed measures of cannabis consumption, personality, self-reported and objective creativity. Relative to non-users, sober cannabis users self-reported higher creativity, and performed significantly better on a measure of convergent thinking. Controlling for cannabis users' higher levels of openness to experience abolished these effects. Therefore, while cannabis users appear to demonstrate enhanced creativity, these effects are an artifact of their heightened levels of openness to experience.

1. Introduction

Enhanced creativity is a commonly reported consequence of cannabis use. In fact, many highly acclaimed artists, musicians, writers, and great minds have attributed some of their creative successes to cannabis use, suggesting that cannabis can facilitate creative thought processes. Musician and composer Louis Armstrong referred to cannabis as "an assistant – a friend" (Brothers, 2014), the late founder and CEO of Apple. Inc., Steve Jobs, once said that cannabis made him "relaxed and creative," (Heisler, 2012), and Brian Wilson of the Beach Boys attributed the completion of his critically acclaimed album, *Pet Sounds*, to cannabis (Wenzel, 2015). In line with this anecdotal evidence, studies have found that cannabis users report heightened creativity during intoxication (Cuttler, Mischley, & Sexton, 2016; Green, Kavanagh, & Young, 2003; Sandberg, 2012). Despite the popular belief that cannabis increases creativity, the scientific literature investigating the relationship between cannabis and creativity remains somewhat sparse and equivocal.

Creativity is defined as the ability to contribute novel and relevant solutions to a problem (Runco, 2007), and has traditionally been split into two categories; divergent, and convergent thinking (Guilford, 1967). Divergent thinking involves coming up with many novel and different potential solutions to a problem, while convergent thinking is the process of coming up with one specific, fixed solution to a problem. Divergent and convergent thinking are dissociable, well-established creative processes (Chermahini & Hommel, 2010) which are thought to correspond to individual differences in cognitive flexibility and cognitive persistence, two related but distinct cognitive functions (De Dreu, Nijstad, Baas, Wolsink, & Roskes, 2012). Although true creativity is

* Corresponding author at: Washington State University, Department of Psychology, P.O. Box 644820, Johnson Tower, Pullman, WA 99164-4820, USA.
E-mail addresses: emily.lafrance@wsu.edu (E.M. LaFrance), carrie.cuttler@wsu.edu (C. Cuttler).

http://dx.doi.org/10.1016/j.concog.2017.10.009
Received 17 July 2017; Received in revised form 21 September 2017; Accepted 10 October 2017

far more nuanced and complex than divergent and convergent thinking, these two domains of creativity are commonly the focus of research on creativity because of their importance in the generation of novel and useful solutions to problems.

The legal classification of cannabis as a Schedule 1 drug in the United States imposes challenges to researchers interested in studying the acute effects of cannabis (Holt & Kaufman, 2010). Nevertheless, the bulk of previous research on cannabis and creativity has examined the influence of acute cannabis intoxication on creativity test performance. The results of this research suggest that low doses of Δ^9-tetrahydrocannabinol (THC) may enhance divergent thinking relative to high doses or a placebo (Curran, Brignell, Fletcher, Middleton, & Henry, 2002; Jones, Blagrove, & Parrott, 2009; Kowal et al., 2015; Schafer et al., 2012; Weckowicz et al., 1975), though these findings have not always been consistent (Bourassa & Vaugeois, 2001; Tinklenberg, Darley, Roth, Pfefferbaum, & Kopell, 1978).

The results pertaining to the acute effects of cannabis on convergent thinking are even less clear cut. Specifically, two studies found that THC perturbs convergent thinking relative to a placebo (Schafer et al., 2012; Weckowicz et al., 1975) and one study found no impact of high or low doses of THC on convergent thinking relative to a placebo (Kowal et al., 2015). On a related note, there is evidence that cannabis reduces inhibition, or the ability to suppress incorrect or inappropriate responses/solutions (Broyd, van Hell, Beale, Yucel, & Solowij, 2016; Hart, van Gorp, Haney, Foltin, & Fischman, 2001; Hooker & Jones, 1987; Metrik et al., 2012). This reduction in inhibition may impair convergent thinking, which requires inhibiting incorrect solutions, while enhancing divergent thinking, which requires generating many different possible solutions (Chermahini & Hommel, 2010; Hommel, 2012; Kowal et al., 2015;).

Far less is known about whether cannabis users who are not under the direct influence of cannabis demonstrate enhanced creativity relative to non-users. Nevertheless, a small number of previous studies have investigated this possibility. First, Victor, Grossman, and Eisenman (1973), Todd and Goldstein (1977), and Eisenman, Grossman, and Goldstein (1980), found that frequency of cannabis use was positively related to self-reported creativity. Second, both Weckowicz, Collier, and Spreng (1977), and Jones et al. (2009) found that compared to non-users, sober cannabis users performed better on divergent thinking tasks. To our knowledge, no previous research has attempted to compare the convergent thinking test performance of sober cannabis users relative to non-users.

One major concern with quasi-experimental research comparing pre-existing groups of cannabis users to non-users is that these groups are known to differ in other ways that may impact creativity. Cannabis users are higher in openness to experience (Eisenman et al., 1980; Fridberg, Vollmer, O'Donnell, & Skosnik, 2011; Hogan, Mankin, Conway, & Sherman, 1970; Terraciano, Lockenhoff, Crum, Bienvenu, & Costa, 2008; Victor et al., 1973), lower in agreeableness (Fridberg, Vollmer, O'Donnell, & Skosnik, 2011; Terraciano et al., 2008), lower in conscientiousness (Fridberg, Vollmer, O'Donnell, & Skosnik, 2011; Hogan et al., 1970; Terraciano et al., 2008), and are more adventuresome (Kay, Lyons, Newman, Mankin, & Loeb, 1978; Weckowicz et al., 1977). Moreover, there is evidence that higher openness to experience is linked to creativity (Kaufman, 2013) and that higher levels of extraversion (Singh & Kaushik, 2015; Sung & Choi, 2009) and lower levels of conscientiousness may also predict higher levels of creativity (Feist, 1998; Guastello, 2008). Therefore, it is possible that cannabis users' higher self-reported creativity (Eisenman et al., 1980; Todd & Goldstein, 1977; Victor et al., 1973), and their superior divergent thinking test performance (Jones et al., 2009; Weckowicz et al., 1977) may be driven by these pre-existing personality differences rather than regular cannabis use directly affecting creativity, per se. To our knowledge no one has investigated personality as a possible mechanism underlying the relationship between cannabis use and creativity.

1.1. Study objectives and hypotheses

The question of whether cannabis use enhances creativity is of great theoretical, psychological, and cultural interest, and results of previous research on the subject have been somewhat mixed. Therefore, the purpose of this study was to further elucidate the nature of the relationship between cannabis and creativity. Specifically, the first objective was to examine whether sober cannabis users show enhanced divergent and convergent thinking test performance. The second objective was to examine whether sober cannabis users report higher levels of creativity using standardized self-report measures of creativity. Finally, the third objective was to explore the Big Five personality traits as possible mechanisms underlying the putative links between cannabis use and creativity. We hypothesized that relative to non-users, cannabis users would demonstrate superior performance on a test of divergent thinking, but not convergent thinking; that cannabis users would report higher levels of creative ability and achievements; and that openness to experience would underlie these effects.

2. Methods

2.1. Participant recruitment

A total of 979 undergraduate students were recruited from the Washington State University Department of Psychology subject pool. Participants were compensated with course credit in exchange for research participation. A student sample was selected because cannabis use is most frequent among young adults (Substance Abuse and Mental Health Services Administration [SAMHSA], 2016), and the sample was readily accessible, allowing us to collect sufficient data to power analyses to detect small sized effects. Specifically, a power analysis indicated that a sample of 787 participants would be needed to have power of 0.80 to detect small sized effects ($\eta_p^2 = 0.01$) with alpha set at 0.05.