Addictive Behaviors Reports 7 (2018) 32–39

Contents lists available at ScienceDirect

Addictive Behaviors Reports

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

Correlates of cannabis vape-pen use and knowledge among U.S. college students

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ARTICLE INFO

Keywords:
Marijuana
Vaporizer
College students
Substance use
Attitudes
Cannabis

ABSTRACT

Introduction: The proliferation of electronic devices, such as vape-pens, has provided alternative means for cannabis use. Research has found cannabis-vaping (i.e., vape-pen use) is associated with lower perceived risks and higher cannabis use. Knowledge of these products may increase likelihood of subsequent use. As policies for cannabis shift, beliefs that peers and family approve of this substance use (injunctive norms) increase and there has been an increase in vape-pen use among young adults (18–35 year olds); however, correlates thereof remain unknown. Young adults often engage in cross-substance use with cannabis and alcohol, making alcohol a potential correlate of cannabis vape-pen use and knowledge. Therefore, we examined alcohol use and other potential correlates of vape-pen use and knowledge among a sample of university students.

Methods: This secondary data analysis utilized surveys at multiple colleges in the U.S. (N = 270). Alcohol use, social anxiety, cannabis expectancies, injunctive and descriptive norms and facets of impulsivity were examined as correlates of vape-pen use and knowledge using bivariate correlations and logistic regressions.

Results: Alcohol use was correlated with cannabis vape-pen use and knowledge. Frequency of cannabis use, peer injunctive norms, and positive expectancies were associated with increased likelihood of vape-pen use. Lack of premeditation, a facet of impulsivity, was associated with cannabis vape-pen knowledge.

Conclusions: Given the unknown nature and consequences of cannabis vape-pens, the present findings offer valuable information on correlates of this behavior. Further, correlates of knowledge of vape-pens may point to areas for education and clinical intervention to prevent heavy cannabis vape-pen use.

1. Introduction

Cannabis is the most commonly used illicit substance in the United States (U.S.) (SAMHSA, 2014) and is increasing among young adults (18–25 year olds; Gaher & Simons, 2007; Phillips, Phillips, Lalonde, & Tormohlen, 2015; SAMHSA, 2014). As use increases, perceptions of cannabis use may become more favorable (Buckner, 2013) with lower perceived risks (Budney, Sargent, & Lee, 2015). Perceived risk influences behavior change, and may be fostered by knowledge and personal beliefs (Ryan, 2009).

The Integrated Behavioral Model (IBM; Montaño & Kasprzyk, 2015) is an extension of the Theory of Reasoned Action and the Theory of Planned Behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1977; Janz & Becker, 1984; Rosenstock, 1974). These theories emphasize the importance of attitudes, subjective norms, and perceived control as having direct influence over one's intentions to perform a behavior. The IBM utilizes these constructs but adds knowledge and personal beliefs as key constructs in predicting if someone will carry out a behavior or not. Specifically *knowledge* is theorized to affect an individual's behavior directly (i.e. salience of behavior, environment, habit, and knowledge; Jaccard, Dodge, & Dittus, 2002). The IBM posits that even if one has a strong intention, they still need the requisite knowledge in order to carry out a behavior (Montaño & Kasprzyk, 2015).

As new cannabis routes of administration emerge, it is important to

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https://doi.org/10.1016/j.abrep.2017.11.004
Received 11 June 2017; Received in revised form 16 November 2017; Accepted 16 November 2017
Available online 21 November 2017

examine how knowledge of these methods may foster use (Farrell, 2001; Ryan, 2009). Knowledge of cannabis products has not been consistently shown to increase overall use, however it has been linked to increasing positive attitudes towards the substance, which can then lead to increased substance use (Farrell, 2001). Prior research, although concerning electronic cigarettes (e-cigarettes) for nicotine rather than cannabis, explains that many young adults will likely try new technologies to administer substances. Specifically, as e-cigarette technology improves for nicotine, these same devices provide alternative means for cannabis use, such as through a cannabis vape-pen (Brown & Cheng, 2014; Giroud et al., 2015). Given that simply knowing about a device or a new way to use a substance (i.e. cannabis vape-pens) may affect an individual's behavior, as theorized by the IBM, examining knowledge of cannabis vape-pen use may offer valuable insight to possible risk factors for subsequent use, and means of potential behavior change.

Several common portable electronic devices are used for vaping cannabis (i.e., “vape-pens”). These devices are commercially available and the most popular design resembles e-cigarettes (Brown & Cheng, 2014; Lee, Crosier, Borodovsky, Sargent, & Budney, 2016). Given lack of regulation, varying devices, and tetrahydrocannabinol (THC) potencies of products, components within the vapor produced by cannabis vape-pens are not well understood and gauging how much THC is administered can be difficult (Cranford, Bohnert, Perron, Bourque, & Ilgen, 2016; Douglas et al., 2015; Giroud et al., 2015). However, vape-pens are potentially appealing to cannabis users because of their less detectable odor and perception of reduced negative health effects compared to smoking cannabis (Budney et al., 2015; Etter, 2015; Johnson et al., 2016; Malouff, Rooke, & Copeland, 2014). U.S. national surveys have found between 9.9%–39% of adults report ever using cannabis vape-pens (Lee et al., 2016; Schauer, King, Bunnell, Promoff, & McAfee, 2016). Cannabis vape-pen use among college students appears higher than the national U.S. average (29% use; Jones, Hill, Pardini, & Meier, 2016), and men have been found to report higher vape-pen use than women (Jones et al., 2016; Lee et al., 2016). Further, individuals younger than 44 years-old, with higher education, and current cannabis users were more likely to report trying vape-pens with cannabis (Cranford et al., 2016). Given these findings, as new means of administration for cannabis continue to emerge, it is important not only to examine the devices themselves, but also how people's knowledge of these cannabis vape-pens may foster initial and sustained use of them.

2. Examined constructs

A consideration of the relevant theoretical and empirical literature explained in Section 1 points to several constructs with potential importance to vape-pen use and knowledge: impulsivity, descriptive and injunctive cannabis norms, cannabis expectancies, social anxiety, and alcohol use.

2.1. Impulsivity

Impulsivity, defined as acting with diminished thought or regard for possible consequences (Brewer & Potenza, 2008; Moeller et al., 2001), is a complex, heterogeneous construct that has been related to cannabis use and other risky behaviors among college students (Bidwell et al., 2013; Whiteside, Lynam, Miller, & Reynolds, 2005), but has not been related to vape-pen use or knowledge. Impulsivity relates to overall cannabis use among young adults (Bidwell et al., 2013). Those who endorse greater impulsivity typically are more likely to try or be willing to try cannabis (Bidwell et al., 2013; Cranford et al., 2016; Etter, 2015; Lee et al., 2016). Thus, there is a strong likelihood of relationships between impulsivity and cannabis vape-pen use or knowledge.

2.2. Normative beliefs

Evidence shows that perceptions regarding an individual's overall use may be impacted by peers' and parents' approval (Buckner, 2013). These perceptions are known as *normative beliefs* (Fishbein & Ajzen, 1977), and they have been shown to influence both perceived prevalence (i.e., descriptive norms) and perceived approval of cannabis by others (injunctive norms; Buckner, 2013). Perceptions that others use or approve of cannabis relate to more frequent cannabis problems and use (Buckner, 2013; Neighbors, Geisner, & Lee, 2008). Specifically, when perceptions of peer approval are high, positive expectancies may mediate an increase in cannabis use (Neighbors et al., 2008), however normative beliefs have not been examined among cannabis vape-pen users. It is likely that when cannabis use is perceived as positive by parents or peers, one may be more likely to engage in varying forms of cannabis use, including vape-pens.

2.3. Positive/negative expectancies

Cannabis Expectancies are anticipated effects individuals believe they will experience from the substance, which may affect decisions regarding substance use (Jones, Corbin, & Fromme, 2001). Expectancies connect memory with behavior to reflect knowledge of a relationship between events and objects (Goldman, Brown, & Christiansen, 1987). Young people are more likely to be influenced by positive than negative expectancies due to an over-emphasis on pleasurable effects, especially among more impulsive individuals (Smith & Anderson, 2001). Specifically, cannabis expectancies have been related significantly to future substance use (Barnwell & Earleywine, 2006). Thus, it will be important to determine whether cannabis expectancies also relate to cannabis vape-pen use and knowledge given lower perceived risk and potential for increased use among young adults.

2.4. Social anxiety

In addition to overall cannabis use and general psychological correlates such as impulsivity, norms and expectancies, we examined a variable with direct clinical relevance that has demonstrated relationships to cannabis use. *Social Anxiety* and social anxiety disorder (SAD) diagnosis remains high in undergraduate samples compared to the general population (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007). Those with SAD are more vulnerable to cannabis use disorders (MUD; Buckner, Silgado, & Schmidt, 2011), and SAD is the only internalizing disorder found to be directly related to cannabis problems (Buckner et al., 2008; Buckner, Mallott, Schmidt, & Taylor, 2006). Similarly, having a negative social encounter due to anxiety has been related to cannabis-related problems (Phillips et al., 2015), and young women who smoke daily have reported a higher state of anxiety, even after adjusting for other substance use (Patton et al., 2002).

2.5. Other substance use

Individuals who report co-use of substances remain at an increased risk for related negative consequences. *Alcohol* is frequently co-used with cannabis by young adults (Gaher & Simons, 2007) and reciprocal relationships between alcohol and cannabis have been found. Specifically, genetic and environmental influences on subjective effects of one drug can alter subjective effects of the other (Haberstick et al., 2010). Further, studies have found parallel correlates of alcohol and cannabis use such as impulsivity, expectancies, and anxiety (Barnwell & Earleywine, 2006; Bidwell et al., 2013; Phillips et al., 2015). College students who use alcohol frequently were two times more likely to use vape-pens in a recent study (Jones et al., 2016). Further, alcohol use increases the chance of co-use with other substances, such as cannabis and tobacco (Yu & Williford, 1992).

Evidence suggests *tobacco* is also frequently used with cannabis by