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Impulsivity and history of behavioral addictions are associated with drug use in adolescents

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ABSTRACT

Background: Previous literature suggests that trait impulsivity and engagement in non-drug-related behavioral addictions (e.g., Internet addiction, food addiction) are two risk factors for drug use. Here we further investigated the potential impact of having one or both of these risk factors on drug use in Los Angeles area adolescents.

Method: High school students (N = 1612; Mean age = 14.1) completed self-report surveys measuring two potential risk factors (impulsivity, lifetime history of several behavioral addictions), and past 6-month use of tobacco, alcohol and marijuana. Participants who reported never using drugs completed questionnaires assessing their susceptibility for future use.

Results: In general, adolescents who endorsed either impulsivity alone or at least two behavioral addictions alone were more likely to have used tobacco, alcohol, or marijuana compared to individuals who had neither risk factor (OR = 2.50–4.13), and individuals who endorsed both impulsivity and three or more behavioral addictions were the most likely to have used these drugs (OR = 9.40–10.13). Similarly, among those who had never tried a drug, individuals with this combined set of risk factors were the most likely to be susceptible to future drug use (OR = 3.37–5.04).

Discussion: These results indicate that the combination of trait impulsivity and a history of behavioral addictions increases the risk for current and future drug use in adolescents, to a greater extent than either risk factor alone. It may be useful for drug prevention efforts to target impulsive adolescents who also actively engage in other non-drug-related addictive behaviors.

1. Introduction

For a large proportion of the U.S. population, use of several drugs of abuse (e.g., tobacco, alcohol, and marijuana) begins in adolescence. In 2014, 4.9% of individuals aged 12 to 17 reported currently smoking tobacco (i.e. past 30-day use), 11.5% currently drank alcohol, and 7.4% currently used marijuana. Further, among these individuals the average age of initiation was approximately 15 years old (SAMHSA, 2014). In general, earlier drug use initiation in adolescents increases the likelihood of both developing a substance use disorder and difficulty quitting in adulthood (Moss, Chen, & Yi, 2014). Additionally, adolescents who use drugs are at a greater risk for having concurrent psychiatric disorders, such as affective and anxiety disorders, compared to their non-drug-using counterparts (Gil, Wagner, & Tubman, 2004). Thus it is critically important to better understand the risk factors for drug use among adolescents in order to develop better prevention strategies. Previous research has examined a wide range of potential risk and protective factors for drug use in adolescents (Sussman & Ames, 2008), including those at the individual level (e.g., the risk for smoking cigarettes is higher for adolescents with high trait hostility: Weiss, Mouttapa, Cen, Johnson, & Unger, 2011), as well as those at the social (e.g., peer tobacco, alcohol, and marijuana use is strongly associated with an individual's drug use: Bahr, Hoffmann, & Yang, 2005) and larger contextual levels (e.g., highly religious adolescents are at a lower risk for drug use compared to their non-religious counterparts: Wallace et al., 2007). In this study, we examine the impact of two potential risk factors, both alone and in combination: a history of engagement in non-drug-related addictive behaviors and trait impulsivity.

One possible risk factor for drug use is engagement in one or more non-drug-related addictive behaviors (e.g., gambling addiction, food

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addiction, and Internet addiction). Similar to substance use disorders, these "behavioral addictions" consist of potentially maladaptive behavioral patterns (e.g., preoccupation with – and loss of control over – the behavior: Demetrovics & Griffiths, 2012; Sussman, 2017). Evidence from genetic, neuroimaging, and biochemical studies indicates that there is considerable overlap in the neurobiological mechanisms underlying both drug-related and non-drug-related addictive behaviors (Grant, Brewer, & Potenza, 2006). Interestingly, preclinical and epidemiological studies suggest that a history of past engagement in one addictive behavior may contribute to greater risk of engagement in another addictive behavior in the future. For instance, rats exhibit amphetamine-induced sensitization (i.e., an exaggerated behavioral and neurobiological response thought to be one mechanism underlying addiction: Robinson & Berridge, 1993), following earlier exposure to "gambling-like" schedules of rewarding stimuli or excessive sugar consumption (Avena & Hoebel, 2003b; Zack, Featherstone, Mathewson, & Fletcher, 2014). Conversely, earlier exposure to amphetamine increases later sugar intake and sexual behavior (Avena & Hoebel, 2003a; Fiorino & Phillips, 1999). Further, in adolescent humans both alcohol and cigarette use may precede Internet addiction (Lee, Han, Kim, & Renshaw, 2013).

Another possible risk factor for drug use and abuse is trait impulsivity. Impulsivity is a broad, multifaceted construct that is often described in two ways: (1) impulsive action, defined as a lack of behavioral inhibition without regard to potential negative consequences; and (2) impulsive choice, defined as a failure of self-control or inability to delay gratification (Grant & Chamberlain, 2014; Perry & Carroll, 2008; Weafer, Mitchell, & de Wit, 2014). Impulsivity is quite common (approximately 17% of the U.S. population) especially in younger individuals (Chamorro et al., 2012), and several lines of evidence indicate a strong relationship between impulsivity and drug use. College undergraduates with greater impulsivity self-report initiation of cigarette, alcohol, and marijuana use at a younger age than their less impulsive peers (Kollins, 2003). Additionally, greater impulsivity in adolescence predicts future increases in alcohol consumption (Fernie et al., 2013), and impulsive adolescent tobacco smokers are less likely to successfully maintain smoking abstinence following a quit attempt (Krishnan-Sarin et al., 2007).

Trait impulsivity in adolescents and adults is also associated with several behavioral addictions, including gambling (Chambers & Potenza, 2003; F. Vitaro, Arseneault, & Tremblay, 1999), Internet use (Mottram & Fleming, 2009), and overeating (Davis et al., 2011; Fischer & Smith, 2008). Recently, Sussman et al. (2014) reported that the prevalence of behavioral addictions in a population of recent graduates of California alternative high schools (which are comprised primarily of students who have one or more behavioral/psychological problems, including possible trait impulsivity) is relatively high (i.e., 62% endorsed at least one current behavioral addiction). Further, Vitaro, Ferland, Jacques, and Ladouceur (1998) reported that adolescents who had co-occurring gambling and substance use disorders were more impulsive than those who had either a gambling or substance use disorder alone, suggesting that there is likely a cumulative-type relationship between impulsivity and several co-occurring expressions of drug- and non-drug-related behavioral addictions.

Here, we further examine the potential relationship between two self-reported risk factors (impulsivity, the presence of one or more behavioral addictions) and tobacco, alcohol and marijuana use – or susceptibility to use these drugs in the future among nonusers – in an adolescent population. We predicted that individuals with high trait impulsivity would be more likely to endorse engagement in one or more non-drug-related behavioral addictions compared to their low-impulsivity counterparts. We further hypothesized that individuals with either risk factor would be more likely to use–or would be more susceptible to use–tobacco, alcohol, and/or marijuana compared to individuals with neither risk factor, and that individuals with both risk factors would be at the greatest risk for use.

2. Method

2.1. Participants and procedure

Approximately 40 public high schools in the Los Angeles metropolitan area were identified as potential data collection sites for a larger study on emotion, addiction, and health. These schools were chosen because of their diverse economic and ethnic demographic characteristics. In total, ten schools agreed to participate (school characteristics have been published previously: Leventhal et al., 2015). For each school all ninth graders who were not enrolled in an English as a second language or special education program (e.g., severe learning/developmental disorder) were invited to participate (N = 4100). The percentage of students eligible for free lunch within each school (i.e., parents' income is at or below 185% of the national poverty level) on average across the ten schools was 31.1% (SD = 19.7, range: 8.0%–68.2%). Study assent and consent rates (N = 3396 [82.3%]) and survey completion rates among contenting students (N = 3383 [99.6%]) were comparable to or exceed studies of public high school students in the region (Sussman, Dent, & Stacy, 2002; Unger, Ritt-Olson, Soto, & Baezconde-Garbanati, 2009). In order to test our hypotheses relating to high trait impulsivity, we used an extreme groups approach and included only individuals who were scored as endorsing either high or low trait impulsivity (see below for description of measures). Thus for the current analysis our final sample was 1612 participants (Mean ± SD age = 14.07 ± 0.40 years). Data collectors administered the paper-and-pencil surveys with the measures described below in compulsory classes and emphasized the confidentiality of student responses.

2.2. Measures

2.2.1. Trait impulsivity

Participants completed a 5-item questionnaire that consisted of a subset of binary true/false items from the Temperament and Character Inventory–Impulsivity Scale (Cloninger, 1994). The questions were: "I often do things based on how I feel at the moment without thinking about how they were done in the past"; "I like to think about things for a long time before I make a decision [reverse-coded]"; "I usually think about all the facts in detail before I make a decision [reverse-coded]"; "I often follow my instincts, hunches, or intuition without thinking through all the details"; "I like to make quick decisions so I can get on with what has to be done". Participants who endorsed 4 or more items were considered to have high trait impulsivity (N = 783; 23.1% of the original sample) and those who endorsed 1 or fewer items were considered to have low trait impulsivity (N = 829; 24.5% of the original sample). Analysis of reliability of the five dichotomous items using polychoric correlations revealed an alpha coefficient of 0.83 (Gadermann, Guhn, & Zumbo, 2012).

2.2.2. Lifetime behavioral addictions

This 12-item index assesses engagement in a range of potentially addictive behaviors (Sussman, Lisha, & Griffiths, 2011). The header for the measure read: "Sometimes people have an addiction to a certain drug or other object or activity. An addiction occurs when people experience the following: they do something over and over again to try to feel good, for excitement, or to stop feeling bad; they can't stop doing this thing, even if they wanted to; bad things happen to them or to people they care about because of what they are doing". Below the header participants were asked to respond yes or no to whether they were "ever addicted to the following things": "cigarette smoking", "alcohol drinking", "other drugs", "eating", "gambling", "Internet", "online or offline video games", "shopping", "love", "sex", "exercise", "work". For the purpose of this analysis, we removed the drug-related items, leaving 9 non-drug-related behavioral addictions. The primary predictor was categorized as either the absence of a non-drug-related