



# Preadolescent sensation seeking and early adolescent stress relate to at-risk adolescents' substance use by age 15



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## HIGHLIGHTS

- Youth who experiment vs. use heavily during early adolescence can be discriminated.
- Sensation seeking and stressful life events relate to early adolescent substance use.
- Stressful life events independently contribute to heavier adolescent substance use.

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## ABSTRACT

**Background and aims:** Substance use during adolescence can lead to the development of substance use disorders and other psychosocial problems. These negative outcomes are especially likely for individuals who use substances at earlier ages and those who engage in heavier use during adolescence, behaviors which are both more common among youth at higher risk for developing a substance use disorder, such as those with a family history of substance use disorders (FH+). Factors such as increased sensation seeking and greater exposure to stressors among FH+ youth may influence these associations. Therefore, the aim of this study was to examine the relative and unique contributions of sensation seeking during preadolescence and exposure to stressors during early to mid-adolescence to cumulative substance use by mid-adolescence among FH+ youth.

**Methods:** A total of 167 mostly Hispanic FH+ youth (ages 12–15) who were participating in an ongoing longitudinal study were included in these analyses. Participants' data from biennial waves covering approximately 2.5 years were used. Self-reported sensation seeking, exposure to stressors, and substance use were compared. **Results:** Higher sensation seeking during preadolescence and greater exposure to stressors during early to mid-adolescence were both associated with substance use by age 15. These factors differentiated Substance Users from Non-Users, and also related to level of substance use.

**Conclusions:** Elevated sensation seeking and exposure to stressors are both associated with substance use by age 15 among high-risk youth. Additionally, these factors can distinguish youth who develop heavier substance use during this important developmental period.

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## 1. Introduction

According to a recent national survey, Alcohol is the mostly commonly used substance among adolescents, followed by marijuana and tobacco. Among high school seniors in that study, 35% reported using

alcohol, 21% reported using marijuana, and 11% reported smoking cigarettes in the past month (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016). The levels of use among these older adolescents is a concern, but even more worrying is the fact that many youths begin using during early or mid-adolescence. Another recent national study reports that 7.8% of 12 and 13 year-olds report ever using alcohol, rising to 50.8% among 16 and 17 year-olds. Rates of marijuana and tobacco use follow a similar pattern of increasing prevalence of use: 2.5% of 12 and 13 year olds and 30.9% of 16 and 17 year-olds report marijuana use, whereas 5.0% of 12 and 13 year-olds and 30.9% of 16 and 17 year-olds report tobacco use. (Center for Behavioral Health Statistics and Quality, 2016). Although much of this use may be experimental, the

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use of alcohol and illicit drugs, in particular, can nevertheless increase the risk that an adolescent develops a substance use disorder. In fact, a third recent national survey of adolescents found that the median age of onset for a DSM-IV-TR diagnosis of substance abuse is 14 years old (Swendsen, Burstein, & Case, 2012). This suggests that some substance-using adolescents are developing problematic patterns of alcohol or illicit drug use that are accompanied by significant impairment.

Previous research has demonstrated that youth who begin using alcohol and illicit drugs at earlier ages, and those who engage in more frequent use during adolescence have a greater risk of experiencing negative outcomes such as poor psychological development, psychiatric disorders, substance use disorders, disease, accidental overdoses, and suicide attempts (Fergusson, Horwood, & Swain-Campbell, 2002; Grant et al., 2006; Hawkins et al., 1997; Substance Abuse and Mental Health Services Administration, 2012; Schuckit & Russell, 1983). However, the variables that predict which youth will engage in early and/or frequent alcohol and illicit drug use during adolescence are not well understood. Therefore, it is important to identify factors that contribute to these high-risk patterns of substance use during adolescence. A better understanding of these factors could improve prevention and intervention services to reduce adolescent substance use.

One factor that increases an individual's risk for developing problematic alcohol or illicit drug use during adolescence is having a family history of substance use disorders (FH+). FH+ youth engage in substance use at earlier ages than do youth without a family history of substance use disorders (FH-; Chassin, Curran, Hussong, & Colder, 1996). Additionally, this early use among FH+ youth has been linked to the development of substance use disorders (Warner, White, & Johnson, 2007; Dawson, 2000), which are more common among FH+ individuals (Sher, Grekin, & Williams, 2005; Tarter et al., 2003). Although there is considerable evidence that FH+ individuals are at increased risk for developing problematic substance use, the reasons for this association are not well understood.

Several explanations for the increased incidence of problematic substance use among FH+ individuals have been suggested. Some research has suggested that FH+ individuals are more likely to inherit traits, such as high sensation seeking, that contribute to their increased risk for developing a substance use disorder (Sher, Walitzer, Wood, & Brent, 1991; Tarter, 1988; Tarter, Kirisci, Habeych, Reynolds, & Vanyukov, 2004). Sensation seeking is defined as the tendency to pursue exciting, novel, and often risky experiences (Zuckerman, 1994), and cross-sectional research has found elevated sensation seeking among individuals who are frequent substance users and those who have substance use disorders (Fischer & Smith, 2008; Gerra et al., 2004; La Grange, Jones, Erb, & Reyes, 1995). Additionally, studies focused specifically on adolescents have found that greater sensation seeking can predict higher levels of alcohol and marijuana use longitudinally (Crawford, Pentz, Chou, Li, & Dwyer, 2003; Pedersen, Molina, Belendiuk, & Donovan, 2012). Therefore, it stands to reason that elevated sensation seeking in FH+ youth could contribute to their risk for developing problematic substance use.

Other research suggests that parental substance use disorders can increase the environmental stress that a family experiences, which in turn increases the likelihood of offspring developing a substance use disorder. Previous studies have established that FH+ individuals report greater exposure to a variety of stressors during their childhood and adolescence, including major stressors such as exposure to violence (Anda et al., 2002) and more minor stressors such as academic problems (Charles et al., 2015). In particular, stressors in the domains of family, academics, peers, and finances are more common among FH+ individuals (Charles et al., 2015; Hussong et al., 2008; Pillow, Barrera, & Chassin, 1998). Given that increased exposure to stressors has been associated cross-sectionally with substance use in adolescence and early adulthood (e.g., Anda et al., 2002; Charles et al., 2015; Pillow et al., 1998; Vermeiren, Schwab-Stone, Deboutte, Leckman, & Ruchkin, 2003) and reported retrospectively by substance-abusing adults

(e.g., Anda et al., 2002; Dube, Anda, Felitti, Edwards, & Croft, 2002; Pilowsky, Keyes, & Hasin, 2009), one interpretation is that increased exposure to stressors among FH+ individuals might play a role in their elevated risk for developing substance use disorders.

There is considerable evidence that sensation seeking and exposure to stressors are likely to contribute to the development of substance use disorders, and that this link may be especially apparent among high-risk groups such as FH+ youth. However, previous research is limited in two primary ways. First, prior studies have primarily focused on individuals who already meet criteria for substance use disorders (e.g., Anda et al., 2002; Dawson, 2000; Dube et al., 2002; Pilowsky et al., 2009). Relatively less is known about how these disorders develop, including factors that may be important during adolescence. Second, we are not aware of any studies that have combined measures of exposure to stressors and sensation seeking in the same analysis. There is evidence that both factors are positively related to substance use (e.g., Anda et al., 2002; Tarter et al., 2004), but the relative strength of each as a predictor of substance use during adolescence is unknown. A better understanding of this would be useful for shaping prevention and intervention efforts to reduce adolescent substance use. Therefore, the purpose of the current study is to examine how sensation seeking and exposure to stressors relate to substance use by age 15 in a sample of FH+ youth enrolled in a longitudinal study of adolescent development.

## 2. Method

### 2.1. Participants

Participants were 167 youth (89 girls, 78 boys) selected from a larger cohort of 386 youth enrolled in an ongoing longitudinal study of adolescent development in a large southwestern U.S. city. Details about the sample characteristics of the larger study are described elsewhere (Ryan et al., 2016). Briefly, it should be noted that the larger study has equal numbers of boys and girls enrolled and that the sample is majority Hispanic, reflecting the demographics of the local area. The larger study also oversampled FH+ youth, with about 80% of the sample coming from this high-risk group. The files of all 386 participants in the larger study were reviewed for inclusion into these analyses; the inclusion criteria for the present study were 1) being at least 15 years old at the most recent study visit, so that total substance use prior to age 15 was available and 2) having a family history of substance use disorders (FH+).

### 2.2. Screening & study procedures

Families were recruited to participate in the larger study between 2010 and 2012, when the youth were 10–12 years old, using radio and online advertisements. Youth and one parent completed consent/assent procedures together at enrollment but were otherwise kept in different testing rooms to complete self-report questionnaire and interview measures separately. Exclusion criteria for the larger study were: low IQ (<70; Wechsler Abbreviated Scale of Intelligence; The Psychological Corporation, 1999); physical/developmental disabilities that would interfere with the ability to understand or complete study procedures; and current or past major depressive, bipolar, or psychotic disorders based on parent and child report on the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). Once enrolled, participants completed biannual follow up evaluations.

At enrollment, parents provided information about demographic characteristics, youths' developmental history, and current and lifetime psychiatric symptoms in the youth. In addition, family socioeconomic status was determined using parent report on the Four Factor Index of Socioeconomic Status (FFISS; Hollingshead, 1975), and family history of substance use and psychiatric disorders was assessed using parent responses on the Family History Assessment Module (FHAM; Janca,

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