Personality Correlates of Nonclinical Substance use in Adolescents

Catherine Chambliss[1], Kristi Blust[1], Amy Hartl,[1] & Maureen Lannon[1]

Abstract

A substance use survey (Wechsler, et al., 1998) and several personality scales were administered to undergraduates. Both Study 1 and 2 revealed associations between personality factors and cigarette, alcohol, and marijuana use. When compared to nonusers, smokers were higher in negative emotionality and lower in conscientiousness; alcohol and marijuana users were more extraverted. Gender moderation of relationships between personality and substance use was also evaluated.

Introduction

Individuals become casualties of substance use disorders as a result of a convergence of forces, almost certainly including genetically-grounded neurophysiologic vulnerability and exposure to eliciting environmental experiences. Belcher et al. (2014) have recently argued that research should focus on three key personality traits (positive emotionality/extraversion, negative emotionality/neuroticism, and behavioral restraint) known to be tied to specific brain systems and genes, that have also consistently been associated with substance use. They contend that these personality features, and the genetic factors that moderate them, interact with the environment, including the substances themselves, to shape one's risk of substance use disorder. While Belcher et al. see personality as the appropriate end phenotype; Blum et al. (2014) contend that a better end phenotype to use is reward deficiency syndrome (RDS), which involves behaviors found to have gene-based association with hypodopaminergic function. They maintain that identifying individuals genetically predisposed to RDS risk might help improve substance abuse prevention efforts and assist in stemming the global rise in problems such as opiate addiction.

Several personality traits thought to involve elevated dopamine sensitivity, including extraversion, positive effect, and strong motivation, have been linked to vulnerability to substance addiction (Belcher et al., 2014; Depue& Collins, 1999; Depue, and Fu, 2013). Many believe people with elevated dopamine sensitivity experience greater pleasurable substance-induced dopaminergic transmission, which may yield higher risk of addiction (Belcher et al., 2014).Given that impulsive behaviors depend on dopamine transmission in the nigrostriatal and mesocorticolimbic pathways, individual differences in impulsivity probably indicate variation in dopaminergic function. Supportive of this contention is recent work demonstrating that rats with greater conditioned approach behavior toward a food signaling lever have higher dopamine transmission (Saunders and Robinson, 2012).

---

[1] Ursinus College, 601 E Main St, Collegeville, PA 19426, USA.

Animals displaying such high conditioned cue approach are assumed to be more sensitive to the motivating influence of such cues; they seem to come to desire and therefore approach the cue itself (Berridge, 2007). A sensitized dopamine pathway may underlie these phenomena, which parallels what is commonly seen in those afflicted by substance abuse. The work of several researchers suggest associations among behavioral under control/impulsivity, dopamine sensitivity and substance use disorders (Cloninger, 1986; Sher, Bartholow & Wood, 2000; Tarter et al., 2007; Weafer&deWit, 2013).Sher, Bartholow, and Wood (2000) conducted a 6 year prospective study of freshmen undergraduates and found behavioral under control (impulsive sensation seeking and behavioral disinhibition) to be the best predictors of substance use disorders. Their results were consistent with the notions that negative emotionality is both a cause and a consequence of substance use.

Debate among researchers continues about the relative causal contributions of various factors, but most agree that personality traits enable at least modest predictions of risk of substance use. Some hypothesizing a link between personality types and substance use preferences also predict that those using different substances require different treatment approaches. Clinicians have long debated whether type of substance used should dictate differential treatment, and whether substance users should be clustered in homogeneous groups as a function of their substance abuse preferences. Several empirical studies suggest that there are greater similarities than differences between alcohol-dependent and drug-dependent patients, when adequate statistical controls are exercised for critical demographics variables such as age, race, and sex (Carroll & Chambliss, 1990; Carroll, 1982; Carroll, Malloy, Roscioli, Pindjack, & Clifford, 1982). This research suggests that common factors are likely to underlie various types of substance use.

Those who see substance use as a means of self medicating anticipate that users will select the substance whose psychoactive properties best address their idiosyncratic need(s). Variation on personality measures presumably reflects differences in such underlying needs. Since alcohol is a powerful central nervous system depressant and calmative, its appeal might be expected to be different from that of stimulants. Those high in anxiety might be more drawn to alcohol, while those high in extraversion, more susceptible to boredom, might be more drawn to stimulants. To the extent that adolescent substance use is a means of self medicating, personality differences should predict type of substance used, because personality characteristics are associated with particular symptom tendencies (e.g., anxiety among those high in neuroticism versus boredom in those high in extraversion). Alternatively, if more generalized sensation seeking underlies most adolescent substance use, one might expect personality variables distinct from those related to risk taking and rebellion to be unrelated to substance use.

Research spanning the last six decades has demonstrated a limited but fairly consistent association between certain personality characteristics and substance use. Eysenck (1967) was one of the first to suggest that extraversion heightens sensitivity to psychoactive substances. Zuckerman (1979) noted that sensation seeking increases risk of early and regular substance use. Wechsler, Dowdall, Davenport, and Castillo (1995) found that nonconformity and deviance were related to multiple substance use.

Study 1 and 2 explored the association between several personality dimensions and three types of substance use by surveying undergraduate students. The MMFFPS was selected as a measure of personality factors because it provides an efficient assessment of the five factors repeatedly found to be most basic in accounting for personality variability across multiple populations (Costa & McCrae, 1997; McCrae & Costa, 1989). Developed by Saucier (1992), this test assesses the five empirically derived core dimensions of personality: openness, conscientiousness, extreme agreeableness, and neuroticism often (summarized by the acronym OCEAN). Each of these variables is assumed to shape how the individual experiences and responds to the environment.

Differences on these five dimensions might well influence the perceived attractiveness of different substances as well as involvement in social situations where these substances are made available. Research exploring the relationship between the Five-Factor model of personality (agreeableness, conscientiousness, extraversion, neuroticism, and openness) and substance use began fairly recently. In 1994 Trull and Sher examined the association between the five factors of personality and various Axis I disorders in a nonclinical sample. The participants were given a variety of psychological inventories, including a personality assessment and a structured interview intended to detect disorders from the Diagnostic and Statistical Manual. The researchers found that participants diagnosed with a past or present substance use disorder (drugs, alcohol, or nicotine) had higher levels of neuroticism and openness and lower levels of agreeableness, extraversion, and conscientiousness compared to participants without a past or present diagnosis of a substance use disorder or dependency. However, for those exclusively diagnosed with an alcohol abuse or dependence disorder, extraversion tended to be somewhat higher than participants with a lifetime diagnosis of either drug abuse/dependence or nicotine dependence. These findings suggest that some personality characteristics may make individuals more vulnerable to substance abuse.

Numerous studies since Trull and Sher (1994) have found that substance users tend to score lower compared to non-users or moderate users on measures of agreeableness and conscientiousness (Walton & Roberts, 2004; Gunnarsson, Gustavsson, Tengstrom, Franck, & Fahlke, 2008; Malouff, Thorsteinsson, & Schutte, 2006; Terracciano, Lockenhoff, Bienvenu, & Costa, 2008). Additionally, findings associated with levels of neuroticism among substance users have been consistent. In line with the findings of Trull and Sher (1994), several other studies have reported higher levels of neuroticism among substance users compared to non-users (Malouff et al., 2006; Terracciano et al., 2008). Reported findings on the relationship between openness to experience and substance use have also been relatively constant. Substance users tend to be more open to experience than non-users (Gunnarsson et al., 2008; Trull&Sher, 1994; Terracciano et al., 2008). It may be important to note, however, that only marijuana users in the study by Terracciano et al. (2008) scored higher on measures of openness than non-users.

While a general pattern arises when looking at personality traits such as conscientiousness, agreeableness, neuroticism, and openness in individuals who use substances, research findings concerning extraversion are variable. For example, in their 2004 study, Walton and Roberts found that moderate and heavy users of drugs and alcohol scored higher than abstainers on measures of extraversion. However, a recent study by Gunnarsson et al. (2008) reported that participants with risk-consumption of tobacco, alcohol, and drugs scored lower compared to non-risk users on measures of hedonic-capacity (a facet of extraversion). These divergent findings leave much room for debate.

While participants comprising the Walton and Roberts study were taken from a large undergraduate university in the Midwestern United States, Swedish adolescents served as the participants in the Gunnarsson et al. (2008) study. The findings of Chambliss, Austin, Brosh, Iannella, Outten, and Rowles (2005) complicate the reported association between extraversion and substance use further. While Chambliss et al. (2005) found that college students were more likely to use substances than high school students, no link between extraversion were and substance use was reported. A similar finding was reported by Malouff et al. (2008). In a meta-analysis of nine studies, all exploring the relationship between personality and cigarette smoking, Malouff et al. (2008) reported no association between extraversion and smoking. Different sample populations were suggested as a possible reason for disparities from earlier studies; it could also be that certain substances appeal to individuals with specific personality traits. For example, both Chambliss et al. (2005) and Malouff et al. (2008) included smoking in their definition of substance use. It may be that individuals who smoke cigarettes are simply less extraverted than non-smokers or users of other substances.

Perhaps further research will lead to a better understanding of the complex relationship between extraversion and substance use. Additional personality variables, selected on the basis of the consideration of their importance in the clinical literature, including depressive symptoms, empathy, emotional intelligence, attachment, and quality of parental relationships were included in Study 2 in order to provide an expanded view of substance use susceptibility. This study explored the association between personality factors and substance use in a nonclinical sample. It also permitted an assessment of shifting relationships between personality and substance use through comparison of Study 1 findings with those obtained in Study 2, later parallel work in the same setting one decade later. Examination of the relationship between scores on these personality dimensions and substance use may help to resolve some of the inconsistencies in previous work exploring how personality affects this behavior in adolescents. In addition, it may assist in the design of preventive programs that seek to target subgroups of adolescents who may be at especially high risk of becoming compromised by substance use.

Method

Study 1

Participants

Respondents were 654 college students from a small liberal arts college from a suburban area in the Northeast United States. Two hundred and sixty-three male students and 391 female students, with a combined mean age of 18.95 years (s.d.=2.15), responded. The sample consisted of 119 who reported being current smokers, 142 former smokers, and 355 nonsmokers. The majority (n=394) reported that they had used alcohol in the past month, and among these, 32 reported daily use; 97 had never used alcohol. The majority (n=315) reported never using marijuana, and 115 reported daily (n=31, 6%) or recent (n=84, 14%) use.

Survey Instrument

The survey included a revision of the instrument used by Bartlett et al. (1999), consisting of 200 items pertaining to current and previous personal smoking habits, motivations for smoking and not smoking, and perceptions of current smokers, nonsmokers, and former smokers. The survey also included the Mini Markers Five Factors Personality Scale (MMFFPS, Saucier, 1992) and author devised items assessing the subject's reported substance abuse behavior and demographic variables. The MMFFPS consists of 40 alphabetized self-descriptive personality characteristics that respondents endorse using a 10-point Likert scale; it yields summary scores on five basic personality traits (openness, conscientiousness, extreme agreeableness, and neuroticism). The frequency of the participant's cigarette, alcohol, and marijuana use were also assessed using self report items (Wechsler et al., 1998). Participants were categorized according to how often they reported using substances. Abstainers reported no use of substances, moderate users reported using within the past 12 months, and regular users were daily users, or had used within the past 30 days.

Results

Study 1

Directionally adjusted items were totaled to create scores on the personality measures. Pearson correlation analyses were performed on the complete sample to assess the relationships among the five personality factors and age, cigarette, alcohol, and marijuana use. Extraversion and alcohol use were significantly correlated (r=.17, p<.001, N=570). Extraversion was also significantly correlated with marijuana use (r=.09, p<.05, N=569).

Conscientiousness was found to be negatively correlated with cigarette and marijuana use (r= -.12, p<.01, N=563 and r= -.11, p<.01, N=563, respectively). A 2 (sex) x 3 (cigarette use: none, moderate usage, regular usage) multivariate analysis of variance (MANOVA) was conducted on the five personality scores. Multivariate tests revealed a significant cigarette use main effect: Wilks' Lambda= .97, F (10/1046)= 2.37, p<.01. The multivariate effect size based on Wilks' Lambda was modest, .02. Multivariate tests also revealed a significant sex main effect: Wilks' Lambda= .94, F (5/523)= 6.83, p<.001; the multivariate effect size based on Wilks' Lambda was modest, .06. No significant interaction effects were found. Tests of between-subjects effects showed a significant cigarette use main effect on neuroticism and conscientiousness (Table 1). A between-subjects test also revealed significant sex main effects on neuroticism, agreeableness, and conscientiousness (Table 2). There were no interaction effects.

Table 1: Cigarette use main effects on neuroticism and conscientiousness.

	Neuroticism	Conscientiousness
No use n=309	x=36.69 s.d.=9.67	x=51.47 s.d.=10.02
Moderate use n=116	x=39.66 s.d.=9.18	x=48.83 s.d.=9.67
Regular use n=108	x=37.91 s.d.=9.45	x=48.23 s.d.=10.75
	F=5.29, df=2/527, p<.01	F=5.87, df=2/527, p<.01

Table 2: Sex main effects on neuroticism, agreeableness, and conscientiousness

	Neuroticism	Agreeableness	Conscientiousness
Males n=207	x=35.86 s.d.=9.28	x=55.17 s.d.=8.65	x=48.44 s.d.=10.37
Females n=326	x=38.68 s.d.=9.61	x=57.26 s.d.=9.54	x=51.37 s.d.=9.91
	F=5.8, df=1/527, p<.05	F=5.52, df=1/527, p<.05	F=10.29, df=1/527,p<.01

A 2 (sex) x 3 (alcohol consumption: none, moderate consumption, regular consumption) multivariate analysis of variance (MANOVA) was conducted on the five personality scores. Multivariate tests revealed a significant alcohol consumption main effect: Wilks' Lambda= .94, F (10/1048)= 3.39, p<.001. The multivariate effect size based on Wilks' Lambda was modest, .03. Multivariate tests also revealed a significant sex main effect: Wilks' Lambda= .94, F (5/524)= 7.15, p<.001. There were no interaction effects. Tests of between-subjects effects showed a significant alcohol consumption main effect on extraversion and openness (Table 3).

Table 3: Alcohol consumption main effect on extraversion and openness

	Extraversion	Openness
No use n=86	x=42.74 s.d.=11.15	x=54.88 s.d.=8.92
Moderate use n=106	x=44.76 s.d.=11.04	x=52.81 s.d.=8.79
Regular use n=342	x=47.65 s.d.=11.14	x=51.76 s.d.=9.35
	F=7.02, df=2/528, p<.01	F=3.16, df=2/528, p<.05

A 2 (sex) x 3 (marijuana use: none, moderate usage, regular usage) multivariate analysis of variance (MANOVA) was conducted on the five personality scores. Multivariate tests revealed a significant marijuana use main effect: Wilks' Lambda= .96, F (10/1046)= 2.46, p<.05. The multivariate effect size based on Wilks' Lambda was modest, .02. Multivariate tests also revealed a significant sex main effect: Wilks' Lambda= .94, F (5/523)= 6.55, p<.001. Tests of between-subjects effects showed a significant marijuana use main effect only on extraversion.

Table 4: Marijuana use main effect on extraversion.

	Extraversion
No use	x=45.18 s.d.=11.03 n=298
Moderate use	x=48.27 s.d.=11.59 n=122
Regular use	x=47.19 s.d.=11.20 n=113
	F=3.91, df=2/527, p<.05

Study 2

Method

Participants

Respondents were 188 college students (72 males, 116 females) with a combined mean age of 18.93 (S.D.=1.10) years from a small liberal arts college from a suburban area in the Northeast United States. The survey was administered to undergraduates enrolled in an introductory psychology course.

Survey Instrument

The survey consisted of standard personality measures, demographic variables, and items assessing the subject's reported substance abuse behavior *(Wechsler, et al., 1998)*. Depression symptoms were assessed using the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). This is self-report measure containing 21 items scored on a scale of 0 to 3. Each question assesses a symptom of depressive disorders.The 10-item Rosenberg Self Concept Scale (Rosenberg, 1965) was used to measure self-esteem. Subjects were asked to indicate on a 4-point Likert scale how strongly they agreed or disagreed with statements assessing participants' perceptions of their self-worth and competence.

The Adult Attachment Scale (AAS) was included in the packet. It consists of 18 items based on Hazan and Shaver's (1987) Attachment Style Measure and other descriptions of infant attachment (Collins & Read, 1990). Participants indicate how characteristic the items are of themselves on a scale of 1 to 5, in which 1= not at all characteristic of me and 5= very characteristic of me.The statements indicate three fundamental dimensions of adult attachment, Closeness, Dependence, and Anxiety, with six items assessing each factor. Closeness describes items that express the degree to which participants are comfortable with closeness and intimacy; Dependence illustrates the extent that participants can trust others and depend on them to be available; and Anxiety reflects fear of abandonment and not being loved in relationships (Collins & Read, 1990). Past research suggests that the AAS is an internally consistent measure of adult attachment style.

The packet also included the Adolescent Relationship Questionnaire (ARQ), which consists of short paragraph descriptions of four attachment styles, which are designed to measure how participants view themselves and others (Bartholomew & Horowitz, 1991). Participants indicate how the descriptions best describe them on a scale of 1 to 5, in which 1= not at all and 5= very much. The four attachment patterns are secure, dismissing, preoccupied, and fearful. Preoccupied represents anxious-ambivalent attachment, and dismissing and fearful represent two distinct forms of avoidant attachment. Past research suggests that the ARQ is an internally consistent measure for attachment ratings (Scharfe& Bartholomew, 1995).

Components of empathy were assessed using the Davis Interpersonal Reactivity Index (DIRI; Davis, 1980). The DIRI is a 28 item self-report questionnaire. The DIRI contains four subscales measuring fantasy, perspective taking, empathic concern, and personal distress. The Schutte Self Report Emotional Intelligence Test (SSEIT) was used to measure general emotional intelligence (EI). The SSEIT is based on the EI model developed by Salovey and Mayer (1990) and is closely associated with the EQ-I model of Emotional Intelligence.

The Mini Markers Five Factors Personality Scale (MMFFPS, Saucier, 1992) was used to measure basic personality factors. The MMFFPS consists of 40 alphabetized self-descriptive personality characteristics that respondents endorse using a 10-point Likert scale; it yields summary scores on five basic personality traits (openness, conscientiousness, extreme agreeableness, and neuroticism). The frequency of the participant's cigarette, alcohol, and marijuana use was assessed using self report items developed by Wechsler, et al.(1998). On these scales 1 denotes never having used, 2=used, but not in the past 12 months, 3=used, but not in the past 30 days, 4=used in the past 30 days, and 5=used on a daily basis.

Results

Study II

Cigarette Use

The majority (68%) of the complete protocol sample reported that they had never smoked cigarettes. Only one quarter of the respondents in this sample was regular smokers. Oneway ANOVA indicated differences among the smoking groups on several of the personality measures. Follow up independent samples t-tests comparing the never smoked and regular smoker groups clarified some of these observed relationships. Those who had never smoked scored lower on the BDI-II and higher on the RSC scale. They also reported higher quality relationships with their parents. They scored lower on the MMFFPS Openness scale, and higher on the Conscientiousness scale. The abstainers also scored lower on the perspective taking subscale of the DIRI. No significant differences emerged on the other three MMPPFS dimensions or the other three DIRI subscales.

Table 5: Independent Samples t-test comparisons of personality scores for regular cigarette smokers and non smokers (means and standard deviations)

	Cigarette Use	N	Mean	Std. Deviation
Conscientiousness t=1.85, df=147, p=.06	Never smoked	117	50.72	10.24
	Regular Smoker	32	46.97	10.02
Openness t=2.25, df=157, p=.03	Never Smoked	125	52.00	10.03
	Regular Smoker	34	56.38	10.35
Perspective Taking t=2.41, df=160, p=.02	Never Smoked	127	23.91	4.91
	Regular Smoker	35	26.17	4.88
RSC t=2.44, df=159, p=.02	Never Smoked	126	76.91	16.85
	Regular Smoker	35	69.06	16.88
BDI-II t=1.86, df=153, p=.06	Never Smoked	122	9.91	8.71
	Regular Smoker	33	13.27	11.15
Father t=1.12, df=160, p=.27	Never Smoked	127	15.25	3.48
	Regular Smoker	35	14.51	3.40
Mother t=2.03, df=160, p=.04	Never Smoked	127	15.72	2.93
	Regular Smoker	35	14.57	3.07

Marijuana use

Roughly, half of the respondents had never tried marijuana. Over one third (38%) reported that they were regular users. Oneway ANOVA and follow-up independent samples t-tests indicated a few differences in personality scores among individuals reporting varying levels of marijuana use. Regular users scored higher in extraversion. They also rated their relationships with their parents less positively. A trend in the data suggested that those who had never consumed marijuana scored lower on the BDI-II and higher on the perspective taking subscale of the DIRI. No significant differences emerged on the other four MMPPFS dimensions, the other three DIRI subscales, or the Rosenberg Self Concept Scale.

Table 6: Independent Samples t-test comparisons of personality scores for regular marijuana consumers and non consumers (means and standard deviations)

	Marijuana use	N	Mean	Std. Deviation
BDI-II	Never used	94	10.1330	8.54123
	Regular user	68	11.8382	9.10242
Paternal Relationship Scale	Never used	97	15.1649	3.54342
	Regular user	72	14.8194	3.32013
Maternal Relationship Scale	Never used	97	15.7526	2.84323
	Regular user	72	14.8333	3.15336
t=1.98, df=167, p=.05				
Extraversion	Never used	95	42.6105	10.90607
t=3.57, df=161, p<.001	Regular user	68	48.2647	8.47405
Perspective Taking	Never used	98	23.9184	4.88987
t=1.85, df=147, p=.06	Regular user	72	24.8056	4.76383

Alcohol Use

Only a minority (15%) of the respondents had never tried alcohol. The majority, 70%, reported regular use. Oneway ANOVA revealed differences across the levels of use groups on only two variables. Regular users scored higher on the extraversion scale and higher on perspective taking. No significant differences emerged on the other four MMPPFS dimensions, the other three DIRI subscales, the parental relationship scales, the BDI-II, or the Rosenberg Self Concept Scale.

Table 7: Independent Samples t-test comparisons of personality scores for regular alcohol consumers and non consumers (means and standard deviations)

	Alcohol use	N	Mean	Std. Deviation
Extraversion	Never used	27	40.9259	11.56229
t=1.94, df=169, p=.05	Regular user	144	45.2778	10.53495
Perspective taking	Never used	29	23.0345	4.09253
t=2.03, df=176, p<.05	Regular user	149	24.7852	5.02099

Discussion

The Study 1 findings partially affirmed previous research. Smokers scored significantly higher on measures of neuroticism and lower on measures of conscientiousness compared to nonsmokers. These findings support those of Malouff et al. (2006), who also found smokers to be high in neuroticism and low in conscientiousness. Unfortunately, since nicotine has stimulant effects, this substance provides little relief for such worrisome individuals. Furthermore, following addiction, smoking cessation promotes irritability and arousal, compounding the plight of anxious adolescents. Since neuroticism is characterized by psychological distress, and users often report smoking for relaxation purposes or to "de-stress," neurotic youngsters may be drawn to experiment with cigarettes more so than non smokers because they wrongly believe it will reduce their anxiety. Study 2 did not find an association between cigarette use and neuroticism, although it did show a link with other measures of negative emotionality (higher depression and lower self esteem).Both Study 1 and 2 showed that users of both alcohol and marijuana scored significantly higher on measures of extraversion compared to nonusers, lending support to the earlier findings of Walton and Roberts (2004). Extraversion involves a highly sociable, active, lively, carefree, dominant, and sensation-seeking style. The presence of substances, especially alcohol, at social events and gatherings is extremely common on college campuses; those who are more outgoing and gregarious are more likely to be subjected to environments making access to substances convenient, making use among extraverts more likely.

In Study 1, while moderate users of marijuana scored higher compared to nonusers and regular users on measures of openness, participants who reported no consumption of alcohol scored higher on this factor compared to moderate and regular users. This finding may sound counterintuitive, as those higher in curiosity and experimentation, fundamental characteristics of the openness personality factor, might be expected to find the altered state of consciousness associated with substance use appealing. Conversely, it may be that alcohol abstainers feel that the physical effects brought on by consumption interfere with their ability to process information and be receptive to new thoughts, ideas, and emotions. As a result, those higher in openness may be less attracted to use of alcohol. In Study 2, differences in openness only emerged when cigarette use was considered; other forms of substance use were unrelated to openness, although in the earlier Study 1 sample openness had been associated with marijuana use. This may stem from the growing acceptability of marijuana use on campuses in recent years.

In Study 2, cigarette use was more associated with personality factors than marijuana or alcohol use. Regular smoking was the rarest form of substance use in this sample, suggesting that situational factors (environmental encouragement) played less of a role in shaping this form of substance use. As a result, this behavior may be expected to vary more as a function of internal predispositions and personality variability. Those who abstained from cigarette smoking showed fewer symptoms of depression and higher self esteem than their peers who regularly smoked cigarettes. They also reported better relationships with their parents and greater conscientiousness. The abstainers were also less likely to seek out novel experiences. Abstainers were also found to be lower in self-reported capacity for perspective taking. Cigarette use was not associated with extraversion. In contrast, both marijuana and alcohol use were associated with higher extraversion. When compared with abstainers, those who regularly used marijuana were more extraverted. They also rated their relationships with their parents less positively, which is not surprising given that use of this substance is illegal and likely a point of friction with parents. Regular marijuana users showed somewhat higher levels of depression, which supports the possibility that adolescents turn to this substance in part to self medicate. Alternatively, marijuana may reduce motivation and interfere with success, giving rise to greater risk of depression. A trend in the data suggested their perspective taking ability exceeded that of students who abstained from using marijuana.

In Study 2, regular alcohol consumers were more extraverted and showed greater perspective taking ability than peers who self described as abstainers. Interestingly, these were the only two personality differences to emerge when the regular users were compared with abstainers. This may be due to norms making alcohol consumption quite acceptable on college campuses.

Study 1 data indicated sex differences on three personality factors: neuroticism, agreeableness, and conscientiousness. Females were found to have higher scores on all three dimensions compared to males. These findings are consistent with previous research, specifically the findings of Schmitt et al. (2008), which showed women to be higher on the aforementioned factors, in addition to extraversion.

Previous research, paired with the findings presented here, strongly suggests that individuals who report using substances are similar in terms of some personality factors and dissimilar compared to individuals who do not report use. Additionally, males and females appear to differ on various personality dimensions. This knowledge may inform re-evaluation of some current substance use prevention strategies. For example, adolescents low in agreeableness and conscientiousness may experience counterproductive reactance when exposed to intervention methods such as the D.A.R.E. program. While public service announcements boasting alarming statistics associated with substance use have become more frequent in the mainstream media, young people continue to use substances, disregarding the health information that has been presented to them. Perhaps this is an indication of our current lack of understanding regarding prevention of substance use in adolescents and young adults. It may be time to begin crafting intervention strategies with personality diversity in mind.

References

Bartlett, A., Brackin, T., Chubb, J., Covatta, S., Ferguson, L., Hinckley, A., Hodges, J., Liberati, C., Tornetta, J., & Chambliss, C. (February, 2000). Factors influencing and motivating smoking among college students. Poster session presented at the Fifteenth Annual University of Scranton Psychology Conference, Scranton, PA.

Belcher, A.M., Volkow, N.D. Moeller, F.G., &Ferre, S. (2014).Personality traitsand vulnerability or resilience to substance use disorders. *Trends in Cognitive Sciences*, 18(4): 211-17. doi: 10.1016/j.tics.2014.01.010.

Berridge, K.C. (2007). The debate over dopamine's role in reward: the case for incentive salience. *Psychopharmacology,* 191(3):391-431.

Berridge, K.C. (2012). From prediction error to incentive salience: mesolimbic computation ofreward motivation. *European Journal of Neuroscience,* 35(7):1124-43. doi: 10.1111/j.1460-9568.2012.07990.x.

Blum, K., Oscar-Berman, M., Demetrovics, Z., Barh, D., & Gold, M.S.[1] Genetic addiction risk score (GARS): Molecular neurogenetic evidence for predisposition to reward deficiency syndrome (RDS).*Molecular Neurobiology*, 10.1007/s12035-014-8726-5.

Burt, R. D., Dinh, K. T., Peterson, A. V., Sarason, I. G. (2000). Predicting Adolescent Smoking: A prospective study of personality variables. *Preventive Medicine*, 30, 115-125.

Chambliss, C., Austin, M., Brosh, J., Iannella, G., Outten, R., & Rowles, M. (2005). The relationship between substance use and scores on the Mini Markers Five Factors Personality scale in college and high school students. *Journal of Alcohol and Drug Education*, 49, 21-31.

Cloninger, C.R. (1986). A unified biosocial theory of personality and its role in the development of anxiety states. *Psychiatry and Development*, 4(3); 167-226.

Costa, P. T., & Widiger, T. A. (1994). Introduction: Personality Disorders and the Five-Factor Model of Personality. In P. T. Costa and T. A. Widiger (Ed.), *Personality Disorders and the Five-Factor Model of Personality* (pp. 1-8). Washington, D.C.: American Psychological Association.

Depue, R.A. & Collins, P.F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences*, 22(3):491-517.

Depue, R.A. & Fu, Y. (2013). On the nature of extraversion: variation in conditioned contextual activation of dopamine-facilitated affective, cognitive, and motor processes. *Frontiers in Human Neuroscience, 7*, 288. doi: 10.3389/fnhum.2013.00288.

Depue, R.A., Luciana, M., Arbisi, P., Collins, P., & Leon, A. (1994). Dopamine and the structure of personality: Relation of agonist-induced dopamine activity to positive emotionality. *Journal of Personal and Social Psychology*, 67(3):485-98.

de Wit, H., Enggasser, J.L., & Richards, J.B. (2002). Acute administration of damphetamine decreases impulsivity in healthy volunteers. *Neuro psychopharmacology, 27,* 813-25.

Emmons, K. M., Wechsler, H., Dowdall, G., & Abraham, M. (1998). Predictors of Smoking among US College Students. *American Journal of Public Health*, 88 (1), 104-107.

Gallagher, K., Williams, S., Paxton, N., Blust, K., & Chambliss, C. (2008, April).Correlates of Substance Abuse in College Student Athletes and Nonathletes. Poster session presented at the 23rd Annual Lehigh Valley Undergraduate Student Psychology Conference, Bethlehem, PA.

Gunnarsson, M., Gustavsson, J. P., Tengstrom, A., Franck, J., &Fahlke, C. (2008). Personality traits and their associations with substance use among adolescents. *Personality and Individual Differences*, 45, 356-360.

Lilienfeld, S. O. (2007). Psychological Treatments That Cause Harm. *Perspectives on Psychological Science*, 2, 53-70.

Malouff, J. M., Thorsteinsson, E. B., &Schutte, N. S. (2006). The Five-Factor Model of Personality and Smoking: A Meta-Analysis. *Journal of Drug Education*, 36, 47-58.

Moran, P., Coffey, C., Mann, A., Carlin, J.B., Patton, G.C. (2006). Personality and substance use disorders in young adults. *The British Journal of Psychiatry, 188,* 374-379. doi: 10.1192/bjp.188.4.374

Saucier, G. (1994). Mini-Markers: A brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment*, 63(3), 506-516.

Saunders, B.T. & Robinson, T.E. (2010). A cocaine cue acts as an incentive stimulus in some but not others: Implications for addiction. *Biological Psychiatry,* 67(8), 730-6.doi: 10.1016/j.biopsych.2009.11.015.

Schmitt, D. P., Realo, A., Voracek, M., &Allik, J. (2008). Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures. Journal of Personality and Social Psychology, 94(1), 168-182.

Sher, K.J., Bartholow, B.D. & Wood, M.D.(2000). Personality and substance use disorders: a prospective study. *Journal of Consulting and Clinical Psychology*, 68, 5, 818-829.

Tarter, R.E., Kirisci, L., Feske, U., & Vanyukow, M.M. (2007) Modeling the path ways linking childhood hyperactivity and substance disorder in young adulthood. *Psychology of Addictive Behaviors.*, 21(2); 266-71.

Terracciano, A., Lockenhoff, C. E., Crum, R. M., Bienvenu, O. J., & Costa, P. T. (2008) Five-Factor Model personality profiles of drug users. *BMC Psychiatry*, 8. Retrieved September 14, 2008, from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2373294

Trull, T. J., &Sher, K. J. (1994). Relationship between the five-factor model of personality and Axis I disorders in a nonclinical sample. *Journal of Abnormal Psychology*, 103, 350-360.

Walton, K. E., Roberts, B. W. (2004). On the relationship between substance use and personality traits: Abstainers are not maladjusted. *Journal of Research in Personality*, 38, 515-535.

Weafer, J., de Wit, H. (2013). Inattention, impulsive action, and subjective response to damphetamine. *Drug and Alcohol Dependence. 133*(1): 127-33.doi:10.1016/j.drugalcdep.2013.05.021.

Wechsler, H., Rigotii, N. A., Gledhill-Hoyt, J., & Lee, H. (1998). Increased levels of cigarette use among college students: A cause for national concern. *Journal of the American Medical Association*, 280(19), 1673-1678.

Wills, T.A., Vaccaro, D. & McNamara, G. (1994).Novelty seeking, risk taking, and related constructs as predictors of adolescent substance use: An application of Cloninger's theory. *Journal of Substance Abuse*, 6, 1–20.