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SUBSTANCE USE, PERSONALITY, & GENDER AMONG A CLINICAL SAMPLE

Substance Use in a Clinical Sample: The Importance of Personality and Gender

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Abstract

The purpose of our study was to examine the role of the big five personality traits in explaining substance use disorders (SUDs) among a clinical sample. High rates of comorbidity indicate that psychiatric patients are vulnerable to SUDs. However, most previous studies on personality and SUDs have focused on community samples. Our aim was to investigate the extent to which findings from previous research on personality and SUDs can be extrapolated onto a psychiatric population. We also explored the stability of these relations according to gender, and among specific drug categories.

Our sample consisted of 764 psychiatric patients from the MacArthur Violence Risk Assessment Study. Personality traits were assessed using the NEO-Five Factory Inventory. SUDs were based on patients' clinical diagnosis of lifetime drug dependence. Specific drug use was evaluated according to whether or not patients with SUDs ever used particular drugs more than five times.

Using logistic regression, we examined the relationship between personality and gender interactions in explaining SUDs. Further analysis was also conducted according to specific drug categories to determine whether the traits that predict SUDs remain stable across different drugs of abuse. The results indicated that the personality traits of Agreeableness and Conscientiousness were inversely related to any SUDs. Openness to Experience was positively related to the use of hallucinogenic substances. Gender differences in the traits that predicted substance use were most evident for hallucinogenic substance use.

Our findings were similar to previous research on personality and SUDs among community populations, in that the traits of Agreeableness and Conscientiousness were found to be inversely related to SUDs among a psychiatric population. The trait of Neuroticism was not found to be related to SUDs among our sample, which is in contrast to research on community substance users. This suggests that psychiatric substance users did not differ in terms of this trait compared to other psychiatric patients without SUDs. Slight gender differences and heterogeneity across drug categories were found, however more research in this area is needed in order to ensure that our findings were not sample specific. Despite this, the results of our study imply that previous research on personality and SUDs in community populations can be extended onto psychiatric populations.

Substance use is a complex issue that has negative implications on the wellbeing of the individual and the society. According to the Canadian Mental Health Association, substance use becomes a diagnosable disorder when the behavior becomes impulsive and creates life problems (CMHA, 2005). The Epidemiological Catchment Area Project, which surveyed over 20,000 U.S. citizens from five sites found the prevalence of substance use disorders (SUDs) to be around six percent, with half of these individuals experiencing concurrent mental illnesses (Regier et al., 1990). Individuals with concurrent psychiatric and substance use disorders are referred to as having dual diagnoses (Solomon et al., 1993). Patients with dual diagnoses often initially experience the SUDs and mental illness independently; however, over time the disorders tend to interact and exacerbate the associated problems (Solomon et al., 1993). The health-related and social costs of substance use have spurred on a great deal of research attention on the subject; however, research on SUDs in psychiatric populations has been limited. The goal of the present study was to examine some factors that underlie the problem of dual diagnosis in a clinical population.

Research on substance use indicates several factors that may predispose individuals to the onset and maintenance of SUDs. These include inherent features such as biologically-informed personality traits, neurobiology, and cognitive-affective regulation; and external factors such as environment, culture, and other situational contexts (Lubman et al., 2004). Among these factors, many researchers have been interested in the role of personality in particular, and have accorded personality traits a central role for the understanding of SUDs (McGue et al., 1999). Conway (2002) suggests that personality may be predictive of SUDs because personality traits precede the onset of substance misuse (Conway et al., 2002). As such, an examination of the associations between personality dimensions and SUDs may

provide useful insight to the underlying nature of the disorder (Krueger et al., 1996; McGue et al., 1999; Ball, 2005).

Personality can be defined by a set of traits that organize the individual's mental system, and develop to become stable over time and consistent across situations (Piedmont, 1998). Theory proposes that the link between personality characteristics and substance-related behavior may be mediated by different reinforcement processes (Wise, 1988; Comeau et al., 2001; Woicik et al., 2009). The consumption of psychotropic substances is associated with various negative and positive reinforcement effects (Wise, 1988). Negative reinforcement refers to symptomatic relief that the individual experiences through the use of the substance. It is suggested that some individuals may have personality traits that motivate them to use drugs as a way of coping with their problems and self-regulation (Comeau et al., 2001; Woicik et al, 2009). For instance, neurotic personality traits such as a proneness to anxiety and depression have been found to be correlated with SUDs via a negative reinforcement pathway (Comeau et al., 2001; Woicik et al, 2009). At the same time, certain psychotropic substances have positively reinforcing effects that are associated with an enhancement of affect (Comeau et al., 2001; Woicik et al, 2009). Researchers have found personality traits such as sensation-seeking, the desire for new experiences, and impulsivity to be associated with the positive reinforcement pathway to SUDs (Comeau et al., 2001; Woicik et al, 2009). As such, personality traits may be an effective indicator of individuals who are more susceptible to SUDs via specific reinforcement pathways.

Several theories have also been developed to explain the relationship between SUDs and psychiatric disorders among dual diagnosis populations. The signal hypothesis holds that the excessive misuse of substances is a sign of distress, and the comorbidity with other psychological problems acts as testimony to the validity of this hypothesis (Segrin, 2001). Another more prominent theory is the self-medication hypothesis; this suggests that

individuals use substances as a compensatory way of modulating affect and self-soothing the distress caused from the psychiatric disorder (Khantzian, 2008; Gandhi et al., 2003). The self-medication hypothesis falls in line the previously discussed negative reinforcement pathways that mediate between personality and substance misuse (Comeau et al., 2001). Although some personality traits may predict an increased risk of SUDs among psychiatric populations, there has been a lack of research examining this among those with dual diagnoses. Since most studies have focused on personality traits and SUDs among non-psychiatric populations, it would be worthwhile to explore the extent to which this information maps onto a dual diagnoses sample.

Recent studies on personality and SUDs have used comprehensive assessment approaches in the evaluation of traits related to substance use. The NEO Five Factor Inventory (NEO-FFI) has numerous strengths with regards to reliability and validity in cross-cultural, clinical and community samples (Ball, 2005; Piedmont & Ciarrocchi, 1999; Carter et al., 2001). The NEO-FFI evaluates five super-ordinate personality domains of Neuroticism (N), the tendency to experience negative emotions, Extraversion (E), the inclination to social stimulation, Openness to Experience (O), the willingness to try new things, Agreeableness (A), the dimension of interpersonal relations, and Conscientiousness (C), the tendency to be organized and reliable (Piedmont, 1998; Terracciano et al., 2008). These five traits offer a useful summary of personality dispositions for clinicians and researchers of SUDs, and the information gathered using the NEO-FFI may also be useful for the planning of intervention, treatment, or prevention of the disorder (Miller, 1991; Piedmont, 1998, Trull & Sher, 2004).

The NEO-FFI yields information about personality that may be useful for the matching of treatments to persons with SUDs. A qualitative study by Miller (1991) provided insight into how individuals who score high or low on each personality domain might respond to therapy (Miller, 1991). According to Miller, individuals with high N typically experience difficulties

in mood and anxiety regulation, and may engage in self-defeating behaviors like substance use. Consequently, intervention programs for high N clients should be directed towards addressing the client's emotional distress (Miller, 1991). The personality trait of E was found to be positively correlated with treatment outcomes (Miller, 1991). Correspondingly, Ball (2005) found that patients with low E were prone to social and psychological withdrawal that may ultimately hinder treatment progress (Ball, 2005). Individuals with high degrees of O are more likely to respond positively to novel treatment methods, whereas those with low levels of O typically prefer more conventional therapy styles (Miller, 1991). With regards to the domain of A, Miller highlighted that low A clients were more predisposed to interpersonal antagonism and skepticism of treatment, and high A clients had difficulties in the area of decision-making. Finally, Miller noted that individuals with high C were more likely to make an effort towards their treatment, but individuals with low C were not. As personality domains are exhibited simultaneously, Miller suggested that the combination of high N, low E, and low C was a particularly problematic one with regards to treatment progress, and that clinicians should be aware of this (Miller, 1991).

Studies using the NEO-FFI in non-psychiatric community samples have identified an association between personality traits and SUDs. In general, research findings indicate higher scores for N, and lower scores for A and C among substance users (Piedmont & Ciarrocchi, 1999; McCormick et al., 1998; Brooner et al., 1994; Kornør & Nordvik, 2007; Terracciano et al., 2008). According to McCormick (1998), this pattern of scores on the personality traits may differ within subgroups of substance users, depending on gender and the category of substance used. McCormick focused his study on SUDs among men, he found that cocaine users had higher E and O than alcohol users, whereas poly-substance users scored the lowest in A and C (McCormick et al., 1998). It was also found that the poly-substance users and alcohol users had the highest scores of N compared to other substance users in the sample

(McCormick et al., 1998). In another community study of 1,102 participants, cocaine and opioid users were found to have high scores on N, and low scores on C; by contrast, marijuana users in the sample scored high on the domain of O, but low on A and C (Terracciano et al., 2008). The problematic combination of high N and low C that Miller alluded to can be seen among individuals with SUDs (Miller, 1991). These personality traits may be further influenced by other variables such as psychiatric disorders (Ball, 1995).

In sum, we have proposed that personality traits may have an important role for the understanding of SUDs. Theory suggests that personality traits may lead to SUDs through mediating reinforcement pathways; Individuals with SUDs and negative affect tend to use drugs for their negative reinforcing effects, and individuals high in impulsivity and sensation-seeking may use drugs for the positive reinforcing outcomes (Comeau et al., 2001; Woicik et al, 2009). As such, the personality dimensions of individuals with SUDs may indicate the pathways taken toward the development of the problem. Furthermore, research on the link between personality traits and SUDs in non-psychiatric populations may inform the matching of patients and treatments. Miller provided useful insight into the development of treatment according to the big five personality domains; in particular, Miller suggested that clients with high N and low E and C may be particularly unreceptive to treatment efforts, and prompted clinicians to be aware of these characteristics during treatment (Miller, 1991). Other research on personality and SUDs among non-psychiatric samples have found a similar problematic pattern in the personality traits of N and C (Piedmont & Ciarrocchi, 1999; McCormick et al., 1998; Brooner et al., 1994; Kornør & Nordvik, 2007; Terracciano et al., 2008). However, research on personality and SUDs have yet to be extended onto a dual diagnosis population. We are interested in examining the association of personality and SUDs among a clinical population, because these individuals are likely to have skewed personality trait scores, and

may be more vulnerable to the negative reinforcement pathway to the use of psychotropic substances.

Other factors that may further elucidate our understanding of personality and SUDs among dual diagnoses patients are moderators such as gender, the individual's choice of drug, and the specific psychiatric disorder experienced.

Gender has pervasive and fundamental consequences for many aspects of life (Straussner & Zelvin, 1997). The NEO-FFI is sensitive to gender differences; although gender divergence is small relative to individual variations, they are found to be robust across cultures and age (Costa Jr. et al., 2001). Among normative samples, gender differences can be found in the personality domains of neuroticism, extraversion, and conscientiousness (Costa Jr. et al., 2001). In particular, women tend to score higher on C, and N, especially in the facets of anxiety, depression, gregariousness, trust, tender-mindedness; men yield higher scores on E in the facets of self-esteem, and assertiveness (Feingold, 1994; Nolen-Hoeksema, 1987). These gender related personality differences are likely to influence life choices, including, for some, the development of SUDs.

Gender and substance use may have important associations that should be considered when studying the personality traits of individuals with SUD. Research indicates that men and women are likely to differ in their choice of drugs, the physiological effects of substance use, and in their help-seeking behaviors (Straussner & Zelvin, 1997). A self-report study conducted among 213 patients with dual diagnosis found that men were more likely to abuse alcohol, and have an earlier age of onset. On the other hand, the women in the study used different substances than men (i.e. cocaine and opioids), and were more likely to be poly-substance abusers (Mangrum et al., 2006). These women were also reported to have more severe SUDs that were associated with higher levels of psychosocial distress (Mangrum et al., 2006). As psychosocial distress is related to the personality trait of N, and as women are

typically found to have higher levels of N, it is suggested that the gender differences may affect personality traits in a way that influences divergent patterns of substance use among men and women.

Sensitivity to gender differences may be useful to clinicians assessing SUD by directing attention to the possible presence of certain psychiatric disorders (Latimer et al., 2002). A study of adolescent substance users found that nearly three times as many men as women had a co-occurring conduct disorder; concurrently, nearly four times as many women as men had a co-occurring depressive disorder (Latimer et al., 2002). According to Straussner and Zelvin, some women are more likely to suffer from major depression, anxiety disorders, eating disorders and borderline personality disorder; whereas some men may be more prone to anti-social and narcissistic personality disorder, attention-deficit and hyperactive disorder, compulsive disorders such as pathological gambling (Straussner & Zelvin, 1997). Despite these gender differences, few studies have examined the impact of gender on the relationship between personality and SUDs among the dually diagnosed (Latimer et al., 2002).

In considering the role of personality traits and SUDs among patients with dual diagnoses, researchers and clinicians might be informed by the individual's choice of drug of abuse. Given that psychiatric patients may use psychotropic substances as a form of self-medication, and the fact that various substances of abuse elicit different effects on the user, it is likely that the individual's drug of choice may vary according to the particular mental illness experienced. Indeed, research has indicated that the drug choices of individuals with psychiatric disorder may be determined by factors relating to the illness when the availability and costs of drugs were controlled (Gandhi et al., 2003). Within their sample, Lehman et al. (1994) found that relative to those without mental illness, substance users with psychiatric disorders were more prone to using entry-level substances like alcohol and marijuana than hardcore street substances like opiates and cocaine (Lehman et al., 1994). This was explained

as being due to attempts to avoid the more severe effects of hardcore substances, such as the discomfort of withdrawal and the necessity of maintaining a constant supply of the substance (Lehman et al., 1994). The findings suggest that the choice of substance of abuse may have important implications in the study of personality traits among psychiatric samples as it does among individuals without psychiatric disorders.

In summary, we are interested in the importance of the big five personality dimensions in the study of SUDs among the dually diagnosed. Studies on personality traits among non-psychiatric populations with SUDs have been consistent in indicating that non-psychiatric substance abusers differ from individuals who do not have SUDs in terms of the personality traits of N and C. The high levels of N and low levels of C associated with non-psychiatric substance abusers is a problematic combination that may have negative implications for the treatment of the disorder. We are interested in exploring the extent to which these findings can be extended to patients with dual diagnoses, because an awareness of these personality dispositions may be useful for the matching and development of appropriate treatment programs.

Another factor that should be considered in the study of personality traits and SUDs is that of gender. The big five personality inventory is sensitive to gender differences, and these are particularly apparent in the domains of N and C where women tend to have higher scores. As these are the same personality traits of interest in the study of SUDs, gender differences may be an important variable that should not be overlooked. Furthermore, gender has been found to be associated with an individual's choice of drug, and with certain psychiatric disorders. Despite this, few studies have looked at the role of gender in the study of personality and SUDs. We are interested in investigating gender differences in the relation of personality traits and SUDs among clinical populations.

We aim to examine the relationship between the big five personality traits and SUDs in a clinical sample. We hope to add to prior research by discovering similarities between the personality traits of non-psychiatric substance abusers and the personality traits of individuals with dual diagnoses. Based on previous research, we hypothesize that the clinical sample will exhibit elevated scores in the personality dimensions of N and C. Following this, we will examine the stability of relations between personality traits and SUDs across the men and women in our sample. Because gender differences in personality traits may influence the individual's choice of drug, as well as have an association with certain psychiatric disorders, our study will explore the role of gender and personality with regards to these areas as well. The results of this may indicate gender specific personality traits that underlie an individual's drug of choice. If this is the case, our results may inform researchers and clinicians of the underlying nature of SUDs; it may also be relevant for the appropriate matching of intervention programs for the dually diagnosed.

Methods

MacArthur Violence Risk Assessment Study:

The present study used the publicly available dataset from the MacArthur Violence Risk Assessment Study (MVRAS). For the MVRAS, data collection began in mid-1992 and was completed in late-1995. The dataset consists of the information from 1136 patients, sampled from three acute civil inpatient facilities in Pittsburgh, PA, Kansas City, MO, and Worcester, MA. The selection criteria for the MacArthur study included: (1) civil admissions to psychiatric institution, (2) aged between 18 and 40, (3) English-speaking, (4) Caucasian-American, African-American, or Hispanic ethnicity, and (5) a chart diagnosis. Patients were sampled so that there were consistent distributions of gender, age, and ethnicity across the inpatient facilities.

Data was collected in two parts, before and after patient discharge from the psychiatric institutions. In hospital data collection was conducted by a researcher who gathered demographic and historical factor information, and a clinician who conducted structured interviews to make diagnoses according to the DSM-III-R Checklist. Follow-up data collection was conducted by the researcher over the one year period following discharge from hospital.

Measures:

Substance Use Disorders (SUD). The criteria for SUD were based on the patent diagnosis of lifetime drug dependence according to the structured clinical interview and the DSM-III-R checklist. Information about the drug dependence was re-coded into a binary variable reflecting the absence or presence of SUDs during the patient's lifetime. This served as the criterion variable for the logistic regression.

In order to explore the predictive value of personality and gender in explaining the choice of drug of abuse, we re-coded data regarding drug choice (marijuana, cocaine, stimulants, hallucinogenic substances, opiates, and heroin) into a binary variable reflecting the absence or presence of use of the specified drug (never used / used more than five times). Each of these variables were used as the criterion variable for logistic regression, with gender and personality as the predictor variables.

The coding list of specific street drugs used by the sample can be found in the appendix (Appendix A).

Personality Assessment (NEO-FFI). Personality was assessed using the NEO-Five Factor Inventory (NEO-FFI). The NEO-FFI is a 60-item self-report questionnaire; this short form version was constructed based on a factor analysis the NEO-Personality Inventory-Revised (Aluja et al., 2004). The measure has been tested internationally, and has shown high domain level reliability, as well as short-term test-retest reliability (Aluja et al., 2005; Costa & McCrae, 1978). The NEO-FFI assessments were conducted after patients were discharged from hospital so as to control for the effects of psychiatric disorders and current drug use on personality scores. Scores on the personality dimensions of N, E, O, A, C were used as individual predictors of SUD.

Study Sample:

We examined the clinical dataset from the MVRAS (N=1136). The dataset was adjusted and 366 cases were removed because of missing scores on the NEO-FFI. Of the 770 cases that remained, a further five cases were removed for missing information on lifetime drug dependence (SUD) and specific drug use details. One more participant was removed from the dataset because of a lack of verification about the patient's diagnosis.

The adjusted dataset for our study consisted of 764 participants. There were 426 men (55.5%) and 338 women (44.5%), and the average age of participants was 29.9 years (SD =

6.25). The ethnic distribution of our sample consisted of 70.8% Caucasian-American, 27.2% African-American, and 2% Hispanic; all participants were English-speaking. All participants in the sample had a diagnosable disorder that was rated from moderate to very severe. Approximately half of the sample was diagnosed with a lifetime alcohol use disorder (49.5%); similarly, 49.3% of the sample was diagnosed with a lifetime SUD. Alcohol was the most used drug of choice in our sample (92.4%), followed by marijuana (69.4%), cocaine (44.7%), stimulants (33.5%), hallucinogenic substances (25/6%), opiates (17.9%), and heroin (10.2%). Based on the principal diagnosis of the patients, the majority of the sample was diagnosed with depression (41.7%), schizophrenia was the second most common diagnosis (11.9%), followed by bipolar disorder (11.5%). The rest of the sample was distributed in terms of their clinical diagnosis.

Analysis:

All analyses were conducted using SPSS v17.0. Logistic regression procedures were used to assess the relation between outcome and predictor variables. One advantage of logistic regression is its ability to predict a dichotomous variable such as SUD, or specific drug use, from either continuous (personality trait scores) or categorical (gender) variables. Logistic regression procedures provide coefficients for predictors, standard errors, odds ratios and the Nagelkerke R-square index. The coefficients for predictors (*b*), are parameter estimates for a predictor variable that indicate that direction and magnitude of the relationship between the predictor variable and the outcome according to the logistic regression equation. The standard error (SE) estimates the variability from sample to sample in a model coefficient; it can be used to compute *z* scores and confidence intervals. The odds ratio (OR) estimates the increase in odds of membership in the target group for every one-unit increase in the predictor while controlling for other predictors in the model. Finally, the nagelkerke R-square index (R^2) summarizes the strength of the relationship between the predictor variable and the outcome

by indicating the amount of variance explained by the predictor. As numerous analyses were being run within the same dataset, we selected a conservative critical alpha level of 0.01 in order to reduce the likelihood of Type I errors.

Results

The initial logistic regression analysis determined if the big five personality traits predicted SUDs (Table 1). We found the personality domain of Agreeableness to be negatively related to SUDs, such that scores on Agreeableness explained 5.2% of the variance of SUDs. In order to determine the stability of the association between personality and SUD across gender, the Personality x Gender interaction variable was used in a logistic regression analysis (Table 2). We found that the interaction between gender and Agreeableness, and gender and Conscientiousness, to be negatively related to SUDs. Follow-up analyses were conducted in order to compare men and women in terms of how Agreeableness and Conscientiousness predicts SUDs (Table 3). We found that scores on Agreeableness were negatively related to SUDs for both men and women. Our results showed Agreeableness to be a stronger predictor for women than men; Agreeableness explained 7% of the variance of SUDs for women, but only 3.5% of the variance of SUDs for men. Conscientiousness was found to be negatively related to SUDs for women but not for men, such that this personality trait explained 2.7% of the variance of SUDs for women.

To determine the value of the big five personality traits in explaining the patient's choice of drug, logistic regression analyses were conducted among those with SUDs, using the specific drug group as the outcome variable (Table 4). The results indicated that substance users are not a homogeneous group, as the personality traits that predicted substance use differed according to the type of drug. We found scores of Conscientiousness to be negatively related to the use of stimulants, such that it explained 3.5% of the variance in stimulant use. Openness to experience was found to be positively related to the use of hallucinogenic substances, explaining 3.3% of the outcome variance.

We repeated the analyses using the Personality x Gender interaction variable as predictors for the choice of drug among those with SUDs (Table 5). The results indicated gender discrepancies in the domain of Conscientiousness for the prediction of alcohol use. Gender differences were also found in the personality traits of Extroversion, Agreeableness, and Conscientiousness, and their relation to the use of hallucinogenic substances. Follow-up analyses were conducted in order to determine how these traits differed across gender in their prediction of the specific drug of choice (Table 6). We found that low scores on Conscientiousness was a better predictor of alcohol use in men than women, explaining 8.1% of the variance in the outcome for men, and only 2% of the variance for women. This was true for users of hallucinogenic substances as well, where low scores on Conscientiousness explained 3.3% of the variance for men, but only 0.5% of the variance for women. Low scores on Agreeableness was found to be a stronger predictor of hallucinogenic substance use in women than men, explaining 1.7% of the variance in hallucinogenic substance use for women, but only 0.4% of the variance for men.

Discussion

Our findings suggest that individuals with dual diagnosis resemble non-psychiatric individuals with SUDs in regards to the personality traits that influence substance use. We found an inverse relationship between the traits of Agreeableness and Conscientiousness with SUDs among our clinical sample that matched previous research on personality and SUDs in non-psychiatric samples. Miller suggested that patients who score low on the domain of Agreeableness tend to be more prone to interpersonal antagonism, and those who score low on the trait of Conscientiousness often lack self-motivation (Miller, 1991). In terms of treatment matching, efforts could be focused towards the development of the patient's social and coping skills so as to prevent relapse into drug use.

This study differed from previous research on personality and SUDs, in that the trait of Neuroticism was not found to be related to SUDs among our sample. As such, our findings fail to support the self-medication hypothesis that suggests a positive relationship between Neuroticism and SUDs. Given that our subjects were all psychiatric patients, the variance in scores of Neuroticism were similar between those with SUDs and those without. Thus, the lack of support for the self-medication hypothesis could be sample specific, limiting the generalizability of our study. Despite this, patients with dual diagnosis may still have higher scores in Neuroticism that should be addressed during treatment. Thus, our findings lend support for the transference of research on non-psychiatric samples of individuals with SUDs onto dual diagnosis samples.

Despite the potential for personality based patient-treatment matching, there is research evidence that challenges the effectiveness of this approach among alcohol users. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) conducted a large-scale

longitudinal study called Project MATCH to determine whether patient-treatment matching would lead to better outcomes. The NIAAA proposed that patient-treatment matching may lead to better treatment outcomes, an increase in cost-effectiveness, and an improvement in resource utilization (NIAAA, 1996). Project MATCH participants were randomly assigned to three behavioural treatments: a 12-step facilitation therapy, cognitive-behavioural therapy, and motivational enhancement therapy (NIAAA, 1996). Overall, participants showed an improvement in abstinence from alcohol use, reduced depression and other drug-related problems; however, the hypothesis of patient-treatment matching was not confirmed. Instead, the results provided confidence for each type of treatment so long as they were well-delivered (NIAAA, 1996). Despite these findings, Gerard Connors, Ph.D., chairperson of the Project MATCH stated that these findings were sample specific, and do not rule out the possibility of effective patient-treatment matching among other samples (NIAAA, 1996). Future researchers might consider matching treatments to patients based on their personality dispositions rather than randomly assigning the intervention programs.

By exploring the association of personality traits and specific drug categories, we discovered some trait variations among those with SUDs. In particular, the domain of Openness to Experience was found to be positively related to the use of hallucinogenic substances. This personality trait is often related to intellectual curiosity and the desire for new experiences (Costa & McCrae, 1978). The finding that this trait is related to the use of hallucinogenic substances corroborates the theory of reinforcement pathways, which suggests individuals who seek new experiences may be influenced to use drugs for their positive reinforcement effects. These results were unique to the use of hallucinogenic substances, as Openness to Experience did not explain the use of any other specific category of drug. This finding was in addition to the previously discussed inverse relationship of Agreeableness and Conscientiousness, which also explained the use of hallucinogenic substances. This

heterogeneity among individuals with SUDs suggests that hallucinogenic users may belong to a different population of drug users. However, more research in the area would be necessary in order to gain a better understanding of what makes these individuals different from others with SUDs.

Finally, gender was found to influence the relationship between personality and SUDs. Among the entire sample, Agreeableness and Conscientiousness were found to distinguish individuals with SUDs more among women than men. Gender differences in the relationship between personality traits and SUDs became evident when considering analyses by specific drug categories. It was found that Conscientiousness was a stronger predictor of alcohol, stimulant, and hallucinogenic drug choices for men than for women. Agreeableness, on the other hand, was found to be a stronger predictor of hallucinogenic substance use for women than for men. Once again, the gender interaction with personality traits and its relation to drug use seems to be most apparent in the drug category of hallucinogenic substances. This further supports the need for more research in the area of hallucinogenic substance use. These findings suggest that men with dual diagnosis may require treatments that are related to motivation and coping skills, whereas women with dual diagnosis may need treatments that focus on building interpersonal relations. However, since the relationship of Agreeableness and Conscientiousness with SUDs were found to be inversed for men and women alike, and because gender differences were slight, it may be more effective for treatment programs to address both coping and social skills, as well as emotional distress, among patients with dual diagnosis.

In conclusion, the results of our study lend support to the extrapolation of research findings on personality and SUDs from non-psychiatric populations onto those with dual diagnosis. Some gender differences were found in the relationship between personality and SUDs. Low scores on Conscientiousness explained the use of alcohol, stimulants, and hallucinogenic substance use in men

more so than women, whereas it was low scores on the trait of Agreeableness that explained hallucinogenic use in women more than men. We found that individuals who use hallucinogenic substances to be a unique from users of other drug categories, and urge future researchers to look into this area. The gender differences with regards to personality and SUDs were relatively small, and as such it is not recommended to distinguish treatment programs based on gender. Treatments and interventions for SUDs should focus on improving the patient's personality trait scores in Agreeableness and Conscientiousness by developing social and coping skills. Treatment should also consider the trait of Neuroticism, with attempts to reduce the patient's emotional distress so as to protect against future self-defeating behaviours such as relapse into substance use.

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Tables

Table 1: Logistic Regression Results of Personality Predicting Any SUDs (N=764)

Predictors	B	SE	Wald	R^2	Exp(B)
N	<.01	.01	.01	<.01	.99
E	<.01	.01	.04	<.01	.99
O	<.01	.01	<.01	<.01	.99
A	-.07	.01	28.18**	.05	.93
C	-.02	.01	4.99*	.01	.98

*$p < .05$. **$p < .01$.

Table 2: Results of Personality and Gender Interactions Predicting Any SUDs (N=764)

Predictors	B	SE	Wald	R²	Exp(B)
N x gen	<-.01	<.01	1.19	<.01	.99
E x gen	-.01	<.01	2.02	<.01	.99
O x gen	-.01	.01	1.96	<.01	.99
A x gen	-.02	<.01	16.99**	.03	.98
C x gen	-.01	<.01	8.46**	.02	.99

p < .05. ***p*<.01.

Table 3:Gender Comparisons of Agreeableness and Conscientiousness in Predicting Any

SUDs (N=764)

Predictors	Gender	B	SE	Wald	R²	Exp(B)
A	Men	-.06	.02	10.83**	.04	.95
	Women	-.09	.02	16.9**	.07	.92
C	Men	-.01	.02	.39	<.01	.99
	Women	-.04	.02	6.78**	.03	.96

*$p < .05$. **$p<.01$.

Table 4: Personality Predicting Drug Choice within group with SUDs (N=377)

Drug	Predictors	B	SE	Wald	R²	Exp(B)
Alcohol	N	.07	.04	2.9	.03	1.07
	E	-.02	.05	.27	<.01	.98
	O	.07	.05	1.54	.02	1.07
	A	.01	.05	.02	<.01	1.01
	C	-.07	.05	2.17	.03	.93
Marijuana	N	.02	.02	.58	<.01	1.02
	E	-.05	.03	3.19	.02	.95
	O	.02	.03	.35	<.01	1.02
	A	.02	.03	.62	<.01	1.02
	C	-.03	.03	.83	.01	.98
Cocaine	N	<.01	.02	.01	<.01	.99
	E	.02	.02	.93	<.01	1.02
	O	-.03	.02	2.65	.01	.97
	A	<.01	.02	.05	<.01	.99
	C	-.01	.02	.28	<.01	.99
Stimulants	N	.03	.01	3.77*	.01	1.03
	E	-.03	.02	2.96	.01	.97
	O	-.01	.02	.57	<.01	.99
	A	-.02	.02	1.43	.01	.98
	C	-.05	.02	9.53**	.04	.95

*p < .05. **p<.01.

Table 4: Personality Predicting Drug Choice within group with SUDs (N=377)

Drug	Predictors	B	SE	Wald	R²	Exp(B)
Sedatives	N	.03	.01	3.38	.01	1.03
	E	-.01	.02	.86	<.01	.99
	O	.02	.02	.82	<.01	1.02
	A	-.01	.02	.13	<.01	.99
	C	-.03	.02	3.05	.01	.97
Hallucinogenics	N	.01	.01	.24	<.01	1.01
	E	-.02	.02	1.59	.01	.98
	O	.06	.02	8.94**	.03	1.06
	A	-.03	.02	2.58	.01	.97
	C	-.03	.02	4.3*	.02	.97
Opiates	N	.03	.01	3.21	.01	1.03
	E	-.01	.02	.32	<.01	.99
	O	<.01	.02	<.01	<.01	.99
	A	-.03	.02	2.73	.01	.97
	C	-.04	.02	5.42*	.02	.96
Heroin	N	.02	.02	.99	<.01	1.02
	E	-.03	.02	2.39	.01	.97
	O	-.06	.02	5.41*	.02	.95
	A	-.04	.02	3.13	.01	.96
	C	-.03	.02	2.66	.01	.97

*p < .05. **p<.01.

Table 5: Personality and Gender Interactions Predicting Drug Choice (N=377)

Drug	Predictors	B	SE	Wald	R²	Exp(B)
Alcohol	N x gen	-.01	.02	.09	<.01	.99
	E x gen	-.04	.02	4.25*	.05	.97
	O x gen	-.02	.02	.69	.01	.99
	A x gen	-.03	.02	2.98	.03	.97
	C x gen	-.04	.02	6.52**	.08	.96
Marijuana	N x gen	-.01	.01	.54	<.01	.99
	E x gen	-.02	.01	4.72*	.03	.98
	O x gen	-.01	.01	.69	<.01	.99
	A x gen	-.01	.01	.62	<.01	.99
	C x gen	-.02	.01	3.25	.02	.98
Cocaine	N x gen	<.01	.01	.01	<.01	.99
	E x gen	<.01	.01	.17	<.01	.99
	O x gen	-.01	.01	.86	<.01	.99
	A x gen	<.01	.01	.23	<.01	.99
	C x gen	<.01	.01	.15	<.01	.99
Stimulants	N x gen	<.01	.01	.6	<.01	.99
	E x gen	-.01	.01	1.76	.01	.99
	O x gen	-.01	.01	.8	<.01	.99
	A x gen	-.01	.01	1.17	<.01	.99
	C x gen	-.01	.01	4.18*	.02	.99

*$p < .05$. **$p < .01$.

Table 5: Personality and Gender Interactions Predicting Drug Choice (N=377)

Drug	Predictors	B	SE	Wald	R²	Exp(B)
Sedatives	N x gen	<.01	.01	.46	<.01	.99
	E x gen	<.01	.01	.42	<.01	.99
	O x gen	<.01	.01	.02	<.01	.99
	A x gen	<.01	.01	.32	<.01	.99
	C x gen	-.01	.01	1.07	<.01	.99
Hallucinogenics	N x gen	-.01	.01	1.76	.01	.99
	E x gen	-.02	.01	8.14**	.03	.98
	O x gen	-.01	.01	.52	<.01	.99
	A x gen	-.02	.01	9.84**	.04	.98
	C x gen	-.02	.01	10.76**	.04	.98
Opiates	N x gen	<.01	.01	.43	<.01	.99
	E x gen	-.01	.01	.61	<.01	.99
	O x gen	<.01	.01	.31	<.01	.99
	A x gen	-.01	.01	2	.01	.99
	C x gen	-.01	.01	2.75	.01	.99
Heroin	N x gen	<.01	.01	.09	<.01	.99
	E x gen	-.01	.01	.45	<.01	.99
	O x gen	-.01	.01	1.35	.01	.99
	A x gen	-.01	.01	.75	<.01	.99
	C x gen	-.01	.01	.43	<.01	.99

*$p < .05$. **$p < .01$.

Table 6: Personality and Gender Interactions Predicting Drug Choice (N=377)

Drug	Predictors	Gender	B	SE	Wald	R²	Exp(B)
Alcohol	E	Men	-.02	.09	.05	<.01	.98
		Women	-.03	.06	.33	.01	.97
	C	Men	-.15	.10	2.19	.08	.86
		Women	-.06	.06	.98	.02	.94
MJ	E	Men	-.1	.04	5.08*	.06	.91
		Women	-.02	.04	.17	<.01	.99
Stimulants	C	Men	-.09	.02	13.81**	.09	.92
		Women	-.01	.02	.2	<.01	.99
Hallucinogenics	E	Men	-.03	.02	1.67	.01	.97
		Women	-.01	.03	.31	<.01	.99
	A	Men	-.02	.02	.58	<.01	.98
		Women	-.04	.03	1.88	.02	.96
	C	Men	-.05	.02	5.27*	.03	.95
		Women	-.02	.03	.6	.01	.98

*p < .05. **p<.01.