



Personality profiles of substance and behavioral addictions

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HIGHLIGHTS

- Different addictions have distinct personality profiles, but share high neuroticism and impulsivity.
- Gambling disorder has similar personality to healthy controls.
- Alcohol use disorders identified by lower extraversion and openness to experience.
- Drug use disorders and compulsive sexual behavior have similar personalities.
- Personality profiles may also relate to socioeconomic status, including religiosity.

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ABSTRACT

Substance-related and behavioral addictions are extremely prevalent and represent a major public health concern. In the ongoing attempt to understand the addictive personality, contradictory results have arisen from studies that have explored personality traits in different addiction populations. The diversity across addiction types suggests that some of these inconsistencies stem from distinct personalities underlying each addiction. The present study compares the personality profiles of several addictions, representing both substance (drugs and alcohol) and behavioral (gambling and sex) subtypes. 216 addicted individuals and 78 controls completed personality and sociodemographic questionnaires. Notable personality distinctions were found among different types of addiction. Whereas impulsivity and neuroticism were higher across all addiction populations, as compared to controls, people with alcohol use disorders also scored significantly lower on the traits of extraversion, agreeableness, and openness to experience. People with drug use disorders and those with compulsive sexual behavior were surprisingly similar, scoring lowest on the traits of agreeableness and conscientiousness. Finally, people with gambling disorder demonstrated a personality profile similar to that of the control group. Of note, personality profiles were also related to several demographic characteristics, including socioeconomic status and religiosity. Our findings support a potential role for personality in distinguishing among different types of addiction. This study suggests that different addictions may, to some extent, stem from distinct processes that are involved in personality development. These findings may provide a useful framework for understanding why different people develop different addictions.

1. Introduction

Recognition by the research community over the last decade that addictions include behaviors, which do not involve the consumption of exogenous psychoactive substances, has led to the emergence of behavioral addiction research. Non-substance related behavioral addictions have come to include internet addiction, pathological gambling,

compulsive sexual behavior, compulsive buying, exercise dependence, food addiction, and work addiction (Griffiths, 1996; Karim & Chaudhri, 2012). Historically, substances of addiction were termed “addictive,” implying they were actually the causes of the addiction. According to this view, each addiction may have to be treated differently, as each substance has its own unique properties. However, it has since become more widely accepted that each addiction might be a distinct expression

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of the same addictive syndrome (Albanese & Shaffer, 2012; Shaffer et al., 2004).

A potential origin of many problematic behaviors related to addiction is personality. Given the stability of personality traits and their impact on decision making and motivation (Kornør & Nordvik, 2007), studies sought to discover an “addictive personality” that confers a predilection to addiction in some individuals. These studies consistently reported that addictions seem to be related to high impulsivity (e.g. (Hwang et al., 2014; Nower, Derevensky, & Gupta, 2004)). According to Kjome et al. (Kjome et al., 2010), impulsivity involves a lack of planning that is associated with short-term gains at the expense of long-term losses. This tendency is very common among addicted individuals, both in substance-related and behavioral addictions, as they often act in ways which grant them immediate reinforcement, but are harmful (to themselves or others) in the longer-term (Grant, Potenza, Weinstein, & Gorelick, 2010; Widiger & Smith, 2012). In line with this view, high impulsivity was consistently related to addictions in studies of substance-abusing individuals both in self-report questionnaires and on behavioral tasks (e.g., (Hwang et al., 2014; Kjome et al., 2010)). Studies evaluating behavioral addictions report similar findings, albeit with less consistency. For example, although several studies on gambling disorder (GD), compulsive sexual behavior (CSB), and internet addiction (IA) reported significantly higher impulsivity in patients than controls (e.g., (Hwang et al., 2014; Miner, Raymond, Mueller, Lloyd, & Kelvin, 2009; Nower et al., 2004)), another study on GD participants did not find group differences on this trait (Myrseth, Pallesen, Molde, Johnsen, & Lorvik, 2009). Therefore, although impulsivity does seem to be related to addictions, it is not entirely clear how and whether this trait manifests differently across different addictions.

Another model that was proposed to classify individuals with addictive tendencies was the five-factor model of personality (McCrae & John, 1992). This model comprises the behavioral, emotional, and cognitive patterns of an individual and describes five basic dimensions of personality: neuroticism, conscientiousness, extraversion, agreeableness, and openness to experience (McCrae & John, 1992). Researchers employing this model in studies of addiction generally report higher neuroticism in addicted individuals compared to controls in both substance (e.g. (Benotsch, Jeffers, Snipes, Martin, & Koester, 2013; Hwang et al., 2014; Kornør & Nordvik, 2007; Terracciano, Löckenhoff, Crum, Bienvu, & Costa, 2008)) and behavioral (e.g., (Bagby et al., 2007; Müller, Beutel, Egloff, & Wölfling, 2014; Reid, Carpenter, Spackman, & Willes, 2008)) addictions. Such individuals may engage in “self-medication” as an effort to alleviate unpleasant or negative emotional states, a characteristic of highly neurotic individuals (Khantzian, 1985). Conscientiousness, which is strongly linked to self-discipline commonly deficient in individuals with addiction (e.g. (Kuntsche, Knibbe, Gmel, & Engels, 2006)), is another dimension that generated relatively consistent results. Lower conscientiousness levels have been reported in substance-abusing individuals (e.g., (Hwang et al., 2014; Terracciano et al., 2008)), although more robustly in drugs than alcohol addiction (Grekin, Sher, & Wood, 2006). Lower conscientiousness levels have also been found in behavioral addictions, such as GD and IA (e.g. (Bagby et al., 2007; Hwang et al., 2012; Hwang et al., 2014; Müller et al., 2014)).

Findings regarding agreeableness, extraversion, and openness to experience are less consistent and seem to vary across addictions and substance types. A meta-analysis reported that of these dimensions only lower agreeableness was related to substance-use, both alcohol and drugs (Kotov, Gamez, Schmidt, & Watson, 2010). Other studies did not find differences on agreeableness, but did find lower extraversion in drug use disorders (DUD) (e.g. (Kornør & Nordvik, 2007)). A few studies found higher openness to experience in DUD (e.g. (Benotsch et al., 2013; Terracciano et al., 2008)), but these were conducted in non-clinical populations. One study found lower agreeableness, extraversion, and openness to experience in alcohol use disorder (AUD) (Hwang et al., 2014), whereas another, non-clinical study, found a relationship

between higher extraversion and lower openness to experience and alcohol symptoms (Grekin et al., 2006).

In behavioral addictions, there is even greater variability in study results. For instance, some GD studies reported that, besides neuroticism and conscientiousness, the only other between-group difference was lower openness to experience in gamblers (e.g. (Hwang et al., 2012; Myrseth et al., 2009)), whereas Bagby et al. (Bagby et al., 2007) did not find any additional group differences. IA studies found addicted individuals to demonstrate significantly lower scores on all three traits (e.g. (Hwang et al., 2014; Müller et al., 2014)), although a study conducted on non-clinical IA concluded that only lower agreeableness significantly predicted higher IA scores (Randler, Horzum, & Vollmer, 2014). CSB studies conducted on non-clinical populations found further associations only with lower agreeableness (e.g. (Pinto, Carvalho, & Nobre, 2013; Rettenberger, Klein, & Briken, 2016)).

An important limitation of the aforementioned literature is that most studies have focused on either substance or behavioral addictions, or otherwise compared a single substance to behavioral addiction, limiting potential generalizations across different types of addictions. The present study aimed to compare the personality profiles of several types of addictive behaviors, representing both substance and behavioral addictions. By including different addiction types, we sought to identify shared patterns across different addictions, as well as unique parameters that may represent some, but not other populations. Given the apparent contribution of demographic and environmental factors to addiction, such as gender (e.g., (Kessler et al., 2008; Odlaug et al., 2013)), age (e.g., (Bakken, Wenzel, Gøtestam, Johansson, & Oren, 2009; Dodge, Reece, Cole, & Sandfort, 2012; Edens & Rosenheck, 2012)), education, and socioeconomic status (e.g., (Chen et al., 2007; Compton, Thomas, Stinson, & Grant, 2007; Kessler et al., 2008; Swendsen et al., 2009)), as well as their potential interaction with personality traits, we also included relevant sociodemographic variables.

2. Methods

2.1. Participants

Participants included individuals addicted to drugs ($n = 58$), alcohol ($n = 50$), gambling ($n = 48$), and sex ($n = 65$) who were all recruited to the study through public and private rehabilitation centers and self-help groups. Some CSB participants who preferred to remain anonymous completed questionnaires online. In addition, 91 control participants were recruited through ads placed around the university campus and on the internet. Eighteen participants were excluded from the analyses (4 CSB participants did not meet the criteria for addiction, 13 controls met one or more of the addiction criteria, and 1 GD subject had missing personality data).

2.2. Instruments

All English questionnaires were translated to Hebrew and rechecked through back-translation to English by fully bilingual English-Hebrew speakers. The translations have been modified and adapted based on this process.

2.2.1. Addiction assessment

Each addiction was assessed using a unique self-report questionnaire. DUD was measured according to the Abuse Screening Test (DAST; (Skinner, 1982)). DAST scores can range from 0 to 28, and a cutoff score of 6 is generally used to indicate drug abuse or dependence (Yudko, Lozhkina, & Fouts, 2007). The internal consistency reliability is 0.92 (Skinner, 1982). AUD was screened according to the modified version of the Michigan Alcoholism Screening Test (MAST; (Selzer, 1971)), a questionnaire parallel to the DAST, where a score of 5 or more indicates alcoholism. The average reliability of this test is 0.75 (Gibbs,

1983). The South Oaks Gambling Screen (SOGS; (Lesieur & Blume, 1987)) was used to assess GD. The SOGS scores range from 0 to 20, with a score of 5 or more indicating risk of GD. The SOGS has shown good reliability and validity with the DSM-IV criteria for GD (Stinchfield, 2002). CSB was assessed according to the 24-item Individual-Based Compulsive Sexual Behavior (I-CSB). Items are scored on a 7-point Likert scale, and scores can range from 24 to 168. A higher score indicates higher hypersexuality. As there is no cut-off score for this questionnaire, we determined CSB as scores of 2 s.d. above the mean score (which was 73 in our sample). The I-CSB shows a good reliability of 0.94 (Efrati & Mikulincer, 2018).

2.2.2. Personality factors

To assess the personality profiles of our participants, we administered two self-report questionnaires. The first was the Barratt Impulsiveness Scale Version 11 (BIS-11, Hebrew version), a 30-item measure of impulsivity using a 4-point Likert scale to indicate severity of each item. It provides a total score, which is based on a principal component analysis of impulsivity (Patton, Stanford, & Barratt, 1995). The Hebrew version was translated by Glicksohn & Nahari (2007) who found an adequate reliability of 0.78. The other questionnaire was the Big Five Index (BFI) which consists of 44 items rated on a 5-point Likert scale (John & Srivastave, 1999).

2.2.3. Demographic factors

These were assessed using a questionnaire with closed and open-ended questions designed specifically for the purpose of this study, including age, gender, religiosity, and socioeconomic variables (i.e., area of residence (peripheral index), education level, employment status (unemployed vs. employed), and monthly income level).

For our clinical populations, we also included questions regarding their addiction and abstinence (i.e., age of addiction onset, years of addiction, and withdrawal time).

2.3. Procedure

All participants gave written informed consent after receiving a full explanation of the research according to procedures approved by the Institutional Review Board. The clinical population received the questionnaires in their rehabilitation center. Following a briefing regarding the study, participants completed all the personality, demographic, and addiction questionnaires. Addicted individuals were instructed to answer only the addiction questionnaires that were relevant to their addiction, whereas controls completed all addiction questionnaires in order to exclude those passing any of the cutoff scores. Addicted participants who considered themselves addicted to several types of addictions were also asked to identify their primary addiction. Participants were instructed to complete all questionnaires fully and honestly and were given an identification number in order to maintain their anonymity.

2.4. Statistical analysis

Pillai's MANOVA was performed using all personality dimensions as dependent variables and group membership as an independent variable. Bonferroni post-hoc tests were used to compare the groups for each dependent variable, where ANOVAs detected significant differences. Welch test was used when Levene tests for equality of variance were not significant. Addiction and abstinence questions were analyzed using univariate ANOVA and Bonferroni post-hoc tests. The categorical demographic questions (gender, religiosity, and employment status) were analyzed using χ^2 tests. Where χ^2 was significant, standardized residuals were used to determine which observed cells mainly contributed to this significance (a value of > 2 or < -2 was considered large). Demographic questions on ordinal scales (age, peripheral index, income, and education) were analyzed using the Kruskal-Wallis test by

ranks, which also provide information regarding post-hoc differences. Given the small number of missing data among the demographic and addiction variables (5.4% on average), a listwise deletion method was used in the analyses (i.e., excluding the participant with the missing data).

Given the substantial comorbidities across our samples, data were analyzed twice: first, comparing samples distinguished by primary addiction, without excluding any secondary comorbid addictions, and second, after excluding participants with secondary comorbidities. After excluding comorbid participants, the samples were reduced to 26 DUD, 30 AUD, 36 GD, and 52 CSB individuals. Despite reduced power, the overall pattern of findings remained virtually the same, and so we report here only the results of the full sample, including individuals with comorbid addictions.

3. Results

There were no significant differences between participants who completed paper-and-pencil questionnaires and those who completed them online, either in the control group (*Wilks' Lambda* = 0.945, *F* (6,71) = 0.684, *p* = 0.663, *Cohen's d* = 0.48) or in the CSB group (*Wilks' Lambda* = 0.943, *F* (Coleman, 1992;Hwang et al., 2014) = 0.544, *p* = 0.772, *Cohen's d* = 0.49). Therefore, the paper-and-pencil and on-line completers were combined in all subsequent analyses. The entire sample included 216 addicted individuals and 78 controls.

3.1. Addiction characteristics

Clinical characteristics of individuals with addiction are shown in Table 1. In the DUD group, 93% reported using marijuana at least once, 79% cocaine, 60% heroin, 60% amphetamines, 70% MDMA (ecstasy), 63% forms of LSD, 72% sedatives, 18% forms of PCP, 49% forms of methadone, and 39% inhalants. Of the DUD participants, 5.3% reported use of only one type of drug, 8.8% two types, 5.3% three types, 15.8% four types, 3.5% five types, 12.3% six types, 15.8% seven types, 10.4% eight types, 14% nine types, and 8.8% reported use of all ten types of drugs. Significant differences were found on age of addiction onset, with DUD and CSB starting at an earlier age (*Welch's F* (3,80.177) = 21.425, *p* = 0.000) than the other groups. There were no significant differences between groups on withdrawal time (*F* (3,199) = 0.61, *p* = 0.608) or years of addiction (*Welch's F* (3,82.03) = 1.32, *p* = 0.273).

3.2. Demographic factors

Demographic characteristics of all study participants are shown in Table 2. As expected, age, gender, and socioeconomic status all revealed significant between-group differences. The control group was the youngest, consisted of mainly female participants, lived in more centrally located areas, and had the highest educational level. Among

Table 1
Addiction characteristics.

Characteristics	Drugs (n = 58)	Alcohol (n = 50)	Gambling (n = 47)	Sex (n = 61)
Main addiction score	22.19 (3.96)	31.76 (10.64)	15.09 (3.91)	131.72 (21.62)
Missing values	0	0	0	0
Withdrawal time (average no. of days)	268 (543)	382 (1067)	400 (778)	463 (682)
Missing values	1	2	5	5
Years of addiction	19.7 (10.6)	16 (11.4)	15.5 (13.3)	18.6 (7)
Missing values	14	8	13	5
Age of addiction onset	15 (4)	23 (10)	24 (13)	12 (5)
Missing values	11	8	14	3

Table 2
Demographic characteristics of the addiction groups and controls.

Characteristics	Drugs (n = 58)	Alcohol (n = 50)	Gambling (n = 47)	Sex (n = 61)	Control (n = 78)	Between-group differences
Age (mean rank)	149	181	165	132	125	$H(4) = 20.095$ $p = 0.000$
Gender						
Male	45	30	44	57	23	$\chi^2(4) = 91.274$ $p = 0.000$
Female	13	20	2	4	55	
Demographic variables						
Area of residence- peripheral index (mean rank)	115	102	149	152	170	$H(4) = 33.735$ $p = 0.000$
Education level (mean rank)	95	102	123	165	212	$H(4) = 96.530$ $p = 0.000$
Employment status						
Unemployed	29	20	6	3	6	$\chi^2(4) = 53.452$ $p = 0.000$
Employed	28	27	39	50	63	
Monthly income level (mean rank)	123	119	178	160	146	$H(4) = 19.110$ $p = 0.001$
Religiosity						
Non-religious	25	26	19	6	56	$\chi^2(8) = 130.418$ $p = 0.000$
Traditional	23	8	16	2	11	
Religious	7	13	8	53	11	

the addicted groups, AUD were the oldest and CSB the youngest, and all groups consisted of mainly male participants. Regarding socioeconomic status, there was a clear difference between substance-related and behavioral addictions on all variables, with substance-related individuals being of lower socioeconomic status. Individuals with behavioral addictions were more similar to controls, and even showed higher socioeconomic status than controls on some variables (i.e., GD and CSB had higher income levels, and CSB had a lower unemployment rate than controls).

Although not part of our primary objectives, given the important role of religious practices in Israel, we asked participants to report the level of their religious commitment. Interestingly, we found that 86.9% of the CSB group defined themselves as “religious”, which was significantly higher than the other groups (who were mostly secular or traditional).

3.3. Personality factors

Given the large differences in level of religiosity, MANCOVA was first conducted using religiosity as a covariate. However, religiosity was not found as a significant covariate (*Wilks' Lambda* = 0.97, $F(6,273) = 1.32$, $p = 0.247$, *Cohen's d* = 0.34). Consequently, analyses of personality traits were conducted using a one-way MANOVA. We found a statistically significant multivariate effect for differences in personality factors according to group (*Wilks' Lambda* = 0.53, $F(24,991.97) = 8.17$, $p = 0.000$, *Cohen's d* = 0.84). Prior to conducting follow-up one-way ANOVA the homogeneity of variance was tested for all six personality traits. Two traits were significant (agreeableness ($p = 0.002$), and impulsivity ($p = 0.002$)). Therefore, we report their Welch test results instead of ANOVA. As can be seen in Table 3, all the Welch/ANOVA results were statistically significant.

Finally, a series of post-hoc analyses were performed on each personality trait to examine individual mean differences across all five group levels (see Table 3). A visual representation of these differences is provided in Fig. 1. As different instruments and scales have been used to assess personalities, preventing a meaningful comparison across traits, participants' scores on each trait were transformed into standard T-scores based on the control group distribution (mean = 50, *s.d.* = 10, on all personality traits). This enabled us to visually present the personality profile of each addiction, as well as the comparison control group. As can be seen in Fig. 1 and Table 3, compared to the control group, the GD group had significantly higher neuroticism and impulsivity. Similarly, the AUD group had significantly higher neuroticism and impulsivity, as well as significantly lower extraversion, agreeableness, conscientiousness, and openness to experience, compared to controls. The DUD and CSB groups also demonstrated higher neuroticism and impulsivity, and lower agreeableness and conscientiousness,

as compared to controls. Furthermore, on certain traits, significant differences emerged among several types of addictions. AUD had significantly lower extraversion levels than DUD and GD, and significantly lower openness to experience than CSB. Additionally, GD had significantly lower neuroticism and higher conscientiousness than CSB, as well as higher agreeableness than DUD and CSB.

4. Discussion

In the present study, different addiction types were found to be associated with different personality characteristics, thereby suggesting a possible explanation for their development. Further, although addictions share certain common traits, the levels of these traits seem to vary across addiction types. In terms of sociodemographic variables, we found that the behavioral addiction groups were more similar to controls than were the substance-related groups on socioeconomic status and educational levels. Notably, we also found that religiosity levels varied across addictions, with substantially higher proportion of religious individuals in the CSB group.

4.1. Gambling disorder

The personality profile of individuals with GD was the most similar to controls (except for higher impulsivity and neuroticism), and most distinctive from other addictions, including the behavioral CSB addiction. Although similar in personality profiles, GD individuals and controls did differ on some sociodemographic factors. Notably, they reported having the highest income. Given that money is necessary for engaging in gambling, perhaps these individuals must have a high income in order to support their addiction.

Our findings regarding GD may suggest that individuals with this addiction are distinguished more by environmental factors, rather than personality profiles. GD was found in our study to have a much later age of onset, starting in the early twenties. Whereas personality characteristics are typically considered stable and define an individual from a very early stage of development (Asendorpf & van Aken, 2003; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001), environmental factors tend to change throughout life and may have a stronger effect at a later stage, especially in the early twenties when people often leave their family homes and begin living independently.

4.2. Alcohol use disorder

In contrast to the GD group, AUD differed from controls on all personality traits examined in this study, which is consistent with Hwang et al. (Hwang et al., 2014). Moreover, this was the only group that differed from controls on extraversion and openness to experience,

Table 3
Personality characteristics of the addiction groups and controls.

Dimension	Drugs (n = 58)	Alcohol (n = 50)	Gambling (n = 47)	Sex (n = 61)	Control (n = 78)	ANOVA/Welch	Cohen's d	Post-Hoc tests (significant only)
Extraversion	26.78 (5.12)	23.54 (4.7)	27.21 (4.99)	25.64 (5.98)	27.58 (5.40)	$F(4,289) = 5.22$ $p = 0.000$	0.54	Alcohol-drugs $p = 0.017$ Alcohol-gambling $p = 0.007$ Alcohol-control $p = 0.000$
Neuroticism	26.97 (5.68)	26.84 (6.57)	24.47 (5.8)	29.15 (4.63)	20.88 (4.78)	$F(4,289) = 23.09$ $p = 0.000$	1.13	Control-drugs $p = 0.000$ Control-alcohol $p = 0.000$ Control-gambling $p = 0.004$ Control-sex $p = 0.000$
Agreeableness	28.67 (7)	29.82 (6.21)	32.70 (5.2)	29.44 (5.74)	34.9 (4.45)	Welch's $F(4,133.809) = 16.04$ $p = 0.000$		Gambling-sex $p = 0.000$ Gambling-sex $p = 0.000$ Control-drugs $p = 0.000$ Control-alcohol $p = 0.000$ Control-sex $p = 0.000$
Conscientiousness	29.88 (6.725)	30.88 (6.063)	32.36 (5.712)	28.62 (6.078)	34.65 (4.731)	$F(4,289) = 10.937$ $p = 0.000$	0.78	Gambling-drugs $p = 0.004$ Gambling-sex $p = 0.035$ Control-drugs $p = 0.000$ Control-alcohol $p = 0.004$ Control-sex $p = 0.000$
Openness to experience	35.40 (5.9)	33.50 (7.05)	34.36 (5.59)	36.89 (6.54)	36.95 (5.29)	$F(4,289) = 3.67$ $p = 0.006$	0.45	Gambling-sex $p = 0.011$ Alcohol-sex $p = 0.036$
Impulsivity	77.53 (9.82)	73.64 (12.27)	73.83 (12.01)	73.87 (8.65)	62.38 (7.65)	Welch's $F(4,131.949) = 32.07$ $p = 0.000$		Alcohol-control $p = 0.018$ Control-drugs $p = 0.000$ Control-alcohol $p = 0.000$ Control-gambling $p = 0.000$ Control-sex $p = 0.000$

and was further characterized by significantly lower levels of extraversion than DUD and GD, and significantly lower levels of openness to experience than CSB.

These two traits seem to be especially prominent in distinguishing individuals with AUD from other addictions. Extraverts tend to be more oriented toward interpersonal connectedness and sociability and place greater value on relationships. Openness to experience reflects an attitude of creativity and imagination and an interest in social relationships. People with low extraversion and openness to experience are usually more conservative, reserved, shy, and quiet (Arora & Rangnekar, 2016). For instance, adults with autism spectrum disorders, typically characterized by limited social interaction skills and a more solitary lifestyle, have been found to be less extraverted and open to experience (Strunz et al., 2015). In addition, a connection between alcoholism and antisociality has been previously reported (Zucker, Ellis, Fitzgerald, Bingham, & Sanford, 1996). Moreover, alcohol has been shown to reduce fearfulness and anxiety in social situations, feelings which tend to arise more frequently among less sociable individuals, and may therefore act as a “solution” for less extraverted individuals (Smail, Stockwell, Canter, & Hodgson, 1984).

4.3. Drug use disorders and compulsive sexual behavior

Perhaps the most unexpected finding in our study was the similarity in personality traits between DUD and CSB patients. Both were characterized by higher neuroticism and impulsivity than controls and had the lowest levels of conscientiousness and agreeableness. One possible explanation for this group similarity arises from their exceptionally lower conscientiousness levels. We expected to find this with the DUD patients, given the illegality of drugs and the tendency of low conscientiousness among people who disregard social rules (McCrae & John, 1992), but we did not predict this in CSB. However, the relatively large proportion of religious people in our CSB sample may shed some light on this finding.

Our study is not the first to report a connection between higher levels of hypersexuality and religion. For example, Needell & Markowitz (Needell & Markowitz, 2004) reported more frequent hypersexual behavior among religious than non-religious Jewish psychiatric inpatients. The Jewish religion maintains strict rules regarding sexual behaviors and has a strong negative attitude toward pornographic material (Crane, 2010). Consequently, the general religious Jewish community might be less tolerant of sexual symptoms and may consider a person as hypersexual more readily than non-religious people (Needell & Markowitz, 2004). The religious individual may also feel greater shame and self-loathing while engaging in sexual activities frowned upon by his or her community, symptoms which are included in the CSB questionnaire (Barth & Kinder, 1987; Coleman, 1992). Several studies have also shown a relationship between non-Jewish religiosity and perceived hypersexuality, but these have been conducted on non-clinical populations, and have also been more specific to Internet pornography and its moral disapproval (Grubbs, Exline, Pargament, Hook, & Carlisle, 2015; Wilt, Cooper, Grubbs, Exline, & Pargament, 2016). On the other hand, a study conducted on a clinical population found no relationship between hypersexuality and religion (Reid, Carpenter, & Hook, 2016), and a review by Karaga et al. (Karaga, Davis, Choe, & Hypersexuality, 2016) found mixed results, suggesting a need to more closely examine the issue.

These findings suggest that the general social attitude toward excessive drug consumption may parallel the attitude toward more liberal sexual behavior in religious individuals, in general, and in the religious Jewish community, in particular. Consequently, Jewish individuals departing from their religious norms, and secular individuals departing from the general societal norms, may score lower than others on measures of conscientiousness.

Another explanation could be the relatively early onset of DUD and CSB found in our study. Given that traits remain fluid during

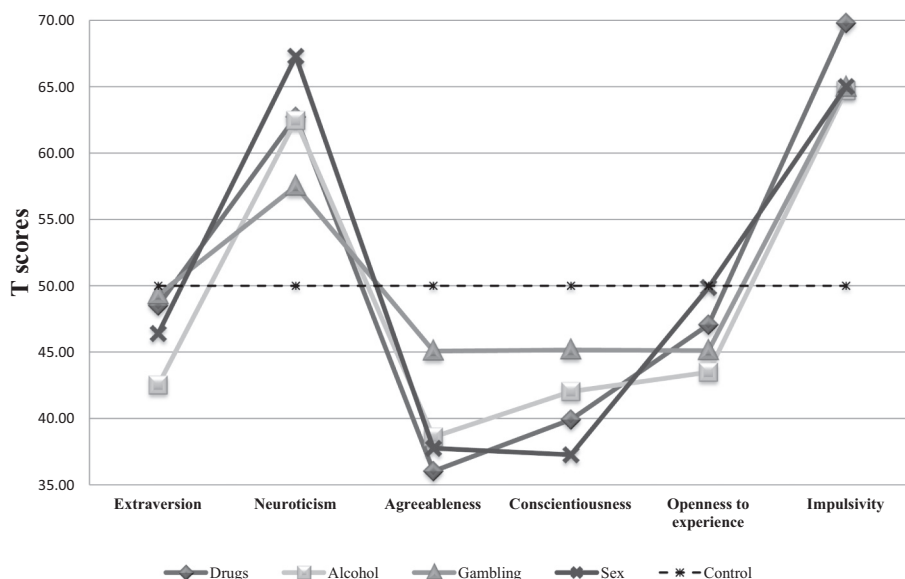


Fig. 1. Addictive personality profiles of the addiction groups and controls.

developmental periods, such as adolescence (Caspi, Roberts, & Shiner, 2005), it is possible that certain personality traits in these two groups were shaped through interplay with their addictive behaviors. Finally, despite similar personality profiles, DUD and CSB differed substantially on education and socioeconomic status. Therefore, it is possible that DUD and CSB may have similar general trait-like tendencies, with environmental factors shaping the type and course of their addiction.

4.4. Study limitations

This study has several limitations that should be noted. First, the CSB sample had a relatively large proportion of religious individuals. Despite studies on the link between religion and hypersexuality, there is currently not enough demographic data to indicate whether this distribution is representative of the Jewish religious community in Israel, or may be a characteristic of religious individuals in general. Therefore, it would be informative to address this subject in future studies of addiction across cultures and religious affiliations, as well as to compare personality profiles of religious and non-religious CSB individuals. Such efforts may inform potential interventions requiring particular cultural and/or religious sensitivity.

Another limitation of this study is the high rates of comorbidity in our groups, especially in DUD. Although reanalyzing our data after excluding individuals with secondary comorbidities yielded a similar pattern of findings, some differences did not reach statistical significance due to reduced power. Therefore, it could be informative in future studies to examine the present hypotheses in larger, “clean” samples that do not include individuals with secondary comorbidities. It is important to note, however, that comorbidity is extremely common in disorders of addiction. It is common, for example, for a person suffering from one primary addiction to develop another addiction in parallel, or to “switch” between different addictions (Black & Moyer, 1998; Essau, 2008; Teesson, Farrugia, Mills, Hall, & Alcohol, 2012). Therefore, excluding comorbidities could potentially reduce the generalizability and ecological validity of study results. In the present study, participants were explicitly asked to identify their primary addiction. Thus, given on our findings, it is possible that, despite high comorbidity rates, the person’s primary addiction may, to a large extent, be affected by his/her personality.

It should also be noted that the DUD group in the present study was comprised of people addicted to different drug types, and was thus more heterogeneous than the other groups. Consequently, these results

may reflect the personality profiles of drug addiction in general, and may not address potential personality differences among different substance users. Larger samples that separate drug users into more homogenous subtypes would be needed to examine whether drug users share a similar personality profile or can be distinguished by substance of choice.

4.5. Conclusions and implications

The present study suggests that, although different addictions may have certain behavioral tendencies in common, they largely reflect a unique constellation of personality traits and demographic variables. These findings may guide the development of more effective prevention and intervention programs, which could be tailored for the individual and/or type of addiction. Specific preventive strategies could focus on identifying at-risk youth based on personality traits. For example, as both DUD and CSB are related to low conscientiousness, prevention programs could screen and follow-up children who receive low scores on this trait. Such programs could be modified further according to cultural differences, with an emphasis on CSB for religious communities and on DUD for communities with low socioeconomic status.

The present findings also have implications for intervention and treatment considerations. For example, the importance of socio-demographic variables in GD suggests that treatment centers and counselors may need to address environmental issues in these individuals, rather than focusing exclusively on risky personality traits. Similarly, lower levels of openness to experience and increased introversion among individuals with AUD is manifest in reduced orientation toward interpersonal connectedness and social relationships. Therefore, intensive reaching-out programs may be an essential component of a proper treatment of individuals with AUD.

This study may thus provide a useful framework for early detection, prevention, and personalized interventions for at-risk individuals or those dealing with this debilitating disorder. Future studies that expand study populations to include several addiction types using the same experimental design, may help to further our understanding of the similarities and differences among addictions, and can potentially elucidate the mechanisms responsible for the development of different types of addictive behaviors.

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Contributors

NZ and YR designed and conducted the study and analyzed the data. YE and GY assisted with study conceptualization and subject recruitment, and YN assisted with data interpretation. NZ wrote the first draft of the manuscript, and all authors contributed to and have approved the final manuscript.

Conflict of interest

Prof. Gal Yadid serves as the Chair of the Research Committee for the Israel Anti-Drug Authority. None of the other authors have any potential conflicts of interest regarding this research.

References

- Albanese, M. J., & Shaffer, H. J. (2012). Addiction: The genesis and evolution of an idea and its consequences. In H. J. Shaffer (Ed.). *APA addiction syndrome handbook: Volume 1 foundations, influences, and expressions of addiction* (pp. 3–25). . cited 2014 Aug 10. <http://psycnet.apa.org.proxy1.athensams.net/books/13751/001.pdf>.
- Arora, R., & Rangnekar, S. (2016). Towards understanding the two way interaction effects of extraversion and openness to experience on career commitment. *International Journal for Educational and Vocational Guidance Springer Netherlands*, 16, 213–232.
- Asendorpf, J. B., & van Aken, M. A. G. (2003). Personality-relationship transaction in adolescence: Core versus surface personality characteristics. *J. Pers.* 71(4), 629–666.
- Bagby, R. M., Vachon, D. D., Bulmash, E. L., Toneatto, T., Quilty, L. C., & Costa, P. T. (2007 Sep). Pathological Gambling and the Five-Factor Model of Personality. *Personality and Individual Differences*, 43(4), 873–880. cited 2014 Aug 24. <http://linkinghub.elsevier.com/retrieve/pii/S0191886907000566>.
- Bakken, I. J., Wenzel, H. G., Gøttestam, K. G., Johansson, A., & Oren, A. (2009 Apr). Internet addiction among norwegian adults: A stratified probability sample study. *Scandinavian Journal of Psychology*, 50(2), 121–127. cited 2014 Sep 18. <http://www.ncbi.nlm.nih.gov/pubmed/18826420>.
- Barth, R. J., & Kinder, B. N. (1987). The mislabeling of sexual impulsivity. *Journal of Sex & Marital Therapy*, 13(1), 15–23.
- Benotsch, E. G., Jeffers, A. J., Snipes, D. J., Martin, A. M., & Koester, S. (2013). The five factor model of personality and the non-medical use of prescription drugs: Associations in a young adult sample. *Pers individ dif [internet]*. *Elsevier Ltd*, 55, 852–855. <http://dx.doi.org/10.1016/j.paid.2013.06.004>.
- Black, D. W., & Moyer, T. (1998). Clinical features and psychiatric comorbidity of subjects with pathological gambling behavior. *Psychiatric Services*, 49(11), 1434–1439.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annu. Rev. Psychol.* 56, 453–484.
- Chen, A. C. H., Porjesz, B., Rangaswamy, M., Kamarajan, C., Tang, Y., Jones, K. A., et al. (2007). Reduced frontal lobe activity in subjects with high impulsivity and alcoholism. *Alcoholism: Clinical and Experimental Research*, 31(1), 156–165.
- Coleman, E. (1992). Is your patient suffering from compulsive sexual behavior? *Psychiatric Annals*, 22(6), 320–325.
- Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States. *Archives of General Psychiatry*, 64, 566–576.
- Crane, J. K. (2010). Judaic perspectives on pornography. *Theology of Sex*, 16(2), 127–142. <http://dx.doi.org/10.1558/tse.v16i2.127>.
- Dodge, B., Reece, M., Cole, S. L., & Sandfort, T. G. M. (2012). Sexual compulsivity among heterosexual college students. *Journal of Sex Research*, 41(4), 343–350.
- Edens, E. L., & Rosenheck, R. A. (2012 Mar). Rates and correlates of pathological gambling among va mental health service users. *Journal of Gambling Studies*, 28, 1–11. cited 2014 Sep 19. <http://www.ncbi.nlm.nih.gov/pubmed/21331515>.
- Efrati, Y., & Mikulincer, M. (2018). Individual-based compulsive sexual behavior scale: Its development and importance in examining compulsive sexual behavior. *Journal of Sex & Marital Therapy*, 44(3), 249–259.
- Essau, C. A. (2008). Comorbidity of Addictive Problems: Assessment and treatment implications. *Adolescent Addiction: Epidemiology, Assessment, and Treatment*, 297–313.
- Gibbs, L. E. (1983). Validity and reliability of the Michigan alcoholism screening test: A review. *Drug Alcohol Depend.* 12, 279–285.
- Glicksohn, J., & Nahari, G. (2007). Interactive Personality traits? Smoking as a test case. *European Journal of Personality*, 21, 225–234.
- Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. *The American Journal of Drug and Alcohol Abuse*, 36(5), 233–241.
- Grekin, E. R., Sher, K. J., & Wood, P. K. (2006). Personality and substance dependence symptoms: Modeling substance-specific traits. *Psychol. Addict. Behav.* 20(4), 415–424.
- Griffiths, M. (1996). Behavioral addictions: An issue for everybody? *Journal of Workplace Learning*, 8(3), 19–25.
- Grubbs, J. B., Exline, J. J., Pargament, K. I., Hook, J. N., & Carlisle, R. D. (2015). Transgression as addiction: Religiosity and moral disapproval as predictors of perceived addiction to pornography. *Arch. Sex. Behav.* 44(1), 125–136.
- Hwang, J. Y., Choi, J.-S., Gwak, A. R., Jung, D., Choi, S.-W., Lee, J., et al. (2014 Jan). Shared psychological characteristics that are linked to aggression between patients with internet addiction and those with alcohol dependence. *Annals of General Psychiatry*, 13(6), cited 2014 Aug 22. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3936872&tool=pmcentrez&rendertype=abstract>.
- Hwang, J. Y., Shin, Y.-C., Lim, S.-W., Park, H. Y., Shin, N. Y., Jang, J. H., et al. (2012 Sep). Multidimensional comparison of personality characteristics of the Big Five model, impulsiveness, and affect in pathological gambling and obsessive-compulsive disorder. *Journal of Gambling Studies*, 28(3), 351–362. cited 2014 Aug 24. <http://www.ncbi.nlm.nih.gov/pubmed/21938524>.
- John, O. P., & Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of the Economics of Education*, 2(1999), 102–138.
- Karaga, S., Davis, D. E., Choe, E., & Hypersexuality, H. J. N. (2016). Religion/spirituality: A qualitative review. *Sex Addict Compulsivity*, 23(2–3), 167–181.
- Karim, R., & Chaudhri, P. (2012). Behavioral addictions: An overview. *Journal of Psychoactive Drugs*, 44(1), 5–17.
- Kessler, R. C., Hwang, I., Labrie, R., Petukhova, M., Sampson, N. A., Winters, K. C., et al. (2008). The prevalence and correlates of DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychol. Med.* 38(9), 1351–1360.
- Khantzian, E. J. (1985). The self-medication of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry*, 142(11), 1259–1263.
- Kjome, K. L., Lane, S. D., Schmitz, J. M., Green, C., Ma, L., Prasla, I., et al. (2010). Relationship between impulsivity and decision-making in cocaine dependence. *Psychiatry Res.* 178(2), 299–304.
- Kornør, H., & Nordvik, H. (2007 Jan). Five-factor model personality traits in opioid dependence. *BMC Psychiatry*, 7(37), cited 2014 Aug 22. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1959226&tool=pmcentrez&rendertype=abstract>.
- Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking “big” personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, 136(5), 768–821. <http://www.ncbi.nlm.nih.gov/pubmed/20804236>.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006 Oct). Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors*, 31(10), 1844–1857. cited 2014 Sep 11. <http://www.ncbi.nlm.nih.gov/pubmed/16460883>.
- Lesieur, H. R., & Blume, S. B. (1987). The south oaks gambling screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, 144(9), 1184–1188.
- McCrae, R. R., & John, O. P. (1992 Jun). An introduction to the five-factor model and its applications. *Journal of Personality*, 60(2), 175–215. <http://www.ncbi.nlm.nih.gov/pubmed/1635039>.
- Miner, M. H., Raymond, N., Mueller, B. A., Lloyd, M., & Kelvin, O. L. (2009). Preliminary investigation of the impulsive and neuroanatomical characteristics of compulsive sexual behavior. *Psychiatry Res.* 174(2), 146–151.
- Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity. *American Journal of Psychiatry*, 158(11), 1783–1793.
- Müller, K. W., Beutel, M. E., Egloff, B., & Wölfling, K. (2014). Investigating risk factors for internet gaming disorder: A comparison of patients with addictive gaming, pathological gamblers and healthy controls regarding the big five personality traits. *Eur. Addict. Res.* 20, 129–136.
- Myrseth, H., Pallesen, S., Molde, H., Johnsen, B. H., & Lorvik, I. M. (2009 Dec). personality factors as predictors of pathological gambling. *Personality and Individual Differences Elsevier Ltd*, 47(8), 933–937. cited 2014 Aug 24. <http://linkinghub.elsevier.com/retrieve/pii/S0191886909003262>.
- Needell, N. J., & Markowitz, J. C. (2004). Hypersexual behavior in Hasidic Jewish in-patients. *J. Nerv. Ment. Dis.* 192(3), 243–246.
- Nower, L., Derevensky, J. L., & Gupta, R. (2004). The relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. *Psychology of Addictive Behaviors*, 18(1), 49–55.
- Odling, B. L., Lust, K., Schreiber, I. R. N., Christenson, G., Derbyshire, K., Harvanko, A., et al. (2013 Aug). Compulsive sexual behavior in young adults. *Annals Clinical Psychiatry*, 25(3), 193–200. <http://www.ncbi.nlm.nih.gov/pubmed/23926574>.
- Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*, 51(6), 768–774.
- Pinto, J., Carvalho, J., & Nobre, P. J. (2013 Jul). The relationship between the ffm personality traits, state psychopathology, and sexual compulsivity in a sample of male college students. *The Journal of Sexual Medicine*, 10, 1773–1782. cited 2014 Aug 18. <http://www.ncbi.nlm.nih.gov/pubmed/23815239>.
- Randler, C., Horzum, M. B., & Vollmer, C. (2014). Internet addiction and its relationship to chronotype and personality in a Turkish university student sample. *Social Science Computer Review*, 32(4), 484–495. <http://ssc.sagepub.com/content/32/4/484.abstract?ct=ct>.
- Reid, R. C., Carpenter, B. N., & Hook, J. N. (2016). Investigating correlates of hypersexual behavior in religious patients. *Sex Addict Compulsivity*, 23(2–3), 296–312.
- Reid, R. C., Carpenter, B. N., Spackman, M., & Willes, D. L. (2008). Alexithymia, emotional instability, and vulnerability to stress proneness in patients seeking help for hypersexual behavior. *Journal of Sex & Marital Therapy*, 34(2), 133–149. <http://dx.doi.org/10.1080/00926230701636197>.

- Rettenberger, M., Klein, V., & Briken, P. (2016). The relationship between hypersexual behavior, sexual excitation, sexual inhibition, and personality traits. *Archives of Sexual Behavior Springer US*, 45, 219–233. <http://dx.doi.org/10.1007/s10508-014-0399-7>.
- Selzer, M. L. (1971). The Michigan alcoholism screening test: The quest for a new diagnostic instrument. *American Journal of Psychiatry*, 127(12), 1653–1658.
- Shaffer, H. J., Laplante, D., Labrie, R., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*, 12(6), 367–374. cited 2014 Jul 27. <http://www.ncbi.nlm.nih.gov/pubmed/15764471>.
- Skinner, H. A. (1982). The drug abuse screening test. *Addictive Behaviours*, 7, 363–371.
- Smail, P., Stockwell, T., Canter, S., & Hodgson, R. (1984). Alcohol dependence and phobic anxiety states. I. A prevalence study. *Br. J. Psychiatry*, 144(1), 53–57.
- Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the south oaks gambling screen (SOGS). *Addictive Behaviours*, 27(1), 1–19.
- Strunz, S., Westphal, L., Ritter, K., Heuser, I., Dziobek, I., & Roepke, S. (2015). Personality pathology of adults with autism Spectrum disorder without accompanying intellectual impairment in comparison to adults with personality disorders. *Journal of Autism and Developmental Disorders Springer US*, 45, 4026–4038. <http://dx.doi.org/10.1007/s10803-014-2183-x>.
- Swendsen, J., Conway, K. P., Degenhardt, L., Dierker, L., Glantz, M., Jin, R., et al. (2009 Aug). Socio-demographic risk factors for alcohol and drug dependence: The 10-year follow-up of the national comorbidity survey. *Addiction*, 104(8), 1346–1355. cited 2014 Sep 14. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2794245&tool=pmcentrez&rendertype=abstract>.
- Teesson, M., Farrugia, P., Mills, K., Hall, W., & Alcohol, B. A. (2012). Tobacco and prescription drugs: The relationship with illicit drugs in the treatment of substance users. *Substance Use & Misuse*, 47(8–9), 963–971.
- Terracciano, A., Löckenhoff, C. E., Crum, R. M., Bienvenu, O. J., & Costa, P. T. (2008 Jan). Five-factor model personality profiles of drug users. *BMC Psychiatry*, 8(22), cited 2014 Aug 22. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2373294&tool=pmcentrez&rendertype=abstract>.
- Widiger, T. A., & Smith, G. T. (2012). Addiction and nosology. In H. J. Shaffer (Ed.). *APA addiction syndrome handbook: Volume 1 foundations, influences, and expressions of addiction* (pp. 49–66).
- Wilt, J. A., Cooper, E. B., Grubbs, J. B., Exline, J. J., & Pargament, K. I. (2016). Associations of perceived addiction to internet pornography with religious/spiritual and psychological functioning. *Sex Addict Compulsivity*, 23(2–3), 260–278.
- Yudko, E., Lozhkina, O., & Fouts, A. (2007 Mar). A comprehensive review of the psychometric properties of the drug abuse screening test. *Journal of Substance Abuse Treatment*, 32, 189–198. cited 2015 Apr 24. <http://www.ncbi.nlm.nih.gov/pubmed/17306727>.
- Zucker, R. A., Ellis, D. A., Fitzgerald, H. E., Bingham, C. R., & Sanford, K. (1996). Other evidence for at least two alcoholisms II: Life course variation in antisociality and heterogeneity of alcoholic outcome. *Dev. Psychopathol.* 8, 831–848.