

## Predictors of Multiple Substance Use in Alcohol Dependence: The Role of Personality

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### Abstract

**Objective:** The simultaneous use of several licit and illicit psychoactive substances is highly common among patients with mental health disorders. Relatively few studies have investigated the role of personality in the different patterns of multiple substance use among alcohol dependents. The authors aimed to assess the association of several clinical, socio-demographic and personality predictors of nicotine and multiple substance use in alcohol dependents.

**Method:** A sample of 178 alcohol-dependent patients was eligible for this study. The profiles of 3 groups of alcohol-dependent patients were compared: 1. alcohol dependents without nicotine use or other substances ("pure" alcohol-dependents; PAD); 2. alcohol-dependent smokers (ADS) without substances use and 3. alcohol-dependents with the use of multiple substances (ADMS).

**Results:** Multiple regression analysis showed that age, educational background, occupational status, years of alcoholism and the personality trait of openness to experience were predictors of Multiple Substance Use (MSU) in alcohol dependent outpatients. Results of the mediation analyses/multivariate regression modelling using bootstrapping method confirmed the mediation role of educational level in the relation between openness to experience and substance use.

**Conclusion:** In alcohol dependents, as in the general population, the personality trait openness to experience may constitute a vulnerability factor associated with polydrug use.

**Keywords:** Alcohol; Smoking; Substance use; Personality; Neuroticism; Openness to experience

### Introduction

The concomitant use of several licit and illicit psychoactive substances is highly common among patients with mental health disorders [1]. Indeed, the use of several psychoactive substances seems to be the rule, not the exception, in mental health institutions [2]. This has become particularly worrying in the last decades, with an increasing range of available psychoactive substances in the market, which might result in a much more complex clinical profile of drug use. Frequently, individuals use different psychoactive substances at the same time, i.e., Multiple Substance Use (MSU). Conceptually, MSU may encompass numerous patterns of use: from occasional heroin, cocaine or cannabis use to the daily use of nicotine and alcohol. For instance, patients could be dependent of one drug, abuse one or two or occasionally use several others. This pattern of use could confound greatly clinical interventions and research trials. In "real-world" clinical settings, alcohol, nicotine and drug addictions are common and highly interactive, with studies suggesting that multiple dependencies may interfere with successful treatment interventions [3-6].

The most common comorbid substance addiction is nicotine with a prevalence estimated to be as high as 80% [7]. The prevalence of MSU

in patients with risky alcohol consumption has been found to be between 12 to 82%, according to the AUDIT-C risk [8]. In literature, several predictors of increased risk for smoking and MSU in alcohol dependent individuals have been proposed. For instance, Sintov [9] observed that male gender, younger age, maternal alcohol dependence, fewer years of education; higher neuroticism scores, conduct disorder, and early alcohol use were significant predictors of one or more substance classes dependence in alcohol dependence. Schizotypal personality disorder and Cluster B personality disorders (Axis II from DSM-IV-TR) seem also to be associated with alcohol and MSU, especially borderline, antisocial and narcissistic types [10-12]. Beside psychiatric co-morbidity, as well as other social conditions as cost, local prescribing practices, availability, legality or fashion [13], the use of several substances by an alcohol dependent individual over a longer period of time might also reflect personal needs (preferences) connected to personality functioning. Some personality characteristics may constitute vulnerability factors that would interact with other biological, psychological and social variables in the development of polydrug-taking behaviour [14-16]. One of the most important models to evaluate personality are the "big five" proposed by Costa and McCrae. For instance, illicit substance use has been associated with the openness to experience trait [17].

People with illicit substance use disorders present higher scores on neuroticism, disinhibition, low conscientiousness and low agreeableness (i.e., the disposition to experience negative emotions) as

well as impulsivity, openness to experience and social deviance [18-23].

Clinical studies have shown that the use of multiple substances such as nicotine and other drugs is escalating in alcohol dependent populations, possibly pointing for a change in the hypothetical class of “pure” alcoholics, i.e., non-comorbid alcohol-dependent subjects [24]. Although co-morbidity between alcohol dependence and other major drugs of dependence as cocaine or heroin has been frequently assessed in literature [25-28], to our best knowledge, few studies addressed the patterns of MSU (without addiction criteria) in patients with a diagnosis of alcohol dependence. Considering the increasing complexity of the alcohol dependence phenotypes, currently also maximized by the spreading of MSU [24,29-32] we believe that is important to assess the clinical profile of different patterns of MSU among alcohol dependent patients.

Since personality concepts like openness to experience and neuroticism have been associated with alcohol and drug addictions [33-41] as well as have been described in people who are more likely to use illicit substances in the general population [17], the current study aimed to test the association between these personality traits in a sample of alcohol dependent patients with different patterns of MSU.

## Design and Subjects

A correlational and comparative study was designed to assess predictors of substance use in alcohol dependent patients.

Study participants were recruited in the alcoholism unit of the Psychiatric Service of Santa Maria University Hospital. The initial sample comprised 230 alcohol-dependent patients, diagnosed according to DSM-IV-TR criteria, sequentially admitted in the unit [42].

In this study, 3 groups of alcohol dependent patients are compared: 1. alcohol-dependents without nicotine use or other substances (“pure” alcohol dependents; PAD); 2. alcohol-dependent smokers (ADS) without substances use and 3. alcohol-dependents with the use of multiple substances (ADMS).

The following variables were measured: Drinking and substance use habits and socio-demographic information were collected at patient’s hospital admission with a standardized interview adapted to alcoholic patients. Alcohol dependence degree was assessed using the Severity Alcohol Dependence Questionnaire (SADQ) and the severity of nicotine use with the Fagerström Test for Nicotine Dependence (FTND). Quantity-Frequency method (QF) was used to quantify the average of alcohol consumption.

The psychometric evaluation was only conducted when patients were stabilized and not in the acute phase of their illness (normally, after 2 or 3 weeks of admission). The big-five model of personality (Revised NEO Personality Inventory) and psychopathological symptoms (Brief Symptom Inventory) were used for this evaluation.

Conditions that could interfere with our analysis were also controlled, particularly, those that could influence the interpretation of personality functioning as psychiatric co-morbidity. For that, all subjects who were enrolled in the study underwent a screening procedure that included a semi-structure neuropsychiatric interview [43] to determine psychiatric axis I co-morbidity (DSM-IV-TR) [42]. Of 230 patients enrolled, 33 met the criteria for illicit drug dependence (other than nicotine); 10 for anti-social and borderline personality

disorders; 3 for bipolar depression. 6 patients were former smokers. All were removed from the sample. Other exclusion criteria were severe psychiatric disorders as schizophrenia and/or other psychotic disorders, patients younger than 18 years of age, state of alcoholic intoxication (or other toxic substances) during assessment and marked cognitive deficit or mental retardation. Therefore, we ended up with a final sample of 178 alcohol-dependent patients.

All subjects included in the study participated voluntarily and gave their informed consent. The study was approved by the local Ethical Board of Medical School of Lisbon.

## Statistical Analysis

The normal distribution of psychometric measures was confirmed using the Kolmogorov-Smirnov test. Thus, considering normally distributed data, parametric methods were used to calculate numerical relations among variables.

Considering that socio-demographic and clinical factors may influence substance use in alcohol dependents as well as personality traits data analyses comprised different phases.

The first set of analyses included an explorative analysis of the sample characteristics followed by a comparative analysis between 3 groups (PAD, ADS, ADMS) in order to investigate the relationship between multiple substance use and the socio-demographic, clinical and personality features of alcohol dependent patients. Assuming that we could observe a significant interaction between personality/drinking variables and some of the baseline variables of the sample, the 3 groups comparisons were performed with a one-way ANCOVA (analysis of covariance) in order to assess whether the subgroup differences were attributable to covariate factors. After that, multiple regression analyses were applied to establish the potential predictive effect of these variables on substance use. In a second set, a hierarchical regression model was conducted using the variable “substance use” as an outcome variable (dependent), and the baseline significant variables as independent predictors. The dependent variable received the following ordinal categorization: 0=alcoholics with no consume of drugs or nicotine; 1=alcoholics with moderate nicotine use; 2=alcoholics with heavy nicotine use, 3=alcoholics with cannabis use, 4=alcoholics with heroin or cocaine use. To interpret the significance level of the regression results, we used a Bonferroni correction. Finally, since some mediation effects between the independent factors could be expected, namely, between the socio-demographic variables and the personality traits, predictors were re-investigated for potential mediating effects. Mediation analysis was conducted with bootstrapping method [44].

Data were analysed using the Statistical Package for Social Sciences (SPSS-Version 20.0). Statistical significance was defined at  $p < 0.05$ .

## Instruments

### Severity alcohol dependence questionnaire (SADQ)

The SADQ is a self-administered questionnaire developed to measure alcohol dependence severity [45]. This scale is divided into 5 thematic sections of excessive alcohol consumption, namely physical withdrawal symptoms, psychological withdrawal symptoms, craving, alcohol consumption and relief withdrawal symptoms after abstinence period.

### Semi-structured interview for alcohol dependent patients

Clinical and socio-demographic information was collected through a semi-structured interview for alcohol dependent patients. This interview explores patients' socio-demographic information, family history of alcoholism, age of alcohol use, abuse and dependence onset, other substance consumptions, previous alcohol treatments, patterns of alcohol consumption, and alcohol related problems. This instrument has been used in other studies [24,29,46].

### Quantity-frequency method (QF)

QF method is a fast alcohol consumption measure that quantifies the weekly average alcohol consumption per drinking day. This estimation formula was used in order to compute the average number of drinking days over a certain period (typical week) and then to estimate the average number of drinks consumed per drinking day. The QF drinking variable was then calculated as the product result of those measures (in standard drinks)-average number of drinks per week. A standard drink was defined as one beer, one glass of wine, one glass or shot of liquor. In the cases of alcohol abstinence, patients were asked about the last week of alcohol consumption before they stopped drinking.

### Fagerstrom test for nicotine dependence (FTND)

The FTND is a widely used tobacco research tool. This six items questionnaire is used to assess the pattern and the severity of nicotine use [47]. These 6 questions assess the level of dependence of nicotine and provide a stronger measure of physical dependence [48]. We used the Portuguese version [49].

### Brief symptom inventory (BSI)

The BSI is the short version of the SCL-R-90 developed by Derogatis and Melisaratos [50]. This self-report instrument comprises of 53 items covering nine clinical symptom dimensions: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Respondents rank each feeling point on a 5-point scale ranging from 0 (not at all) to 4 (extremely), characterizing the intensity of distress. The Portuguese version was validated by Canavarró [51] with good psychometric properties.

### Mini neuropsychiatric interview (MINI)

The MINI is a short and rapid structured diagnostic interview, created to assess 17 psychiatric disorders. This instrument can be easily incorporated into the clinical practice routine with an administration time of approximately 15 minutes [43]. The MINI is nowadays available in almost 30 languages, including Portuguese [52].

### NEO-FFI

One of the most used instruments to evaluate personality traits is the NEO-FFI [53], which is a scale designed to assess the five basic dimensions neuroticism (N), extraversion (E), openness to experience (O), agreeableness (A) and conscientiousness (C). NEO-FFI is a reduced version of the personality questionnaire NEO-PI [54]. Using the position of each person in this comprehensive 5 factors scheme the evaluator can define his/her emotional, interpersonal and motivational

style. The Portuguese version was validated by Bertoquini and Pais-Ribeiro [55].

### Results

The sample comprised 143 alcohol-dependent males (80.3%) and 35 females (19.7%). Age varied between 24 and 65 years, with a mean value of 47.9 years (DP=9.0). Regarding civil status, 59.6% were married or lived in marital union, 14.6% were single and the others were separated/divorced (25.8%). The mean value of school attendance was 7.3 years (DP=4.4). Regarding professional activity, 48.3% were active workers, 30.9% were unemployed and the rest were retired (20.8%). Concerning substance use related characteristics, 65.7% were current smokers and 23.4% reported the previous consumption of illicit drug use. Lifetime diagnosis of depression (MINI) was observed in 12.9% of the patients, been significantly ( $\chi^2=10.6$ ;  $p<0.05$ ) higher in alcohol dependent females (28.6%) than males (8.4%).

Considering gender differences, female alcohol dependent patients presented a higher level of school attendance ( $F(176)=1.5$ ,  $p<0.05$ ), when comparing to male alcohol dependent patients. There were no significant differences between groups by age ( $F(174)=4.5$ ,  $p>0.05$ ), civil status ( $\chi^2=4.9$ ,  $p>0.05$ ), professional activity ( $\chi^2=6.2$ ,  $p>0.05$ ), average age of drinking onset ( $F(174)=1.5$ ,  $p>0.05$ ), age of excessive alcohol use onset ( $F(172)=1.1$ ,  $p>0.05$ ), age of alcohol dependence onset ( $F(148)=1.8$ ,  $p>0.05$ ), weekly average of alcohol consumption per drinking day ( $F(174)=1.3$ ,  $p>0.05$ ), Family History of Alcoholism ( $\chi^2=0.8$ ,  $p>0.05$ ). Concerning personality/psychopathology assessment, alcohol dependent patients with a lifetime history of depression presented higher scores of neuroticism ( $F(141)=2.3$ ;  $p<0.05$ ), interpersonal sensitivity ( $F(144)=1.5$ ;  $p<0.05$ ), depression ( $F(144)=1.0$ ;  $p<0.05$ ), anxiety ( $F(144)=6.2$ ;  $p<0.05$ ), when comparing to alcohol dependent patients without a lifetime history of depression. The other personality dimensions did not showed any significant differences ( $p>0.05$ ).

### Group comparisons

Comparative analysis reveals some significant differences among the alcoholic subgroups. ADMS were younger ( $F_{2,173}=17.1$ ;  $p<0.05$ ) and presented a higher educational status ( $\chi^2=16.8$ ;  $p<0.01$ ) and more active workers and less retired individuals ( $\chi^2=13.7$ ;  $p<0.05$ ), when comparing to the other subgroups. Gender ( $\chi^2=5.2$ ;  $p<0.05$ ) and civil status ( $\chi^2=1.9$ ;  $p<0.05$ ), did not differentiate the subgroups. Considering drinking variables, ADMS patients started to depend on alcohol significantly earlier and presented less years of alcoholism, when comparing to the other subgroups (all data are present in Table 1). Considering that the subgroups significantly differentiate in terms of age and years of alcoholism and we observed a significant interaction between gender, lifetime history of depression and NEO-FFI, an analysis of covariance (ANCOVA) was conducted to assess personality/psychopathological differences among the subgroups, using age, gender, years of alcoholism and lifetime history of depression as covariate factors. Thus, following an ANCOVA, bonferroni corrected multiple comparisons tests only identified significant differences in openness to experience ( $F_{24,2,26,0}=2.3$ ;  $\eta^2=0.05$ ;  $p<0.01$ ) dimension, in which ADMS patients significantly presented higher scores when compared to the other subgroups. BSI dimensions did not show any significant differences ( $p>0.05$ ). All results are summarized in Table 2.

N/%		Sample	PAD	SAD	ADMS	Statistics <sup>*</sup>
		178	60/33.7	78/43.8	40/22.5	
Age of drinking	M	14.9	14.8	15.1	14.5	F <sub>2,173</sub> =0.3/ns
	sd	4.7	5.4	4.8	3.5	
Age of excessive alcohol use	M	27.8	30	27.1	26.1	F <sub>2,171</sub> =1.9/ns
	sd	9.6	10.7	10.7	8.5	
Age of alcohol dependence	M	36.4	38.3	36.5	33.2	F <sub>2,147</sub> =3.0/p<0.05a
	sd	9.4	8.3	9.8	8.5	
Alcohol consumption (week)	M	90.9	81.5	89.1	108	F <sub>2,171</sub> =1.3/ns
	sd	80	53	79.3	101.1	
Alcoholism (years)	M	20.3	21.1	22.3	15.1	F <sub>2,173</sub> =5.2/p<0.05 <sup>b</sup>
	sd	11.8	13.2	11.5	8.8	
SADQ	M	27	27.6	27.1	25.8	F <sub>2,163</sub> =0.3/ns
	sd	12.9	13.4	13.3	11.8	
Daily cigarette use	M	25	0	25.2	24.7	F <sub>1,105</sub> =0.4/ns
	sd	12	0	12.2	11.8	
Age onset cigarette use	M	15.4	0	15.8	14.7	F <sub>1,104</sub> =0.9/ns
	sd	3.4	0	3.5	3	
FTND	M	5.7	0	5.8	5.5	F <sub>1,105</sub> =0.0/ns
	sd	2.3	0	2.3	2.2	
PFHA (%)		65	66.7	63.6	65.1	χ <sup>2</sup> =0.14 /ns
DT (%)		23.8	22.8	24	25	χ <sup>2</sup> =0.11/ns
Seizures (%)		22.8	19.3	23	27.5	χ <sup>2</sup> =0.90/ns
Detox. (%)		42.2	38.6	47.4	37.5	χ <sup>2</sup> =1.52/ns

**Table 1:** Legend I: PAD – “Pure” alcohol dependents; ADS-alcohol dependent smokers; ADMS-alcohol dependents with the use of multiple substances; PFHA (positive family history of alcoholism); DT (Delirium Tremens); FTND-fagerström test for nicotine dependence; SADQ-severity alcohol dependence questionnaire. Legend II: a: earlier age of alcohol dependence onset in ADMS when comparing to PAD. b: less years of alcoholism in ADMS when comparing to PAD and ADS.

### Multivariate analyses of predictors

Single standard regression analysis confirmed the significant relationship between the dependent variable (substance use) and the predictor variables, namely, age (beta=-0.37; CI=-0.07– -0.03, p<0.01); educational level (beta=0.34; CI=0.05–0.13, p<0.01); years of alcoholism (beta=-0.19; CI=-0.04– -0.05, p<0.05); occupational status (beta=0.17; CI=0.03–0.03, p<0.05) and openness to experience (beta=0.21; CI=0.08–0.04, p<0.01) from NEO-FFI. After that analysis, a hierarchical regression model was conducted. The socio-demographic and clinical variables enter the first block of the regression model and, in the second stage of analysis; the personality variables go into the equation.

The regression analysis showed that openness to experience predicts substance use in alcohol dependents when controlled for the effect of

age, years of alcoholism and occupational status (beta=0.04, CI=0.12-0.74; p<0.001). The variables, in the first block, of the analysis, contributed 15% for the variance of substance use (F=7.8, p<0.01). In the second step of the analysis, with the variable openness to experience inserted, the model contributed to 20% of the variance substance use (F=8.1, p<0.001). When we put education level in the regression model, the model contributed to 22% of the variance substance use, nevertheless, the results no longer remain significant (beta=0.02, CI=-0.18-0.05; p=0.32). Indeed, the regression model showed a change in substance use for every unit change in openness to experience that is mediated by educational level, suggesting that the association between the higher scores of openness to experience and substance use in alcohol dependents was explained by education level. As a further approach, we decided to calculate the indirect effect of educational level and test it for significance–The amount of mediation.

Thus, multiple regression analyses were conducted to assess each component of the proposed mediation model. The following criteria were met: 1. casual variable was significantly correlated with the dependent variable and the mediator; 2. the mediator was significantly associated with the dependent and independent variable even after it has been entered in the regression analysis; 3. the causal variable was controlled when establishing the effect of the mediator on the dependent variable [56]. It was observed that openness to experience was positively associated with educational level (a-path;  $B=0.41$ ,  $t(9.0) = p < 0.001$ ). Results also indicated that the mediator, educational level, was positively associated with substance use (b-path;  $B=0.08$ ,  $t(3.4)$

$= p < 0.001$ ). Because both a-path and b-path were significant, the model has met the criteria according to Baron and Kenny [56], and then, mediation analyses were tested using bootstrapping method with bias corrected confidence estimates. For the present analyses, the 95% confidence interval of the indirect effect was obtained with 5000 bootstrap re-samples [44]. Results of the mediation analyses confirmed the mediation role of educational level in the relation between openness to experience and substance use ( $B=0.04$ ;  $CI=0.013-0.05$ ). In addition, results indicated that the direct effect of openness to experience on substance use became non-significant ( $B=0.18$ ,  $t(1.0)$ ,  $p=0.32$ ) when controlling for educational level interactions.

N/%		Sample	PAD	SAD	ADMS	Statistics <sup>†</sup>
		178	60/33.7	78/43.8	40/22.5	
<b>NEO-FFI</b>						
Neuroticism	M	26.7	26.8	26.6	26.5	F=1.3/ns
	sd	7.3	6.9	7.6	7.3	
Extroversion	M	24.4	24	23.4	26.4	F=2.8/ns
	sd	7.3	6.9	7.6	7.3	
Openness to experience	M	24.8	23.7	24.4	27.4	F=2.3/p<0.05 <sup>a</sup>
	sd	6	7.3	7.8	7.9	
Agreeableness	M	32.1	31.5	32.1	32.9	F=2.0/ns
	sd	5.9	5.2	4.4	5.9	
Conscientiousness	M	32	31.9	32.2	31.7	F=0.6/ns
	sd	5.9	5.2	4.4	5.9	
<b>BSI</b>						
Somatization	M	0.79	0.83	0.73	0.83	F=1.2/ns
	sd	0.58	0.54	0.59	0.62	
Obsessive-compulsive	M	0.99	1.01	1.11	1.21	F=1.4/ns
	sd	0.62	0.62	0.65	0.66	
Interpersonal sensitivity	M	0.85	0.87	0.88	0.77	F=3.1/ns
	sd	0.72	0.75	0.69	0.73	
Depression	M	1.1	1.21	1.1	1.14	F=4.0/ns
	sd	0.68	0.79	0.62	0.63	
Anxiety	M	0.94	0.89	0.94	1.02	F=2.3/ns
	sd	0.62	0.69	0.61	0.57	
Hostility	M	0.73	0.77	0.64	0.82	F=1.8/ns
	sd	0.65	0.67	0.52	0.79	
Phobic anxiety	M	0.48	0.47	0.51	0.47	F=1.4/ns
	sd	0.55	0.56	0.58	0.51	
Paranoid ideation	M	1.05	1.01	1.15	0.98	F=1.1/ns
	sd	0.71	0.69	0.77	0.63	

Psychoticism	M	0.63	0.66	0.6	0.66	F=4.6/ns
	sd	0.6	0.53	0.58	0.6	

**Table 2:** Personality related variables according to the sample and the subgroups \* One-way ANCOVA followed by Tukey's test, using age, gender, years of alcoholism and lifetime history of depression as covariate factors. Bonferroni adjustment for multiple comparisons. Legend I: PAD – “Pure” alcohol dependents; ADS-alcohol dependent smokers; ADMS-alcohol dependents with the use of multiple substances; *BSI*-Brief Symptom Inventory. Legend II: a: higher scores in ADMS when comparing to PAD and SAD.

## Discussion

Regression and comparative analysis showed that age, educational background, occupational status, years of alcoholism and the personality trait of openness to experience were predictors of MSU in alcohol dependent outpatients.

In our sample of alcohol dependents without history of severe psychiatric co-morbidity or drug addiction, the multiple uses of psychoactive substances, alone or in combination, was restricted to a specific subgroup of younger and more educated patients, socially and professionally active, entering treatment with fewer years of alcoholism evolution but with similar severity of alcohol problems (rapid progression) and with a high level of openness to experience. The most common alcohol/drug combinations were alcohol with marijuana (86.9%), alcohol with cocaine (27.5%), and alcohol with heroin (7.5%). Similar clinical profiles were described in literature [57]. Cardoso and colleagues [29] labelled these patients as “adictopathics”, a polydrug alcoholic subtype that reflects a hybrid group not devoted to a particular psychoactive substance beside alcohol. Adictopathic factor isolates the younger individuals, consuming other types of psychoactive substances and with a disruptive behaviour in childhood and/or adolescence (behaviour problems). Other studies described these patients as a severe course and high-severity/vulnerability subgroup [24,58], often connected to drug addiction life-style (drug networks, sex trading, promiscuity and other behavioural problems) [57]. The absence of a co-morbid drug addiction disorder (exclusion criteria) in our ADMS places this subgroup that uses but not depends on drugs on the beginning of a polydrug clinical spectrum of severity.

The homogeneity between PAD and ADS may reflect similarities in physiological, psychological and social conditions that lead to both behaviours-smoking and drinking, which constitute, in fact, complementary behaviours [59]. When analysing personality prevalent traits, the only dimension that differentiates the subgroups was openness to experience. Alcoholics with MSU had significantly higher scores when compared to PAD and ADS. A hierarchical regression model observed that openness to experience was a predictor of MSU rather than nicotine on its own. However, a subsequent analysis confirmed the mediation role of educational level in the relation between openness to experience and substance use in alcohol dependents. According to our findings, we could hypothesized that a younger age coupled with a higher education level and openness to experience personality trait promotes a behavioural functioning marked by emotional and intellectual curiosity that, when linked to frequent alcohol intoxication, leave alcohol dependent patients more prone to experience the effects of other drugs. Openness feature is strongly related with the Sensation Seeking construct [60]. This trait has been attributed to extraverted and impulsive individuals and is related with the proneness to high stimulating activities such as adventure sports, intake of drugs, sex, illegal activities, and so forth as well as the willingness to take risks in pursuit of novelty [61].

Biologically, openness to experience has been associated with the neuromodulator dopamine according to the theory of DeYoung [62] which accounts for the association of this neurotransmitter with traits ranging from sensation and novelty seeking to impulsivity and aggression.

Alcohol dependence as well as neuroticism, depression, anxiety and affective temperaments carrying a depressive component have been correlated with genetic variations on the 5-HTTLPR polymorphisms, a serotonin transporter [63-65]. Although neuroticism has been frequently related to alcoholism [37,38,40], smoking [33,34,41] and substance abuse [35,36,39], in our sample, this dimension of the “five factor” model of personality did not differentiate the 3 subgroups. Even though it was not assess in the study, we may speculate the possible influence of other similar constructs in the use of MSU in alcohol-dependents. For instance, patients with cyclothymic affective temperament (temperamental disposition that is characterized by an erratic instability in mood with biphasic shifts from an ‘up’ phase to a ‘low’ phase) tend to be more involved in other drug consumption besides alcohol. When concerning cigarette smoking, cyclothymic temperament did not enclose any relevant influence in the nicotine consumption level [66]. The authors suggested that the presence of temperamental traits connected to impulsiveness, novelty seeking or dis-inhibition, might represent key personality risks for alcohol dependent subjects to engage in multiple substance consumptions in order to increase the overall psychoactive experience.

## Conclusion

There is increasing number of alcoholic polymorphic subtypes derived from the interactive complexity between genetic/family and psychosocial factors of civilization. MSU represents a relevant warning sign of changes affecting the “clinical picture” of our alcohol-dependent patients. When planning the treatment of an alcohol use disorder, clinicians should be aware and prepared to deal with this particular MSU phenotype. Besides age, education, professional status, and length of alcohol abuse, openness to experience was a relevant personality construct connected to poly-drug experience even in subjects who have already developed an alcohol use disorder.

More research is needed to fully evaluate how personality features can be useful in understanding drug evolvement.

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