Personality traits among the various profiles of substance use disorder patients: new evidence using the DSM-5 section III framework

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Abstract

Background: The specialized literature provides solid evidence that substance use disorders (SUD) and personality disorders (PD) are interrelated. Given the relative novelty of the Alternative Model for Personality Disorders, there are still few studies that have analyzed the relationship between the different facets, substance use disorder, and the various consumption profiles.

Objective: This paper analyzes the relationship between the facets of the Alternative Model for Personality Disorders and different substance use disorder profiles, using the facet scores obtained in a sample of substance use disorder patients and comparing these with normative scores. A comparison is also conducted between types of patients.

Method: The Personality Inventory for DSM-5 (PID-5-SF) was administered to a sample of 289 patients diagnosed with SUD who began treatment for alcohol, cannabis, cocaine, or heroin use disorder. A latent class analysis was conducted and scores obtained for each of the classes were compared with normative scores. Logistic regression analyzes were carried out to determine which facets and domains show the greatest explanatory capacity of belonging to each latent class.

Results: Four patient profiles were identified on the basis of their SUD: POLY (polydrug use), COC-HER (cocaine-heroin), ALC (alcohol) and CAN (cannabis). When comparing the groups with the normative population, POLY presented higher scores on all the domains, COC-HER and ALC on all domains except antagonism, and CAN showed higher scores on detachment and psychoticism. The CAN cluster presented lower scores than the other three groups in different domains. No statistically significant

differences were observed on any domain between the groups POLY and COC – HER, whilst differences were found between the classes POLY and ALC for the detachment domain.

Conclusions: The results help to identify the personality profiles associated with various SUD profiles. In particular, patients from the groups POLY, COC-HER, and ALC present high scores on pathological facets related to borderline personality disorder and schizotypal personality disorder (all three), and antisocial personality disorder (POLY), while the CAN cluster is more normalized and its pathological facets are related to the schizotypal personality disorder. Patients with polydrug use have a greater tendency towards pathological personality, with the involvement of a large number of facets, whilst COC-HER and ALC show a slightly less severe profile, and cannabis users are characterized by lower scores, but high detachment and psychoticism.

Introduction

The specialized literature provides solid evidence that substance use disorders (SUD) and personality disorders (PD) are interrelated. In addition to the commonly described biological and genotypic factors [1,2], the prevalence rates reported in epidemiological studies indicate their concomitance. Whilst the prevalence of each specific PD in the general population is between 1 and 5.9% [3], studies conducted in patients with alcohol use disorder (AUD) report rates of around 40% [4]. Among patients with SUD, these rates increase to 18-69% [5, 6]. Several authors have also shown that the presence of both disorders is related to higher rates of treatment abandonment [7-9], greater severity of dependence [10], and lower quality of life [11].

Moreover, some studies have revealed that there is a relationship between the different PDs and the main consumed substances. For example, among alcohol and cocaine users, higher prevalence rates of antisocial (APD) and borderline (BPD) disorders have been detected [12,13] with odds ratios of 2.1 and 1.9 respectively [5]. However, the schizotypal PD (SPD) has greater comorbidity with the use of cannabis and opioids [14-17], although this latter relationship has been reported with less consistency.

Among the studies that have attempted to explain the common bases of both groups of disorders, one particular line of enquiry has focused on the use of dimensional models to explain which maladaptive personality variations occur in patients with SUD. In this regard, much of the research has been carried out within the framework of the Five Factor Model [18,19], trying to identify the most outstanding personality traits in drug users. These studies have reported that alcohol users show high scores on extraversion [20] and neuroticism [21] and low scores on agreeableness [21,22] and conscientiousness [20-23]. In cannabis users, high openness scores have been observed [20, 22, 24] and, with less consistency, low extraversion [20] and agreeableness [24]. Regarding cocaine and heroin users, several studies have found higher scores on neuroticism and lower scores on conscientiousness [22, 24-26].

The introduction of the Alternative Model for Personality Disorders [27] in Section III of the DSM-5 has opened new perspectives for the integration of evidence related to the characterization of personality traits within the framework of PDs as clinical syndromes. To be more specific, The Alternative Model for Personality Disorders proposes that personality is organized into five domains: negative affect, detachment, antagonism, disinhibition, and psychoticism. Several authors have established that the domains defined in the Alternative Model for Personality Disorders are organized as the maladaptive variants of the Five Factor Model [18]. According to empirical research,

the negative affect domain is aligned with the dimension of neuroticism, detachment with extraversion, disinhibition with conscientiousness, antagonism with agreeableness, and psychoticism with openness, with the latter producing more inconsistent results [28, 29]. These observations allow for continued research to be carried out on the basis of the Five Factor Model. In addition, the Alternative Model for Personality Disorders includes within these 5 domains a total of 25 facets that represent more specific aspects of personality [29, 30]. The presence of high scores on these facets allows for identifying the possible presence of six clinical syndromes or PDs [27]. Taking as an example one of the most prevalent personality disorder among SUD patients, antisocial personality disorder requires an elevated score on four or more of the following facets: hostility, deceitfulness, callousness, manipulativeness, impulsivity, risk taking, and irresponsibility. For schizotypal personality disorder, an elevated score on four or more of the following facets is required: withdrawal, restricted affectivity, suspiciousness, unusual perceptions & beliefs, eccentricity, and perceptual dysregulation. In the case of borderline personality disorder an elevated score is required on four of the following facets: hostility, impulsivity, risk taking, anxiousness, emotional lability, separation insecurity and depression, one of which must be hostility, impulsivity, or risk taking. Given the relative novelty of the Alternative Model for Personality Disorders, there are still few studies that have analyzed the relationship between the different facets, SUD, and the various consumption profiles. In problematic alcohol consumers, Creswell et al. [31] have found significant correlations between scores on the Alcohol Use Disorder Identification Test (AUDIT) and all domains defined in the Alternative Model for Personality Disorders, with the exception of detachment. More recently, Somma et al. [32] analyzed PID-5 scores in a sample of adolescent students, finding moderate correlations between some facets of the disinhibition domain (impulsivity and risk

taking) with the number of times they have been drunk. This last study also found a link between high scores on the facets of irresponsibility, risk taking, and unusual perceptions & beliefs with a higher frequency in the use of illegal drugs. Finally, a study conducted with patients being treated for various mental disorders [33] found the disinhibition domain to be the greatest predictor of alcohol and illegal drug use, although only one of the patients of the sample had a specific diagnosis of AUD.

Beyond the aforementioned works, to the best of our knowledge no studies to date have explored the relationship between facets defined in the Alternative Model for Personality Disorders and consumption profiles specifically in patients diagnosed with SUD. In addition, most of these studies – when using both the Alternative Model for Personality Disorders and the Five Factor Model – analyzed the consumed substance in isolation. However, in reality it has been shown that a high percentage of patients with SUD are for the most part polydrug users [34, 35]. In this regard, the specialized literature points out that polydrug users show greater personality imbalances than those who consume a single substance [36-39]. Therefore, it may be useful to identify the personality patterns that are related to polydrug use.

On the basis of the above literature review, the objective of this paper is to analyze the relationship between the facets of the Alternative Model for Personality Disorders and various SUD profiles, comparing these scores with normative scores as well as conducting a comparison between types of patients. Considering the parallels indicated between the Five Factor Model and the Alternative Model for Personality Disorders, and the specific association between certain PDs and SUD with different substances, the following hypotheses are proposed: i) there will be high scores on most of the facets among patients diagnosed with SUD when compared with normative population scores; ii) patients consuming alcohol and cocaine — who show higher rates of antisocial and

borderline personality disorders — will score high on the facets of hostility, impulsivity, risk taking, deceitfulness, callousness, manipulativeness, irresponsibility, anxiety, emotional lability, separation insecurity, and depression; iii) cannabis users — who show higher schizotypal personality disorder rates — will have higher scores on the facets of unusual beliefs & experiences, eccentricity, perceptual dysregulation, restricted affectivity, withdrawal, and suspiciousness and; iv) patients with a pattern of polydrug use will show a greater tendency towards personality disorder and, therefore, show higher scores on a greater number of facets.

Material and methods

Participants

The sample consisted of 289 patients diagnosed with SUD who began their last treatment in specialized centers for drug addiction and mental health during the year prior to the study. In particular, 97 patients began treatment in an Outpatient Drug Treatment Center, 116 patients in 3 Therapeutic Communities, and 85 patients in 5 Community Mental Health Units, all of them in the region of Andalusia (Spain).

To participate in the study, patients had to meet the following inclusion criteria: 1) patients must be diagnosed with alcohol, cannabis, cocaine, or heroin use disorder according to DSM-IV criteria; 2) patients must not present disorders due to mental retardation or other disorders related to learning; 3) patients must know how to read and write; 4) patients who signed the informed consent.

The fieldwork was carried out between January 2016 and November 2017. During the study period, 19 patients who met the inclusion criteria refused to participate. The majority of these patients mainly pointed out the lack of time available to conduct the interview.

The sample was composed of 85.9% males with an average age of 39.94 years (SD = 10.88), with 45.3% of the sample receiving treatment for alcohol consumption, 46% for cannabis use, 62.8% for cocaine use, 27.5% for heroin use, whilst 57.4% were receiving treatment for more than one psychoactive substance. Of the sample, 45.6% of the participants had completed primary education, and 16% were working at the time of the interview.

Instruments

Personality Inventory for DSM-5 (PID-5SF) [29, 40]. The Spanish version of this instrument was administered, whose psychometric properties have been compared by Díaz-Batanero et al. [41]. The instrument showed adequate internal consistency (Cronbach's alpha above .65 in 21 out of 25 facets assessed) and high stability in a 2-week test-rest study (effect size under .30 on most facets). Confirmatory Factor Analysis confirmed the structure of the five correlated factors that had previously emerged in the exploratory factor analysis of the original PID-5. Factorial congruence demonstrates the comparability between the Spanish version of the PID-5-SF and the original version of PID-5 [29]. Each of the DSM-5 facets is evaluated with 4 items using a Likert-type response format, with scores ranging between 0-3 (from "Very false or often false" to "Very true or often true"). The score on each facet is obtained through the average score of the four items of which it is composed. Higher scores are indicative of a greater presence of the evaluated facet. Following the instructions of the PID-5, the domain scores were obtained by calculating the average of the three facets established in the instrument.

Substance Use Disorders. The diagnosis of SUD was made by the therapeutic team of the treatment centers, following the criteria established in the diagnostic classification

of the DSM-IV. This diagnosis was later compared with information gathered in the interview with the patients, where the *Spanish version of the Substance Dependence Severity Scale* was administered [42]. In the case of observing differences between the diagnosis provided by the clinician and the information given by the patients (<5%), the patient's diagnosis was analyzed individually by the research team and the clinical manager.

Procedure

The tests were administered by a psychologist with experience in the evaluation of patients, and the interviews were conducted in the centers where the patients received their treatment. Initially, the clinical professionals of the therapeutic centers informed the patients of the research that was being conducted, and indicated that the study was external to their therapeutic process. Next, they were read the informed consent indicating that if they wanted to participate, they should sign the form. This study has been approved by the ethics committee of the University of Huelva and the hospital center to which the Mental Health Units belong (Juan Ramón Jiménez hospital area, Huelva, Spain).

Analysis

First, a latent class analysis was applied to establish the profiles of the patients according to their SUD. Latent class analysis facilitates the extraction of distinct, meaningful subgroups based on the unobserved heterogeneity within a population, and on the similarity of their response profiles. For this, diagnoses were used for the following substances: alcohol, cannabis, cocaine, and heroin. The optimal number of latent classes was evaluated through the adjustment of each of the models (from 2 to 5

classes) using the Bayesian Information Criterion (BIC) and Akaike Information Criteria (AIC). The BIC and AIC are descriptive fit indices where lower values indicate a better fit of the model. To determine the accuracy of latent classes in the sample employed, a cross-validation procedure was followed, selecting 60% of the sample at random.

To test if the facet scores on each class are statistically different from the normative scores, we used the community sample scores published in Gutiérrez et al. [38]. The differences between the latent classes in the scores on the facets and domains were analyzed by applying ANOVAS. To determine which facets and domains show the greatest explanatory capacity of belonging to each latent class, logistic regression analyzes were carried out, controlling for gender and age variables. Bonferroni correction was applied to adjust statistically significant results.

The latent class analysis was conducted with the Latent Gold 4.0 software, the logistic regressions with STATA version 14, and the remaining analyzes were conducted with the SPSS 22.0 software.

Results

Latent class results

The 2 and 3 class solutions obtained from latent class analysis showed an inappropriate fit (p <.05). Among the other two models assessed (4 and 5 classes), the solution of 4 classes showed a lower value of BIC and AIC. The assignment of belonging to each class was retained for those patients with a probability of belonging to at least one latent class equal to or greater than .70, leaving 36 patients that failed to meet this criterion (12.08%). For this solution, the average probability of belonging to each of the classes ranged between .799 and .987. Cross-validation analysis showed percentages of

agreement of classification of patients in the same class of 80% for the first group and 100% for the remainder.

Latent class 1 was composed of 33.3% of the sample with a high conditional probability of having cocaine use disorder (conditional probability = .996), as well as cannabis (conditional probability = .944) and, to a lesser extent, alcohol (conditional probability = .624) and heroin (conditional probability .298). Latent class 2 consisted of 34.4% of the sample, and was composed of patients with a high probability of presenting cocaine use disorder (conditional probability = .915) as well as a high probability of heroin use (conditional probability = .590). In the case of class 3 (19.9% of the sample), this was exclusively composed of patients with alcohol use disorder (conditional probability = .987); and finally, class 4 (14.5% of the sample) was exclusively composed of patients with cannabis use disorder (conditional probability = .984).

Analysis of socio-demographic and consumption profiles

Table 1 shows the socio-demographic and consumption profile of the four classes analyzed. A first latent class with a profile of polydrug use (POLY) was observed, in which all patients present cocaine use disorder, with 93.1% using cannabis and 59.8% alcohol. The second latent class also showed a majority of patients with cocaine use disorder (91.1%) and 55.6% with heroin use disorder (COC-HER group). Classes 3 and 4 corresponded to patients with exclusive alcohol (ALC) and cannabis (CAN) SUD respectively. In terms of the socio-demographic profile, it was observed that the patients of the POLY and CAN classes had a lower mean age (Class 1: M = 35.22, SD = 9.57, Class 4: M = 34.58, SD = 10.55, F3.258 = 25.70, p <.001). In these classes, there were a higher percentage of single substance use patients (Class 1: 81.4%, Class 4: M = 78.9%, versus Class 2: 55.1%, Class 3: 44.7%, $\chi 2 = 28.88$, $p < .001$).

INSERT TABLE 1

Differences between the normative population and patients with SUD

Table 2 compares the facet and domain scores of the different latent classes with the normative scores reported in the study by Gutiérrez et al. [43]. In the POLY group, high and statistically significant scores ($p < .001$) were observed for all facets and domains, except for the facets of attention seeking, grandiosity, rigid perfectionism, and submissiveness. The observed effect sizes were greater than 0.70 for all domains. For the facets, effect sizes greater than .70 were observed in the facets of anhedonia, anxiousness, deceitfulness, depressivity, distractibility, eccentricity, impulsivity, irresponsibility, perseveration, separation insecurity, suspiciousness, and unusual perceptions.

The patients included in the COC-HER and ALC classes showed significantly higher scores than the normative population in all domains except antagonism. In this domain, patients in the COC-HER group only showed average scores higher than the normative scores on the facet of grandiosity, although with low effect sizes ($d = 0.32$). The ALC group did not differ significantly from the normative sample in either the antagonism domain nor the facets included in this domain. In patients in the CAN group, scores on the psychoticism domains differed significantly from those observed in the normative population. All facets of this domain differed with respect to the normative population, with an effect size between $d = 0.66$ (eccentricity) and $d = 0.93$ (unusual perceptions).

INSERT TABLE 2

Differences in personality profiles between the latent classes

Table 3 shows the adjusted odds ratios (AOR) between the latent classes, adjusted for age and gender. Regarding the POLY group, no statistically significant differences were observed on the domain scores in comparison with the COC-HER class. Differences

between the POLY and ALC class were found for the detachment domain (AOR = 0.43, [0.21, 0.86], $p < .001$). Statistically significant adjusted odds ratios (AORs) were observed in the comparison between the POLY class and the CAN latent class for the negative affect domains (AOR = 2.27, [1.23, 4.48], $p < .001$). In relation to the facets, following the application of the p-value correction for multiple comparisons no significant differences were found in any of the facets or for the comparison between POLY and either the COC-HER or ALC group. However, larger effect sizes were observed for depressivity (AOR = 1.60, [1.09, 2.35]), manipulativeness (AOR = 1.56, [1.04, 2.34]) and restricted affectivity (AOR = 1.74, [1.12, 2.71]) compared with the COC-HER group, and in risk taking (AOR = 1.92, [1.10, 3.38]) and the facets of anxiousness and intimacy avoidance when compared with the ALC class. In the comparison between the POLY and the CAN latent class, significant differences were observed on 4 facets (anxiousness, callousness, manipulativeness, and risk taking) (see Table 3).

Regarding the COC-HER latent class, significant differences were observed in comparison with the ALC latent class for the detachment domain (AOR = 0.48, [0.28, 0.82], $p < .05$). The greatest effect sizes were observed for the facets of intimacy avoidance (AOR = 0.66, [0.41, 0.92]) and withdrawal (AOR = 0.58, [0.35, 0.94]). Additionally, when compared with the CAN group — although the differences did not reach significance — patients in the COC-HER group presented higher effect sizes for anxiousness (AOR = 1.77, [1.05, 2.97]) and risk taking (AOR = 1.73, [1.20, 2.85]). Finally, when the scores of the ALC group domains were compared with the CAN class, differences were observed in detachment (AOR = 5.45, [1.94, 15.34], p <.01) (see Table 3). Patients in the ALC group are also more likely to present higher scores than

patients in the CAN group in intimacy avoidance and withdrawal with AOR values of 2.27 and 3.34 respectively.

INSERT TABLE 3

Discussion

In the present work we have analyzed the relationship between the facets and domains defined by the Alternative Model for Personality Disorders and the consumption profiles in a sample of patients with SUD. To our knowledge, this is the first study conducted specifically on patients with SUD using an approach based on the Alternative Model for Personality Disorders. In addition, instead of analyzing the SUD for each substance separately, this paper adopts a perspective that is closer to the therapeutic contexts, identifying and comparing the polydrug profiles of patients.

Firstly, a comparison of the scores of the sample with respect to the normative scores [43] partially supports the first hypothesis proposed in this work. On the one hand, it is observed that all classes presented elevations with respect to the normative sample on three of the facets linked to the disinhibition domain (impulsivity, irresponsibility, and distractibility). These traits have consistently been identified in community drug-using samples [20-22, 24, 32] and in specific groups of patients [21,22, 25, 26, 32, 33]. In the present study, moreover, this relationship is shown in patients with different polydrug consumption profiles. On the other hand, however, variability between the different latent classes is observed in comparison with the normative scores. In particular, in the polydrug group, moderate-high and high effect sizes have been observed on all 5 domains and for 21 of the 25 facets; in contrast, there are no notable differences with respect to the normative population in the latent class of cannabis users. These results are congruent with those of previous studies reporting greater personality alterations in polydrug patients [36-39]. In relation to the cannabis group, the facets of unusual

perceptions and eccentricity — in addition to those related to the impulsive component — are those that show the greatest effect sizes in this group. In this regard, work conducted within the framework of the Five Factor Model has also indicated that these facets are mostly associated with cannabis users [19,20,22].

Regarding the second hypothesis in relation to patients with alcohol and cocaine use disorder, the results obtained are partially consistent with our prediction. On the one hand, significantly higher scores have been found on the facets of anxiousness, emotional lability, separation insecurity, depressivity, and impulsivity in the groups that consume alcohol (ALC and POLY) and those that use cocaine (COC-HER and POLY), compared to normative scores. The elevations found on these facets, which are involved in the diagnosis of borderline personality disorder according to the DSM-5 [27], constitute evidence consistent with the results of other studies linking the presence of this disorder with dependence on opioids [10, 12, 40], cocaine [5, 39, 44, 45] and alcohol [5, 12, 45, 46]. However, among these three groups, only the POLY group presented high scores on the facets of hostility, deceitfulness, callousness, manipulativeness, and risk taking. According to the DSM-5, these facets are related to antisocial personality disorder [27]. Taken together, these results suggest that the impulsive dimension linked to both antisocial and borderline personality disorders is shared between the different patient profiles. In contrast, the antagonistic dimension linked to antisocial disorder appears to be more specific on patients with a polydrug profile. This observation could help to understand the inconsistent results found in previous studies comparing the prevalence of antisocial personality disorder in different groups of patients [8, 47, 45]. Previous results might be ignoring that different components of the disorder (impulsive, antagonist) could be differentially related to specific profiles of consumption. In fact, this antagonistic component has been pointed

out in previous works within more severe consumption profiles [48]. Future research is needed to deepen into this hypothesis.

Further, the results of this study provide support for our third hypothesis. The cannabis group showed moderate-high effect sizes in comparison with the normative population on the facets of restricted affectivity, suspiciousness, unusual perceptions, and eccentricity. According to the Alternative Model of Personality Disorders of the DSM-5, these facets are related to schizotypal disorder. These results are consistent with studies that associate cannabis use with the presence of psychotic spectrum disorders [9, 16, 45, 49, 50]. Furthermore, in a non-hypothesized manner, moderate-high effect sizes for some of these facets were also found in the COC-HER and ALC classes (unusual perceptions, suspiciousness, withdrawal, and eccentricity). The presence of these psychotic symptoms in patients with AUD has been described previously [4,8], although this result is more unexpected in the COC-HER group. The mixed consumption profile of the COC-HER group, previously described in other studies [51-53], might partially explain the presence of these facets.

Finally, in relation to the last hypothesis formulated, as indicated above, patients with polydrug user profile show a greater tendency towards personality disorder when compared with the normative population. However, when this group is compared with the other groups of patients, these differences are markedly reduced. Thus, no significant differences have been observed in comparison with either the COC-HER group or the ALC group, whilst lower scores on negative affect were observed in comparison with the CAN class. A number of previous studies have emphasized the role of negative affectivity in various pathologies, but particularly in patients with SUD [24, 54, 55]. Our results support the role of this dimension in patients with a more severe pathology.

In terms of clinical implications, the results of this work contribute towards identifying the personality patterns linked to various SUD profiles. This information can be used for the development of prevention programs for those individuals who show these risk patterns in the general population. For instance, the presence of high scores on traits such as antisociality, impulsiveness, and affective instability would allow for identifying groups at risk of developing addiction problems. Although the presence of these pathological personality traits is not the only (or determining) factor for the development of an addictive disorder, this is an important risk factor [9] to be taken into account in the development of prevention programs that encourage more adaptive coping strategies. From a therapeutic perspective, the identification of personality patterns must be integrated into the psychological treatment received by patients with SUD. It is important to note that patients with psychiatric comorbidity show poorer therapeutic outcomes [7-9], and therefore having knowledge of their personality patterns can help to maximize the effectiveness of therapeutic interventions.

Although the present study has generated results of great interest for both research and clinical practice, it also presents certain limitations. First, although the DSM-5 domains can be considered as extreme and pathological variants of the Five Factor Model, this correspondence is not completely isomorphic across all dimensions [56]. A notable example is the lack of complete correspondence between Psychoticism and Openness [57-59]. Some authors consider that psychoticism can be a dysfunctional modality resulting from the same mechanism that produces openness, and is characterized by elevated apophenia that entails a tendency to mistakenly identify connections between unrelated phenomena [60]. In this regard, patients with SUD appear to present the pathological characteristics of openness, which coincide with psychoticism, without appearing to be the most adaptive. In addition, the dimensions defined in the FFM are

bipolar, these being extreme maladaptive scores of both poles [61] while the AMPD includes only one maladaptive pole for each domain. On the basis of these considerations, any discussion of the results found in relation to the FFM should be approached with caution.

Another limitation worth noting is that 85% of the participants in the study were men. Whilst this asymmetric distribution of men and women has not allowed us to analyze the possible impact of gender on our results, this variable was controlled in the logistic regression. Moreover, the percentage of men and women is similar to that observed in the demand for treatment for drug use in the general Spanish population (84% in Spain) [62].

In spite of the limitations indicated, we believe that the current work has generated findings that make a novel contribution to this field of research whilst also being potentially useful for clinical practice. These findings support the predictive utility of personality facets in the different consumption patterns of substance use disorder patients.

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Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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Table 1. Sociodemographic and consumption profile of each latent class

	Total *n* = 262	Class 1 *n* = 87	Class 2 *n* =90	Class 3 *n* =47	Class 4 *n* = 38	F/χ^2	*p*
Drug receiving treatment							
Cocaine	169 (64.5%)	87 (100.0%)	82 (91.1%)	0	0	230.16	<.001
Heroin	82 (31.3%)	32 (36.8%)	50 (55.6%)	0	0	64.56	<.001
Cannabis	119 (45.4%)	81 (93.1%)	0	0	38 (100.0%)	239.46	<.001
Alcohol	99 (37.8%)	52 (59.8%)	0	47 (100.0%)	0	173.01	<.001
Male	223 (85.1%)	77 (89.5%)	76 (85.4%)	35 (74.5%)	35 (92.1%)	7.177	.066
Age	39.94 (10.55)	35.22 (9.57)	42.51 (8.35)	48.04 (9.85)	34.58 (10.55)	25.70	<.001
Outpatients	115 (43.9%)	20 (23.0%)	52 (57.8%)	28 (59.6%)	15 (39.5%)	107.87	<.001
Mental health service	43 (16.4)	7 (8.0%)	5 (5.6%)	8 (17.0%)	23 (60.5%)		
Inpatients	104 (39.7%)	60 (69.0%)	33 (36.7%)	11 (23.4%)	0		
No studies	55 (21.0%)	19 (22.1%)	19 (21.3%)	9 (19.1%)	8 (21.1%)	15.24	.084
Primary ed.	117 (44.7%)	38 (44.2%)	42 (47.1%)	19 (40.4%)	19 (47.4%)		
Secondary ed.	81 (30.9%)	29 (33.7%)	26 (29.2%)	14 (29.8%)	12 (31.6%)		
University	7 (2.7%)	0	2 (2.2%)	5 (10.6%)	0		

Employed	42 (16.0%)	15 (17.4%)	13 (14.6%)	7 (14.9%)	7 (18.4%)	15.27	.084
Unemployed	128 (28.9%)	46 (53.5%)	46 (51.7%)	19 (40.4%)	17 (44.7%)		
Pensioned	80 (30.5%)	18 (20.9%)	27 (30.3%)	21 (44.7%)	14 (36.8%)		
Other	10 (3.8%)	7 (8.1%)	3 (3.4%)	0	0		
Single	170 (65.4%)	70 (81.4%)	49 (55.1%)	21 (44.7%)	30 (78.9%)	28.88	.001
Married	30 (11.5%)	4 (4.7%)	14 (15.7%)	8 (17.0%)	4 (10.5%)		
Divorced	54 (20.8%)	11 (12.8%)	24 (27.0%)	15 (31.9%)	4 (10.5%)		
Widowed	6 (2.3%)	1 (1.2%)	2 (2.2%)	3 (6.4%)	0		

Table 2. Facets and domains compared with normative scores

	Class 1		Class 2		Class 3		Class 4	
	M (SD)	*d*	*M (SD)*	*d*	*M (SD)*	*d*	*M (SD)*	*d*
Negative affect	1.79 (0.59)*	1.20	1.77 (0.63)*	1.10	1.81 (0.64)*	1.17	1.44 (0.77)	0.38
Detachment	1.15 (0.68)*	0.94	1.18 (0.66)*	1.02	1.57 (0.74)*	1.60	0.92 (0.66)	0.53
Antagonism	0.94 (0.72)*	0.70	0.63 (0.51)	0.20	0.61 (0.57)	0.14	0.61 (0.51)	0.15
Disinhibition	1.67 (0.66)*	1.08	1.49 (0.56)*	0.83	1.48 (0.69)*	0.69	1.35 (0.76)	0.41
Psychoticism	1.18 (0.63)*	1.15	1.01 (0.58)*	0.88	0.99 (0.65)*	0.78	1.01 (0.69)*	0.78
Anhedonia	1.44 (0.86)*	1.02	1.44 (0.79)*	1.09	1.72 (0.84)*	1.45	1.08 (0.95)	0.46
Anxiousness	1.99 (0.74)*	1.27	1.92 (0.76)*	1.15	2.07 (0.79)*	1.34	1.54 (0.91)	0.52
Attention seeking	0.93 (0.88)	0.16	0.65 (0.83)	0.20	0.57 (0.70)	0.34	0.83 (0.91)	0.03
Callousness	0.66 (0.67)*	0.68	0.43 (0.57)	0.28	0.42 (0.62)	0.24	0.37 (0.49)	0.17
Deceitfulness	1.04 (0.91)*	0.71	0.75 (0.70)	0.37	0.69 (0.74)	0.26	0.65 (0.75)	0.19
Depressivity	1.06 (0.96)*	0.76	0.86 (0.84)*	0.55	1.22 (0.95)*	0.99	0.72 (0.89)	0.33
Distractibility	1.91 (0.84)*	1.38	1.69 (0.85)*	1.07	1.69 (0.97)*	0.97	1.62 (0.95)*	0.90
Eccentricity	1.47 (0.89)*	1.05	1.38 (0.83)*	0.98	1.41 (0.86)*	0.99	1.22 (0.95)*	0.69
Emotional lability	1.69 (0.75)*	0.47	1.73 (0.88)*	0.47	1.82 (0.79)*	0.64	1.48 (1.02)	0.13
Grandiosity	0.66 (0.63)	0.01	0.49 (0.57)	0.32	0.52 (0.70)	0.24	0.58 (0.64)	0.15

Hostility	1.35 (0.87)*	0.49	1.14 (0.83)	0.20	1.08 (0.93)	0.10	0.99 (1.06)	0.01
Impulsivity	1.81 (0.80)*	1.25	1.73 (0.86)*	1.09	1.57 (0.89)*	0.86	1.51 (1.01)*	0.72
Intimacy avoidance	0.90 (0.90)	0.45	0.89 (1.07)	0.38	1.52 (1.23)*	1.01	0.64 (0.89)	0.10
Irresponsibility	1.30 (0.82)*	1.28	1.05 (0.66)*	1.05	1.16 (0.78)*	1.10	0.93 (0.83)*	0.70
Manipulativeness	1.10 (0.97)*	0.54	0.64 (0.70)	0.04	0.61 (0.68)	0.09	0.60 (0.71)	0.11
Perceptual dysregulation	0.82 (0.69)*	0.61	0.63 (0.70)	0.26	0.62 (0.72)	0.24	0.70 (0.82)	0.34
Perseveration	1.52 (0.86)*	0.72	1.41 (0.80)*	0.59	1.43 (0.90)	0.57	1.37 (0.90)	0.48
Restricted affectivity	1.25 (0.79)*	0.62	1.06 (0.81)	0.33	1.18 (0.82)	0.50	1.31 (0.76)*	0.73
Rigid perfectionsim	1.42 (0.80)	0.34	1.33 (0.86)	0.20	1.25 (0.94)	0.08	1.20 (0.78)	0.02
Risk taking	1.60 (0.96)*	0.61	1.16 (0.94)	0.02	0.77 (0.69)	0.63	0.81 (0.85)	0.48
Separation insecurity	1.70 (0.84)*	1.02	1.66 (0.90)*	0.92	1.54 (1.03)*	0.69	1.29 (0.90)	0.44
Submissiveness	0.89 (0.81)	0.09	0.94 (0.84)	0.16	1.01 (0.84)	0.26	0.82 (0.92)	0.01
Suspiciousness	1.55 (0.82)*	1.10	1.23 (0.71)*	0.72	1.21 (0.94)	0.53	1.26 (0.85)*	0.65
Unusual perceptions	1.25 (0.79)*	1.12	1.01 (0.71)*	0.81	0.95 (0.79)*	0.66	1.10 (0.75)*	0.93
Withdrawal	1.12 (0.85)*	0.60	1.21 (0.80)*	0.76	1.48 (0.80)*	1.17	1.04 (0.74)	0.54

Note: * p <.001

Table 3. Odds ratio (95% IC) of facets and domains scores by latent classes

	Class 1 vs 2	Class 1 vs 3	Class 1 vs 4	Class 2 vs 3	Class 2 vs 4	Class 3 vs 4
Negative affect	1.09 (0.64, 1.86)	0.87 (0.43, 1.76)	2.27 (1.23, 4.48)*	0.92 (0.51, 1.67)	1.89 (1.01, 3.55)	2.32 (1.04, 5.17)
Detachment	1.21 (0.73, 2.00)	0.43 (0.21, 0.86)*	1.60 (0.88, 2.92)	0.48 (0.28, 0.82)*	1.58 (0.78, 3.21)	5.45 (1.94, 15.34)*
Antagonism	1.68 (0.97, 2.89)	1.44 (0.69, 3.01)	2.39 (1.20, 4.73)	0.94 (0.46, 1.91)	1.51 (0.64, 3.55)	1.50 (0.50, 4.45)
Disinhibition	1.41 (0.83, 2.40)	0.95 (0.47, 1.91)	1.99 (1.11,3.53)	0.91 (0.49, 1.68)	1.53 (0.79, 2.95)	2.43 (1.01, 5.85)
Psychoticism	1.56 (0.91, 2.68)	0.91 (0.45, 1.85)	1.52 (0.82, 2.80)	0.91 (0.48, 1.71)	0.88 (0.44, 1.75)	1.33 (0.56, 3.18)
Anhedonia	1.23 (0.82, 1.85)	0.90 (0.53, 1.52)	1.56 (0.99, 2.47)	0.69 (0.44, 1.09)	1.49 (0.87, 2.55)	2.22 (1.13, 4.35)
Anxiousness	0.94 (0.61, 1.47)	0.51 (0.27, 0.96)	2.02 (1.22, 3.34)*	0.72 (0.44, 1.90)	1.77 (1.05, 2.97)	2.50 (1.25, 5.00)
Attention seeking	1.27 (0.86, 1.88)	1.02 (0.57, 1.83)	1.19 (0.74, 1.90)	1.02 (0.62, 1.65)	0.92 (0.56, 1.50)	1.19 (0.58, 2.47)
Callousness	1.30 (0.75, 2.24)	1.38 (0.65, 2.94)	2.68 (1.22, 5.91)*	0.89 (0.47, 1.69)	2.04 (0.87, 4.81)	2.00 (1.01, 5.93)
Deceitfulness	1.29 (0.86, 1.94)	1.33 (0.76, 2.26)	1.79 (1.08, 2.98)	0.99 (0.58, 1.68)	1.54 (0.85, 2.79)	1.49 (0.68, 3.22)
Depressivity	1.60 (1.09, 2.35)	1.06 (0.66, 1.68)	1.47 (0.94, 2.30)	0.70 (0.46, 1.07)	1.07 (0.63, 1.81)	1.89 (1.01, 3.57)
Distractibility	1.26 (0.86, 1.85)	0.85 (0.50, 1.44)	1.45 (0.93, 2.27)	0.84 (0.54, 1.29)	1.16 (0.72, 1.86)	1.99 (1.01, 3.98)
Eccentricity	1.16 (0.79, 1.70)	0.78 (0.46, 1.30)	1.34 (0.87, 2.07)	0.85 (0.53, 1.33)	1.19 (0.72, 1.94)	1.94 (0.99, 3.82)
Emotional lability	1.14 (0.76, 1.70)	1.07 (0.59, 1.96)	1.32 (0.83, 2.11)	0.97 (0.62, 1.51)	1.20 (0.76, 1.89)	1.65 (0.85, 3.19)
Grandiosity	1.36 (0.78, 2.38)	1.00 (0.48, 2.05)	1.22 (0.65, 2.30)	0.86 (0.47, 1.55)	0.72 (0.35, 1.48)	0.76 (0.34, 1.71)
Hostility	1.14 (0.77, 1.68)	1.38 (0.82, 2.31)	1.57 (1.10, 2.46)	1.01 (0.65, 1.57)	1.44 (0.88, 2.35)	1.14 (0.63, 2.03)

Impulsivity	1.07 (0.73, 1.57)	1.25 (0.73, 2.14)	1.51 (0.96, 2.38)	1.24 (0.80, 1.92)	1.30 (0.83, 2.04)	1.21 (0.66, 2.20)
Intimacy avoidance	1.14 (0.81, 1.61)	0.58 (0.37, 0.90)	1.37 (0.86, 2.20)	0.66 (0.41, 0.92)	1.28 (0.79, 2.06)	2.49 (1.37, 4.50)*
Irresponsibility	1.39 (0.89, 2.16)	0.84 (0.47, 1.50)	1.85 (1.10, 3.11)	0.75 (0.44, 1.28)	1.39 (0.77, 2.51)	2.27 (1.10, 4.70)
Manipulativeness	1.56 (1.04, 2.34)	1.46 (0.81, 2.64)	2.30 (1.31, 4.04)*	1.02 (0.59, 1.77)	1.51 (0.79, 2.86)	1.87 (0.74, 4.66)
Perceptual dysregulation	1.43 (0.89, 2.30)	1.07 (0.56, 2.03)	1.26 (0.72, 2.19)	0.95 (0.56, 1.61)	0.83 (0.47, 1.47)	0.96 (0.46, 1.99)
Perseveration	1.07 (0.73, 1.57)	0.99 (0.60, 1.64)	1.21 (0.77, 1.91)	0.90 (0.58, 1.42)	1.14 (0.69, 1.87)	1.34 (0.72, 2.49)
Restricted affectivity	1.74 (1.12, 2.71)	1.09 (0.62, 1.91)	0.90 (0.54, 1.48)	0.80 (0.50, 1.28)	0.54 (0.31, 0.95)	0.91 (0.45, 1.82)
Rigid perfectionsim	1.14 (0.77, 1.68)	1.42 (0.83, 2.43)	1.42 (0.86, 2.33)	1.16 (0.76, 1.77)	1.20 (0.71, 2.04)	0.84 (0.45, 1.60)
Risk taking	1.33 (0.94, 1.88)	1.92 (1.10, 3.38)	2.78 (1.69, 4.58)*	1.49 (0.93, 2.37)	1.73 (1.20, 2.85)	1.37 (0.66, 2.82)
Separation insecurity	1.06 (0.73, 1.55)	1.20 (0.75, 1.91)	1.60 (1.11, 2.76)	1.14 (0.76, 1.71)	1.52 (0.94, 2.44)	1.27 (0.74, 2.19)
Submissiveness	0.97 (0.65, 1.44)	0.80 (0.48, 1.33)	1.09 (0.69, 1.75)	0.93 (0.59, 1.45)	1.17 (0.71, 1.94)	1.42 (0.77, 2.62)
Suspiciousness	1.40 (0.91, 2.16)	0.96 (0.58, 1.59)	1.65 (1.10, 2.74)	0.90 (0.55, 1.47)	0.98 (0.57, 1.70)	1.14 (0.62, 2.10)
Unusual perceptions	1.44 (0.94, 2.21)	1.08 (0.61, 1.92)	1.30 (0.78, 2.14)	1.07 (0.64, 1.79)	0.72 (0.40, 1.29)	0.81 (0.39, 1.66)
Withdrawal	0.99 (0.66, 1.47)	0.46 (0.25, 0.82)	1.08 (0.67, 1.74)	0.58 (0.35, 0.94)	1.10 (0.62, 1.93)	3.34 (1.36, 8.20)*

Note: * $p < .001$