Personality profile and drug of choice; a multivariate analysis using Cloninger's TCI on heroin addicts, alcoholics, and a random population group

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Abstract

As personality may predispose, precipitate or perpetuate substance abuse and/or dependence, and as it is considered to remain stable across the years in a given subject, potential links with the drug of choice may help screen future patients before drug consumption. The present study compared three groups: 42 patients with heroin dependence (mean age: 31.2; standard deviation (SD): 5.5; 10 females), 37 patients with alcohol dependence (mean age 44.2; SD: 9.1; 9 females) and 83 subjects from a random population sample (mean age: 38.8; SD: 6.9; 20 females). Personality was measured by Cloninger's Temperament and Character Inventory (TCI). Pillai's MANCOVA with age as a covariate and gender as a cofactor was highly significant. Univariate ANOVA analyses using TCI dimensions as dependent variable showed most variables to vary in parallel for the two patient groups in comparison with controls. Post-hoc tests showed heroin patients to score higher in Novelty-Seeking and Self-Directedness than alcohol patients. Sub-dimensions Exploratory Excitability, Fear of the Uncertain, Responsibility, Congruent Second Nature and Transpersonal Identification were also significantly different in the two patient samples. Logistic regression showed Exploratory Excitability to segregate up to 76% of heroin patients from alcohol patients. In conclusion, personality profiles were linked to some preferential choice of drug and personality screening might be tested in preventive strategies.

Keywords: Personality ; alcohol ; heroin ; dependence ; addiction ; TCI

1. Introduction

Drug abuse or dependence results from a series of factors, including social and family issues, availability or fashion trends. Personality is another factor that may play an important role in the predisposition, precipitation or perpetuation of abuse or dependence behaviours. It is now generally agreed that individuals with substance-use disorders as a whole differ from controls on several broadly-defined personality dimensions (see later), but it is unclear to which degree of specificity these traits may be differentially linked to particular classes of substances. However, the study of links between personality and drug of choice is interesting in order to design optimal strategies in preventive care. And since personality may be associated with specific neurobiological mechanisms (Cloninger, 1987), it could also serve to better understand the complexities of addictive behaviours.

There is abundant literature on how to distinguish substance abusers or addicts from controls. Most studies in this field used dimensional scales focusing on specific aspects of personality rather than categorical divisions between normal patients and patients, such as in axis 2 of DSM-IV. Dimensional scales consider that a continuum is present between psychopathology and the normal range. Personality disorders are seen here as maladaptive extremes of normal personality dimensions.

The most salient variables that have been identified to characterize drug users in general are: (1) sensation seeking (SS; Zuckerman, 1974) and novelty-seeking, (NS; Cloninger, 1987). These (similar) concepts can be defined as: "the seeking of novel, intense, and complex forms of sensation and experience and the willingness to take risks for the sake of such an experience" (Zuckerman, 1994). It was found higher in several classes of addiction in comparison with controls (alcohol and tobacco: Masse and Tremblay, 1997; Ravaja and Keltikangas-Jarvinen, 2001; alcohol, nicotine and cannabis: Van Ammers et al., 1997; nicotine: Pomerleau et al., 1992; opiates: Vukov et al., 1995; cocaine: Ball et al., 1995; pathological gambling: Kusyszyn and Rutter, 1985); (2) impulsivity (IMP) was seen by Barratt (1990) as an "action on the spur of the moment" and is defined in the DSM-IV as "the failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others". The concept is also one of the main tenets of Eysenck's psychoticism scale (1968). Higher levels have been found in substance abusers than in the controls (alcohol: Heath et al., 1997; Cooper et al., 2000; tobacco: Patton et al., 1993; Mitchell, 1999; caffeine: Revelle et al., 1980). (3) Harm avoidance (HA) can be defined as the "tendency toward an inhibitory response to signals of aversive stimuli leading to avoidance of

punishment and nonreward". It is close to Eysenck's Neuroticism concept (1968). In comparison with the controls, it was found lower in alcohol patients with early onset (Cloninger et al., 1988), with alcohol, tobacco and marijuana use in adolescents (Wills et al., 1994) and with the drinking frequency among adolescent psychiatric inpatients (Galen et al., 1997). In contrast, higher Shyness with Strangers (a sub-dimension of HA in the Cloninger model) has been found in moderate drinkers (de Wit and Bodker, 1994).

There are far fewer studies trying to differentiate between drug users of different types. Although the number of drugs used, whether stimulant or depressant, could be predicted by the SS scale (Zuckerman, 1983, 1987; Moorman et al., 1989), in most cases the studies failed to predict drug of choice over personality variables. For instance, the Multiphasic Minnesota Personality Inventory (MMPI; Hathaway and McKinley, 1940) showed no profile difference between cocaine and marijuana users (Greene et al., 1993). No differential psychopathology or emotional disorders were found between users who take drugs from different classes (O'Connor and Berry, 1990). And personality similarities rather than differences between cocaine and heroin addicts were stressed by comparisons using DMS-III-R axis 2 and Millon Clinical Multiaxial Inventory (Craig and Olson, 1990).

A few papers, however, reported different personality profiles between specific drug users. Using the Tridimensional Personality Questionnaire (TPQ), a first design by Cloninger (1987), healthy non-addicts have been shown to prefer alcohol, diazepam and placebo as a function of personality traits, with ethanol-preferring subjects showing less Attachment (a sub-dimension of the Reward Dependence scale) than benzodiazepine-preferring ones (de Wit and Bodker, 1994). A relationship was found between the drug of choice and DSM-III co-morbid disorders, with cocaine users showing more cyclothymic disorders, and sedative-hypnotic abusers showing more Generalized Anxiety and Panic Disorders (Mirin et al., 1991). Using the Eysenck Personality Questionnaire (EPQ), one report showed opiate users to score higher than alcoholics in Susceptibility to Boredom (O'Connor et al., 1995). Using Tellegen's multidimensional personality questionnaire (MPQ, 1985), opioid users were shown to score lower on constraint than alcoholics, which indicates more impulsivity in the former (Conway et al., 2002).

In the same study, a comparison between users of several different drugs showed the Constraint dimension of the MPQ to be decreased with the social deviance of the drug of choice (Conway et al., 2002). Opioid users and alcoholics showed the most opposite characteristics, so that these groups should be more easily distinguishable on the basis of personality questionnaires. Some differences between alcoholics and drug users, such as heroin can be expected from general observation and form the rationale for the present study. Since alcohol is a legal drug and heroin is not, the persons using the latter can be suspected to be more prone to ignore laws and rules, that is, to a more antisocial profile. This would be in line with the last two mentioned reports: (O'Connor et al., 1995; Conway et al., 2002). Also, as alcohol is more often used than illegal drugs to reduce stress, alcoholics can also be hypothesized to have "weaker" personalities, that is, to be more avoidant of danger and less "responsible" than other substance users. Given their usually more marginal style of living, heroin users could also have a less efficient capacity for reality-testing than alcoholics.

To compare these traits in a homogeneous way, it was important to use a global construct where factors are clearly isolated. Cloninger's biosocial model (Cloninger et al., 1993) offers such a structure. It also presents the advantage to combine the hypothesized genetic and neurobiological bases of personality (temperament) with their interaction with learning and environment (character). This contrasts with a model, such as Eysenck's epq (1967, 1990), which bases personality almost exclusively on biology.

The present study compared a group of specific heroin addicts, a group of alcoholics and a healthy control group. An antisocial profile (main hypothesis) should be translated into a higher degree of Exploratory Excitability, more Impulsiveness (both sub-dimensions of NS) and less HA than normal users or abstainers. The "weaker" personality of alcoholics suggests more HA and less Self-Directedness (SDT) than heroin users (second hypothesis). A looser reality-testing capacity of the heroin users may indicate more Self-Transcendence (third hypothesis). The other TCI dimensions were studied here descriptively, in order to help elucidate the structure into which these addiction-associated personality variables are embedded.

2. Material and methods

2.1. Subjects

A total of 42 patients with heroin dependence (mean age 31.2; SD: 5.5; 10 females), 37 patients with alcohol dependence (mean age 44.2; SD: 9.1; 9 females) and 83 subjects from a random population sample (mean age: 38.8; SD: 6.9; 20 females) were entered in the multivariate analysis.

The Brugmann University Hospital welcomes heroin-dependent patients under a methadone maintenance program, who are seeking detoxification under anaesthesia (Ultra Rapid Opiate Detoxification). Inclusion criteria were DSM-IV diagnosis of dependence to opiate with physiological dependence. Exclusion criteria were psychosis and present or past drug dependence other than opiates and nicotine. Forty-two patients (mean age:

31.2; SD: 5.5; 10 females) filled the TCI questionnaire between 2 and 5 days before their treatment, with no other drug use than methadone. DSM-IV co-morbid diagnoses for heroin patients included 19 (50%) anxiety disorders; 8 (22%) affective disorders; 2 (5%) psychotic disorders. Nicotine was used by 37 patients (90%).

This hospital also welcomes alcohol-dependent patients and offers them a detoxification cure using tapered, individually-titrated, large doses of diazepam, vitamin B complex and large amounts of sugared fluids, in order to keep the withdrawal process under control. Patients are asked to stop all consumption of alcoholic beverages and non-prescribed drugs from their first day in hospital. The inclusion criterion was DSM-III-R dependence to alcohol with physiological dependence. The exclusion criteria were psychosis and present or previous other substance misuse or dependence, except for nicotine. Thirty-seven patients (mean age 44.2; SD: 9.1; 9 females) filled the TCI questionnaire between the end of the second week and the third week of their stay, at a time when they did not need medication to control withdrawal symptoms. The records of this patient group have already been used in a previous study (Basiaux et al., 2001). No patient met diagnostic criteria for major depressive disorders at the time of the evaluation, but alcohol-induced depressive disorders in partial remission were frequent. Nicotine was used by 35 alcohol users (83%).

Eighty-three control subjects (mean age: 38.8; SD: 6.9; 20 females) originate from a normative TCI databank *(n = 322)* representative of the Belgian population with respect to sex, age, geographical area and educational level (Hansenne et al., 2001). The present sample was selected in order to obtain mean values for gender and age that are intermediate between the two patient groups. The subjects completed the questionnaire as part of the 1997 family survey of the University of Liège. This survey has been conducted on a nearly annual basis since 1992, to evaluate a series of variables on family life. The subjects were informed by mail that a personality questionnaire would be added to the usual material of the inquiry. The questionnaires were mailed 15 days after the instructions. An interviewer went to the subjects' residences to collect the questionnaires and to check whether these were completed adequately. Nicotine was used by 22 (26%) subjects.

2.2. Methods

The TCI (3) contains a 226 items designed to measure dimensions and sub-dimensions of the Cloninger model, using forced binary choice questionnaire, with no clues as to what could be considered as "favourable" responses. It includes four Temperament dimensions, as well as and three Character ones. Temperament manifests early in life and involves pre-conceptual or unconscious learning. Character represents conceptual or insight-based learning of self-concepts which mature in adulthood and are not linked to particular biological processes. Temperament initially motivates and biases learning, but Character modifies the significance and salience of perceived stimuli to which the person responds, so that both Temperament and Character development influence one another and motivate behaviour. The Temperament dimensions are: (1) Novelty-Seeking (NS), reflecting behavioral activation, is supposedly associated with dopaminergic activity and is defined as the tendency to respond actively to novel stimuli leading to the pursuit of rewards and escape from punishment; (2) Harm Avoidance (HA), reflecting behavioral inhibition, is linked to serotonergic activity and corresponds to the tendency toward an inhibitory response to signals of aversive stimuli leading to avoidance of punishment and non-reward; (3) Reward Dependence (RD), reflecting behavioural maintenance, is associated with noradrenergic activity and is defined as the tendency for a positive response to signals of reward to maintain or resist behavioral extinction; (4) Persistence (PE), originally included in the RD dimension, was later individualized and is not presently linked to a specific neurotransmitter. The character dimensions include: (5) Self-Directedness (SDT), which refers to the ability of an individual to control, regulate and adapt his or her behaviour to fit the situation in agreement with individually-chosen goals and values; (6) Cooperativeness (CO) was formulated to account for individual differences in identification with and acceptance of other people. Cooperative individuals are described as socially tolerant, empathic, helpful and compassionate, whereas uncooperative individuals are described as socially-intolerant, disinterested in other people, unhelpful and revengeful; (7) Self-Transcendence (ST) is a character associated with spirituality and generally refers to identification with everything conceived as an essential and consequential part of a unified whole. Except for PE which includes only one, all dimensions are divided between three and five sub-dimensions.

The questionnaire was used here in its French translation by Le Bon, Staner and Stefos, which was retro-ranslated and accepted by the author.

2.3. Statistics

All variables were normally distributed (Kolmogorov-Smirnov). Pillai's MANCOVA was performed using TCI dimensions and sub-dimensions as dependent variables, group membership as independent factor, gender as a cofactor and age as a covariate, since age means differed between groups. Where factor effects were significant, univariate ANCOVAs were used to determine which personality dimensions significantly differed between the groups. Post-hoc tests were used to compare the groups for each dependent variable where ANOVAs showed significant differences. PLSD tests were used when Levene tests for equality of variances were not significant

and Games-Howell were used in the other cases. A logistic regression analysis was then performed in order to classify the personality variables that differed between the two patient groups. SPSS 10 (Power PC version) was used for all statistical analyses.

3. Results

A total of 42 patients with heroin dependence, 37 patients with alcohol dependence and 83 subjects from a random population sample were entered in the multivariate analysis.

MANCOVA Pillai's Trace was 3265; df: 50; $P < 0.0001$ for subject group; the analysis was not significant for age. Only spiritual acceptance showed a significant interaction between group and gender $(P = 0.017)$, so that results for this sub-dimension should be taken with caution. Results of univariate ANCOVAs for the total sample and post-hoc tests are given in Table 1.

Table 1 *Comparison of TCI scores between heroin addicts, alcohol-dependent patients and a general population sample*

n	Heroin patients		Alcohol patients		General population		ANOVA	Hero/Ctr	Alc/Ctr	Hero/AIc
	42		38		83					
Novelty-seeking	24.2	4.8	21.3	4.4	17.6	5.5	$F = 678.1; P = 0.000$	0.001	0.001	0.014
Exploratory excitability	6.8	1.8	4.8	2.5	5.6	2.3	$F = 55.3; P = 0.004$	0.001	(0.067)	0.001
Impulsiveness	5.1	2.0	5.3	2.3	3.6	2.3	$F = 80.9; P = 0.001$	0.001	0.001	
Extravagance£	7.0	1.7	6.3	2.5	4.5	2.3	$F = 138.5; P = 0.000$	0.001	0.001	
Disordediness	5.2	1.9	4.8	1.7	3.9	1.8	$F = 32.8; P = 0.010$	0.001	0.019	
Harm-avoidance	17.3	6.4	19.7	9.2	13.7	7.2	$F = 929.7; P = 0.000$	0.016	0.001	
Anticipatory worry	5.2	2.6	6.4	3.3	4.1	2.7	$F = 118.6; P = 0.001$	0.032	0.001	(0.061)
Fear of uncertain£	3.2	1.4	4.3	2.3	3.4	2.1	$F = 32.5; P = 0.019$		0.030	0.046
Shyness with strangers	3.6	2.4	4.2	2.7	3.0	2.3	$(F = 35.6; P = 0.055)$		0.018	
Fatigability	5.1	2.3	4.7	2.8	3.1	2.3	$F = 167.9; P = 0.000$	0.001	0.001	
Reward-dependence	14.0	2.8	13.9	4.0	13.8	4.2	NS			
Sentimentality	7.1	1.4	7.6	2.0	6.3	2.1	$F = 30.0; P = 0.018$	0.034	0.001	
Attachment	4.2	1.9	3.7	2.2	4.6	2.2	$(F = 23.8; P = 0.071)$		0.037	
Dependence	2.7	1.1	2.6	1.2	2.8	1.5				
Persistence£	4.7	2.1	4.4	2.4	5.0	1.7	NS			
Self-directedness	24.2	6.9	20.0	8.1	31.8	6.5	$F = 3232.1; P = 0.000$	0.001	0.001	0.004
Responsibility	4.1	2.0	3.2	2.0	5.6	2.1	$F = 119.7; P = 0.000$	0.001	0.001	0.032
Purposefulness	4.2	1.8	3.7	2.0	5.7	1.6	$F = 93.5; P = 0.000$	0.001	0.001	
Resourcefulness	3.0	1.6	2.4	1.7	4.0	1.3	$F = 68.3; P = 0.000$	0.001	0.001	(0.099)
Self-acceptance£	7.1	2.6	6.3	3.2	8.0	2.3	$F = 58.1; P = 0.016$		0.018	
Congruent second nature	5.8	2.3	4.2	3.0	8.4	2.5	$F = 415.9; P = 0.000$	0.001	0.001	0.005
Cooperativeness	29.8	5.6	29.4	8.5	31.2	6.6	NS			
Social	6.6	1.2	6.0	2.4	6.4	2.0				
Empathy	4.5	0.2	4.2	1.7	4.7	1.6				
Helpfulness	5.4	1.4	5.3	1.5	5.9	1.5				
Compassion	7.5	2.5	7.5	3.4	7.6	2.6				
Principled	6.0	1.8	6.3	1.7	6.5	1.7				
Self-transcendence	18.4	6.8	15.6	8.1	11.9	5.2	$F = 1514.2; P = 0.000$	0.001	0.003	(0.051)
Self-forgetfulness	6.9	2.4	6.5	3.1	4.9	2.4	$F = 150.2; P = 0.000$	0.001	0.001	
Transpersonal identification	4.8	2.0	3.8	2.5	2.9	1.8	$F = 91.0; P = 0.000$	0.001	(0.072)	0.033
Spiritual acceptance£	6.6	3.6	5.3	4.0	4.0	2.6	$F = 298.8; P = 0.000$	0.001	0.040	(0.069)

ANCOVAs and PSLD post-hoc tests except for variables (£) where homogeneity of variances was not assured and Games-Howell tests were used. Means are not adjusted for age or gender and represent raw data.

Novelty-seeking was found significantly higher in both substance user groups than in the control population.

This was true of all sub-dimensions, except for Exploratory Excitability in alcoholics, which showed a trend for a relationship in the opposite direction (less Exploratory Excitability than in controls). Heroin users were significantly more novelty seekers than alcoholics, especially on Exploratory Excitability. In contrast, Impulsivity (sub-dimension impulsiveness) was virtually identical in both user groups.

Harm Avoidance as a whole was more elevated in both patient groups than in the general population. The four sub-dimensions (Anticipatory Worry, Fear of Uncertain, Shyness with Strangers, Fatigability) showed significantly higher levels in alcoholics than in the controls, whereas only the first and the last showed such types of differences between drug users and the controls. Alcoholics showed significantly more Fear of the Uncertain and a trend toward more Anticipatory Worry than heroin users.

Self-Directedness was lower in both groups than in the controls. This lesser value of SDT in both patient groups was true of all sub-dimensions, with the exception of Self-Acceptance where heroin users did not significantly differ from the controls. Alcoholics were significantly less responsible and second nature congruent than heroin users. A trend in the same direction was shown for resourcefulness.

Self-transcendence was significantly higher in both patient groups and showed a strong trend showing drug users to be more distant from the controls than the alcoholics. Virtually all sub-dimensions confirmed these tendencies (only a trend was apparent between the alcoholics and the controls on Transpersonal Identification). Heroin patients showed significantly more Transpersonal Identification than alcoholics.

Miscellaneous: Reward Dependence as a dimension did not differentiate alcohol and drug addicts from either the controls or between themselves. Only Sentimentality was significantly higher in both patient groups than in the controls and Attachment was lower in alcoholics than in the controls. Cooperativeness and Persistence were not significantly different between the groups.

A comparison between the two patient groups was performed using forward stepwise logistic regression with all sub-dimensions significantly different or showing trends. It was highly significant (Wald: 11.7; df: 1; $P < 0.001$) with correct segregations predicted by Exploratory Excitability alone (76.20% heroin; 59.4% alcohol). All other variables improved the segregation criteria by less than 0.001%. Removing Exploratory Excitability, Congruent Second Nature made correct predictions for 69.0% heroin patients and 56.7% alcohol patients (Wald: 5.9; df: 1; $P < 0.014$).

4. Discussion

This comparison between two dependent patient groups (heroin and alcohol) and a general population sample showed the two pathological conditions globally to deviate in the same direction with respect to controls. Both showed more novelty-seeking, less self-directedness and more self-transcendence than the controls. Higher levels of SS in the addict groups than in the controls were previously demonstrated (Malatesta et al., 1981; Cloninger et al., 1988; Galen et al., 1997; Ravaja and Keltikangas-Jarvinen, 2001; Gabel et al., 1997; Van Ammers et al., 1997; Masse and Tremblay, 1997; Heath et al., 1995; Pomerleau et al., 1992; Vukov et al., 1995; Ball et al., 1994, 1995; Kusyszyn and Rutter, 1985). More contrasted results are found in the literature on harm avoidance, with some studies reporting lower levels (Wills et al., 1994), and others, like in the present study, higher levels (de Wit and Bodker, 1994). No previous reports, to our knowledge, showed different levels of self-directedness or self-transcendence. No difference was observed as a function of age. Interaction with gender was limited.

By comparing user groups, our main hypothesis that the personality of heroin addicts would show higher Novelty-Seeking than alcoholics was presently confirmed. This was especially true of Exploratory Excitability, where the means in alcoholics was actually lower than in the controls, although only one trend supported it. The comparison between the two patient groups thus confirmed previous reports on novelty-seeking and related concepts (O'Connor et al., 1995; Conway et al., 2002). However, the analysis of the sub-dimensions showed that it was Exploratory Excitability (a concept close to Sensation-Seeking) that differed between the groups much more than impulsivity. Although both groups were more harm-avoidant than the controls, one HA sub-dimension was shown to be significantly lower in heroin users than in alcoholics (Fear of Uncertain) and another showed a trend in the same direction (Anticipatory Worry). Heroin users thus have a more antisocial profile than alcoholics. Our second hypothesis that alcoholics would show "weaker" personalities than heroin users (more HA and less SD) was also confirmed. Heroin users were even shown previously to be more "autonomous" than the controls (Platt, 1975). The third hypothesis that heroin users would be more Self-Transcendent than alcoholics was not confirmed, although the trend was very close to significance ($P = 0.051$). The present results are generally in good agreement with a recent study using the TCI in a sample of female drug addicts (Gerdner et al., 2002).

The most powerful predictors for preferential drug use were determined by logistic regression performed between the TCI sub-dimensions of both addict groups. The most discriminating variable was Exploratory

Excitability, a sub-dimension of Novelty-Seeking, which segregated up to 76% of heroin patients. When this sub-dimension was discarded, Congruent Second Nature, segregated up to 69% of these patients. A similar approach, using discriminating functions, already showed SS to be the most efficient dimension in segregating drug addict groups (Huba et al., 1980).

From a psychological perspective, the two patient group profiles thus seem contrasted: in comparison with alcoholics, heroin users would seek more sensations (but not be more impulsive), be less apprehensive, be more "responsible" and "disciplined", and be more self-transcendent than their alcoholic counterparts.

From a neurophysiological point of view, candidate heroin patients may show lower dopamine responsivity than alcoholics, which could imply more down-regulated or insensitive receptors, and perhaps higher levels of dopamine synthesis and production. This is especially interesting given that Exploratory Excitability is the sub-dimension that has been the most consistently linked to genetic determinants (Benjamin et al., 1996; Ebstein et al., 1996). Given their lower score found here in fear of the uncertain, candidate heroin addicts could also show higher levels of serotonin than future alcoholics.

One of the advantages of studying personality over clinical co-morbid diagnoses is its lifetime stability, as the main personality traits are probably present long before drug use and abuse. Clinical syndromes, such as anxiety or depression have indeed been frequently associated with alcohol and substance abuse. For instance, 43% of (lifetime) major depression was found in a very large group of patients with substance use disorder (Miller et al., 1996). In another study (Compton et al., 2000), 39% of drug addicts were shown to suffer from phobic disorder, 12% from dysthymia and 10% from generalized anxiety. But it is thus not easy in clinical syndromes to disentangle causes and consequences. In the latter study, for instance, the majority of phobias were found prior to the development of the addiction, whereas generalized anxiety diagnoses were reported to be secondary, and depression and dysthymia, more evenly split. Substances may be taken for pleasure and disinhibition, but also to escape stress, to cope with depression or to avoid withdrawal symptoms at a later stage (self-medication hypothesis; Khantzian, 1985). And it is likely that they, in turn, produce stress, anxiety and depression (especially for illegal drugs), as withdrawal shows clear reductions of stress-related scales (Zuckerman et al., 1975) or depression and anxiety scales (Le Bon et al., 1997). This confusion limits the use of co-morbid clinical disorders as predictors for later substance use.

In contrast, personality traits could serve as pre-existing factors that guide individuals' choice of substances and perhaps shaping individual differences in the susceptibility to the effects of mood-altering substances (Sher and Levenson, 1982; Pandina et al., 1992). For some classes of substances at least, pre-morbid characteristics could thus have a predictive value. For instance, personality traits of alcoholics have been shown to precede the onset of alcohol-related problems (Jones, 1968; Kammeier et al., 1973; Loper et al., 1973; Cloninger, 1987; Caspi et al., 1997). Parental alcohol and tobacco use were shown to be related to higher NS in offspring (Ravaja and Keltikangas-Jarvinen, 2001). Substance-use disorders also aggregate in families with considerable specificity, raising the possibility for a genetic vulnerability to the development of substance use problems. Merikangas et al. (1998) have shown, for instance, that predominant drug use disorder in probands tends to match predominant drug use disorder in first-degree relatives, even after adjusting to other forms of psychopathology.

Personality profile analysis could thus be used in screening procedures to help determining adolescents at risk, as this could increase the efficiency of strategies in preventive medicine. Most people are unaware of the existence of personality differences, and use the same education ideals for all individuals. Perhaps the realization that these differences may eventually influence the use of drugs in a subgroup will help recognize them in a positive way. High novelty-seekers could for instance be helped to develop life-styles in which constructive alternative means of seeking stimulation are developed. But character traits, such as self-directedness and self-transcendence, which are hypothesized to result from an interaction between Temperament and learning, would logically constitute better targets for intervention.

As the TCI was shown here to be an efficient tool for the segregation of alcohol and drug addicts, it could be used for this purpose. A shorter, age-adapted, specifically-oriented version could however prove valuable. Only longitudinal studies on adolescent cohorts will be able to demonstrate whether such a screening is a realistic and efficient perspective. Caution would clearly be recommended in the use of such methods which could unduly stigmatize personalities with extreme traits.

Limitations to the generalization of these results include relatively small groups for multivariate comparisons and subgroups of insufficient size to study the possibly confounding effects of nicotine. The association with nicotine use was however so overwhelming in both patient groups that the distinction appears of little clinical importance. The relatively small groups of females did not allow for full-scale comparison based on gender. Both studied patient groups were seeking help, which may bias their representativeness among their peers, and perhaps more so in the heroin group entering the more hyped rapid Opiate Detoxification protocol than alcoholics seeking classical detoxification treatment. Another possible bias is also that chronic substance abuse

may induce psychiatric states that modify the assessment of personality (Post, 1975; Gawin and Kieber, 1986; Wise and Bozarth, 1987) and this would lessen the interest of such procedures. However, the links between behavioral disinhibition and drug choice are in general unrelated to current or remitted substance-abuse status and differences between individuals with continuing and remitting substance-use problems could not be found (McGue et al., 1999).

The comparison between patient groups was performed 2-3 weeks after the detoxification in alcoholics, but before the detoxification in heroin addicts. This may not be optimal, since symptoms elicited by withdrawal may have influenced the way personality questionnaires were filled in. There was however a trade-off between paradigm similarity and stability. For obvious clinical reasons, alcoholic patients would simply have been unable to fill the questionnaires in before the detoxification process took place. After 3 weeks and the discontinuation of psychotropic drugs, they were as close as can be to a sober steady-state. Heroin addicts, on the other hand, had characteristically been stabilized for years under methadone maintenance treatment and were attempting a detoxification through ultra-rapid opiate detoxification. They were admitted only for a few days and their clinical state was still relatively unstable when they left after this physiological and psychological challenge. As is often observed in this difficult group to study, relapse is frequent and can be early, and a post-hoc questionnaire-filling session after a week or two could have led to a loss of patients, and thus introduce a selection bias.

In conclusion, heroin and alcoholic patients deviate in the same directions as the controls, but differences showed heroin patients to be more interested by novelty and more assuming than their alcoholic counterparts.

Acknowledgements

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