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MMPI-2 clusters of alcohol-dependent patients and the relation to Cloninger's temperament-character inventory

Egger JIM, Gringhuis M, Breteler MA, De Mey HRA, Wingbermühle E, Derksen JJL, Hilberink S. MMPI-2 clusters of alcohol dependent patients and the relation with Cloninger's temperament-character inventory.

Objective: Psychometric research in the field of alcohol dependence has concentrated on identifying certain (personality) characteristics (i.e. typologies). This paper is aimed to identify such typologies and studies the relation of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) and Cloninger's temperament-character inventory (TCI).
Method: To find MMPI-2 scales associated with maximization of group differences between 222 DSM-IV alcohol dependent inpatients and a control group of 222 normal subjects, discriminant analysis was used. In addition, a cluster analysis was performed with these scales, and the MMPI-2 mean scale values of the resulting patient clusters were examined for their TCI-correlates.
Results: The discriminant analyses showed several MMPI-2 scales that could clearly distinguish between alcohol-dependent patients and the normal controls. Cluster analysis resulted in semantically different MMPI-2 profiles implying qualitatively different groups of patients. When related to TCI scales, these differences revealed harm avoidance, self-directedness, and persistence, amongst others, as important elements in the description of the clusters.
Conclusion: Evidence for the validity of MMPI-2 constructs as well as those of the TCI in the assessment of alcohol-dependent patients was provided.

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Introduction

In the past one could find two different views on the role of personality in alcohol dependence: the presumed existence of an 'alcoholic personality' as a nosological entity, on the one hand, vs. the findings of heterogeneity of personality characteristics of alcohol-dependent patients, on the other hand (1). Research has been drifting away from the quest for a specific 'alcoholic personality' towards attempts at the identification of certain typologies of alcohol-dependent patients. Such an approach should facilitate the design of more appropriate treatments for individual patients (2). However, although this is a widespread view, other studies find a linear relation between alcohol dependence and personality disorder in general. Bowden-Jones et al. (3), for instance, find personality disorder to be associated with significantly increased rates of psychopathology, greater social morbidity and problems in treatment. Also, these problems tend to worsen with increasing severity of personality disturbance and are often not picked up by clinical staff (3). The use of multidimensional assessment instruments might be helpful in finding clusters of personality characteristics, (4) but also in supporting clinical diagnosis by objectifying staff observation.

Alcohol dependence is more prevalent in patients with a personality disorder (5). Antisocial, borderline, avoidant, paranoid and histrionic personalities are among the most common types of personality disorders in alcohol-dependent patients (6,7). As is well known clinically, comorbid personality disorders influence treatment in various ways. Comorbid personality disorders tend to complicate and lengthen the diagnostic and therapeutic process (8–10), to produce atypical response to pharmacological treatment (11) and to

interfere with motivation and compliance (12,13). Still, Nelson and Cloninger (14,15) and Joyce et al. (16) have found certain personality dimensions, like harm avoidance and novelty seeking, to have predictive value in medical treatment response, at least so in anxiety and mood disorders related to alcohol dependence. It is stated that early identification of (maladaptive) personality types and of clusters of behavioural characteristics, therefore, could help individualise psychiatric and psychological treatment (17–19).

This study aims at identifying such personality and behavioural typologies by means of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), which has been extensively used to that end (20,21), and needs no further introduction. We also want to compare the results with earlier findings in the literature and with the personality dimensions as measured with the temperament character inventory (22). This inventory results from Cloninger's psychobiological model and distinguishes the temperament dimensions harm avoidance (HA), novelty seeking (NS), reward dependence (RD) and persistence (PE), and the character dimensions self-directedness (SD), cooperativeness (CO) and self-transcendence (ST). Assessment of these seven dimensions of personality allows for a comprehensive description of individual differences in feelings, thoughts and actions and provides a comprehensive paradigm that integrates psychodynamic, cognitive-behavioural, interpersonal and neurobiological insights into case formulation (23).

Earlier findings in the literature on typologies of alcohol dependence, reveal several relevant MMPI clusters. When studying older cluster analysis reports, a pattern can be discerned that basically shows two categories of clusters. The first one has predominantly antisocial characteristics, low conscience and a lack of ability to control emotions. The second category of clusters refers to neuroticism, severe anxiety and (social) alienation, passive-aggressive tendencies, depressive phenomena, and a high prevalence of psychopathology.

Regarding clusters with antisocial tendencies, several were reported. A first cluster refers to elevated scores on scales 2-4-3[1] (24). This cluster describes patients with primary antisocial tendencies without the ability to control emotions. Donovan et al. did also find cluster 2-4-9 and 9-4-3 to be characteristic, mainly referring to lack of conscience. Goldstein and Linden (25), and Whitelock et al. (26), described the clusters 4-2-9 and 4-9-7, whereas Kline and Snyder (27) reported 8-2-4, 9-8-4 and 4-9 based on male subjects and 4-8-9, 4-3 and 4-9 with female subjects. Additionally, they reported clusters 4-2-8, 4-9 and 2-4, with the antisocial component as a central feature.

With respect to the second type of clusters, those with anxiety and alienation, the high prevalence of psychopathology can be seen as characteristic. According to Donovan et al. (24) the cluster of the elevated MMPI scales 2-8-7-4 was associated with alcohol dependence. Goldstein and Linden found an association between alcohol dependence and neuroticism, anxiety and depression, as indicated by 2-7-8-4-1-3 (25). In addition, Morey et al. (28) studied the relation between MMPI scales and Morey's triple typology of alcohol dependence. These types were described as follows. Type A: the young problem drinkers; Type B: the affiliating type; and Type C: the schizoid alcohol-dependent type (29). They reported that at least one of these typologies of alcohol dependence was correlated with the described profiles in the literature in 91% of the 79 studied reports and that the type C profile was strikingly similar to those patients who showed elevated scores on MMPI scales 2-8-7-4. In studies conducted with the revised version of the MMPI, the MMPI-2, results have been found to be congruent with the earlier findings (20,21).

Temperament character inventory (TCI) research has shown a general relation between elevated novelty seeking and alcohol dependence. NS predicts impulsiveness, aggressiveness and criminal tendencies (30–33). With regard to TCI profiles in characterising alcohol-dependent patients, Cloninger et al. (34) described two types of alcohol-dependent patients. Type 1 has a late onset of alcohol dependence and problems, but dependence does expeditiously get more severe. In this type, anxiety and guilt are often mentioned as reason for drinking. Patients are anxious, perfectionistic, passive-dependent and introverted. They show high scores on the dimensions harm avoidance and reward dependence, whereas they display a low score on novelty seeking. In contrast, Type-2 patients experience dependence already as a teenager and the alcohol dependence is associated with ongoing social and criminal problems. Patients show aggressive tendencies, are impatient, verbally active, impulsive and experience low levels of anxiety and guilt. The TCI profile that is descriptive for this type is a high score on NS with low scores on HA and RD. Ball et al. (35), too, find NS and HA reliable and valid dimensions for the assessment of personality (disorders) in alcohol-dependent patients.

1. The MMPI(-2) basic scales are referred to with their numbers (1 – Hypochondriasis, 2 – Depression, 3 – Hysteria, 4 – Psychopathic Deviation, 5 – Masculinity/Femininity, 6 – Paranoia, 7 – Psychasthenia, 8 – Schizophrenia, 9 – Hypomania, and 0 – Social Introversion.

This leads us to hypothesise the existence of at least two types of MMPI-2 clusters in our study: an antisocial-impulsive cluster and a cluster with neuroticism, anxiety and depression. With the first cluster, TCI correspondence can be expected to be highest with novelty seeking, whereas the second cluster should have its main correspondence with harm avoidance.

Method

Participants and procedure

The patient group consists of 222 alcohol-dependent inpatients admitted to the St Paschalis addiction treatment centre of the Dutch Vincent van Gogh Institute for psychiatry. All patients were classified as alcohol dependent according to DSM-IV criteria and 76.6% of them were men. Mean age of the total group was 42.2 years (SD = 9.6). Patients participated only after detoxification and after obtaining informed consent. They completed the Dutch versions of the MMPI-2 (20) and TCI (36) questionnaires, as a part of the regular diagnostic process.

For the comparisons with a normal group, a sample of 222 persons was randomly drawn from the Dutch normative sample, which consisted of 1244 subjects (20). Of this subsample 59.9% were men. The mean age of the total group was 45.2 years (SD = 13.9). These control subjects provided no TCI data; we only had their MMPI-2 protocols at our disposal.

Analysis

To find the clinical MMPI-2 scales that best differentiated between DSM-IV alcohol-dependent inpatients and a control group of normal subjects, discriminant analysis was used. Following this, cluster analysis on the patient group was used to detect groups of alcohol dependent patients with similar profiles. The hierarchical procedure with Ward's method was used after correcting the profiles according to the mean-centering procedure described by Morey (37). In addition, intercorrelations between TCI scales, on the one hand, and the MMPI-2 addiction potential scale (APS), addiction acknowledgement scale (AAS) and Mac-Andrew alcoholism scale (MAC-R), on the other hand, were computed.

Results and discussion

Of nine MMPI-2 clinical scales (5-Mf excluded), the MMPI-2 scales 4, 6, 7, 2 and 8 discriminated best between the alcohol-dependent patients and a normal sample (60% of variance explained, see Table 1). This differentiating scale pattern is in accordance with findings of Kline and Snyder and Morey et al. (27,28).

The MMPI-2 data of the alcohol-dependent patients were cluster analysed, resulting in a three-cluster solution, which provided clinically interpretable mean profiles, as shown in Table 2. Most of the patients (55%) were categorised into cluster 1. Cluster 2 contained 21% and cluster 3 the remaining 24% of the patients.

When looking at the profiles, three distinct types emerge. Their following vignets were composed by means of the MMPI-2 code-type descriptions (21).

Cluster 1 is characterised by high-point code 4 (well-defined). Patients are described as having difficulty in incorporating the values and standards of society. They are likely to engage in a variety of asocial, antisocial and even criminal behaviours. Impulsive, and striving for immediate gratification, they show poor judgement and considerable risk-taking. Often seen by others as immature, childish, selfish and egocentric. High scorers typically are extroverted and outgoing, but tend to be hostile and aggressive. By psychotherapists, they are initially perceived as good candidates for therapy or counselling. However, the prognosis for change is poor and they are likely to quickly terminate treatment.

Cluster 2 could be characterised by two-point code 6–8 (well-defined). Patients with this configuration typically lack self-confidence and self-esteem and tend to withdraw from everyday activities. They commonly show emotional apathy and, being suspicious and distrustful of others, avoid emotional involvement and ties. They are seen as moody, irritable and negativistic. Effective defences seem to be lacking; patients often are preoccupied by abstract or theoretical matters to the exclusion of concrete aspects of their life situation. They respond to stress and pressure with

Table 1. Loadings and rankings after discriminant analysis of nine MMPI-2 basic scales

MMPI-2 scales	Discrimant loading	Rank
1-Hs	0.37	8
2-D	0.63	**4**
3-Hy	0.42	6
4-Pd	0.84	**1**
6-Pa	0.69	**2**
7-Pt	0.64	**3**
8-Sc	0.60	**5**
9-Ma	0.40	7
0-Si	0.28	9

Note: Proportion explained variance = 60%. Rankings in boldface: standardized weight >0.60.

Table 2. Mean scale scores of three MMPI-2 clusters of alcohol dependent patients

	Cluster 1		Cluster 2		Cluster 3	
MMPI-2 scale	M	SD	M	SD	M	SD
L	48.2	9.3	44.5	10.6	44.6	8.9
F	67.1	16.4	85.5	28.9	78.4	19.2
K	43.6	11.4	36.8	10.7	39.7	8.7
1-Hs	59.3	14.7	58.5	13.9	65.2	15.5
2-D	67.3	14.5	62.3	13.7	77.5	13.7
3-Hy	62.4	16.1	59.2	11.5	67.5	16.6
4-Pd	76.3	13.9	73.2	13.2	72.1	13.3
5-Mf	53.5	10.2	55.1	13.5	57.6	11.4
6-Pa	66.2	13.4	84.1	14.9	66.8	10.0
7-Pt	64.9	13.7	71.2	14.9	82.9	11.3
8-Sc	64.3	13.9	78.8	17.0	76.7	13.2
9-Ma	60.4	13.1	70.3	14.1	60.1	13.6
0-Si	54.9	12.1	56.6	11.4	66.9	9.5

Note: Cluster 1: $N = 122$, Cluster 2: $N = 46$, Cluster 3: $N = 54$. Cluster differences were significant for scales HA, SD and ST ($P < 0.01$; Bonferroni corrected); and for scale PE ($P < 0.05$; Bonferroni corrected).

fantasy and daydreaming, often with an incapacity for differentiating between fantasy and reality. In general, their lifestyles can be characterised as schizoid.

Cluster 3, finally, showed a well-defined 7-2-8 three-point code. The patients with this code type are experiencing a great deal of emotional turmoil and tend to feel tense, nervous and fearful. They describe themselves as depressed, despondent and hopeless and often ruminating about suicide. These patients lack social skills and are shy, introverted and passive in relationships. Typically, they feel inadequate and inferior, setting high standards for themselves and feeling guilty when these are not met. As to clinical diagnosis, patients essentially show a neurotic picture. However, psychotic episodes may be present.

The typology of the three clusters is consistent with previously mentioned findings (25,30). As can be seen in Table 2, the clusters' mean scale profiles show several scales to be elevated above 65. Moreover, the number of elevated scales tend to increase from cluster 1 to cluster 3. This may be seen as an illustration of Morey's earlier findings in which profile elevation among his type clusters were accompanied by increased levels of psychological maladjustment (28).

No significant differences were found on the three addiction scales MAC-R, AAS, and APS. They follow the same pattern with an elevated MAC-R and APS (60–64) and a high AAS (80–90) for all clusters. This could be partly because of the fact that only inpatients were used, whose dependence already gave rise to hospital admission, rather than to minor psychological, work-related or social inadequacies. Nonetheless, scores in addiction acknowledgement (AAS) are highest in the anxious cluster 3 (M, 90.7; SD, 13.8). Apart from showing the actual presence of severe alcohol dependence, this may reflect the patient's self-criticising, evaluative cognitions on the severity of his dependence.

The three-cluster solution was now examined with respect to the TCI scales. Although the TCI scale mean profiles of the three clusters showed more similarity than the MMPI-2 profile clusters, some differences were observed, as can be seen in Table 3.

HA and SD significantly differed between clusters 1 and 3, whereas HA and ST significantly differed between clusters 2 and 3. Also, ST was significantly different between cluster 1 and cluster 2. Cluster 1 displayed low to moderate scores on all seven TCI scales. This profile type referred to relatively stable functioning. Cluster 2 had a slight elevation on ST, sometimes associated with naivete and magical thinking (22). Cluster 3 was characterised by a high score on HA and a low score on SD indicating characteristics as anxious, insecure, weak and fragile.

Finally, Table 4 shows the intercorrelations between TCI scales and MMPI-2 addiction scales, revealing a strong negative association between TCI self-directedness and MMPI-2 AAS. Also, TCI novelty seeking and MMPI-2 MAC-R and APS show good intercorrelations. This is in accordance with general findings over NS (38,39).

This first study on the relationship of the Dutch versions of the MMPI-2 and TCI in Dutch alcohol-dependent patients yielded the following results. First, the MMPI-2 scales 4, 6, 7, 2 and 8 can effectively distinguish between alcohol-dependent patients and the normal population. Second, cluster analysis of the MMPI-2 scales resulted in a three-cluster solution. Cluster 1 displayed a somewhat rebellious and impulsive profile, whereas clusters 2 and 3 consisted of patients with evident psychopathology and personality problems. Of these, the former (cluster 2) is more defined by withdrawing and maladaptive interpersonal

Table 3. Mean TCI scale scores of three clusters of alcohol-dependent patients

	Cluster 1		Cluster 2		Cluster 3	
TCI scale	M	SD	M	SD	M	SD
NS	20.9	5.6	20.2	5.8	19.2	6.0
HA	18.8	6.8	18.1	7.6	24.1	5.9
RD	15.0	3.3	14.9	3.2	13.7	3.5
PE	4.6	1.8	4.9	1.8	4.0	1.8
SD	27.7	8.1	25.2	8.6	23.5	7.0
CO	29.8	6.8	27.3	7.3	28.9	5.7
ST	11.7	5.6	16.1	6.5	12.0	5.8

Note: Cluster 1: $N = 122$, Cluster 2: $N = 46$, Cluster 3: $N = 54$. Cluster differences were significant for scales HA, SD, and ST ($P < 0.01$; Bonferroni corrected); and for scale PE ($P < 0.05$; Bonferroni corrected).

Table 4. Intercorrelations of TCI scales and MMPI-2 addiction scales

TCI-dimensions	MMPI-2 addiction scales		
	MAC-R	AAS	APS
Novelty seeking	**0.34**	0.09	**0.34**
Harm avoidance	**−0.18**	**0.37**	−0.01
Reward dependence	−0.12	**−0.17**	−0.01
Persistence	0.04	−0.04	−0.08
Self directedness	**−0.20**	**−0.49**	−0.11
Cooperativeness	**−0.20**	**−0.25**	−0.05
Self-transcendence	**0.24**	**0.18**	0.04

Note: $N = 222$. Intercorrelations in boldface are significant ($P < 0.01$).

behaviour, whereas the second (cluster 3) is characterised as anxious, alienated and inhibited. Third, the distinction between the clusters revealed that the personality dimensions HA, SD and ST were related to (personality) psychopathology in alcohol-dependent patients. This especially makes sense in the more severely dependent patient, who has profound difficulties in regulating his behaviour, who shows inappropriate behaviours (e.g. poly-drug use, social and professional dysfunction) and who typically displays incompetence of behavioural change (40–42).

We identify at least two limitations to the generalisability of this study. First, earlier research pointed out that alcohol-dependent patients are characterised by a high score on NS. However, the results of our study could not replicate this finding. Perhaps the MMPI-2 cluster solution does not adequately reflect this personality dimension, as was earlier suggested by Wetzel et al. (43). Also, as was mentioned by Costa and Widiger (2), research indicates that impulsivity (i.e. lower constraint) may be better characterised by reverse scores on NS and SD simultaneously, rather than by high NS or low SD alone.

Second, it has been suggested that decision-making impairments are closely related to impulsivity and self-regulatory problems (40), important constituents of NS and SD dimensions. Whereas poor decision-making is strongly associated with maladaptation, the current finding of increasing levels of maladaptation among the clusters, would support this relation and hint at the existence of a dimensional (aetiological) factor underlying both alcohol dependence and other types of disinhibitory psychopathology (44). If so, then the more advanced notion that specific personality clusters may each lead to different treatment considerations, would be somewhat too optimistic.

Conclusion

In line with the literature, support has been found for a distinction in three types of alcohol dependence: (a) the antisocial, immature, risk-taking type, (b) the negativistic, alienated, schizoid type, and (c) the anxious, passive, introverted type. Comparison of the MMPI-2 and TCI scores by way of the different clusters leads to the conclusion that the two instruments to a certain extent provide equal information, adding to construct validity of both and supporting the use of these instruments for the detection and differentiation of personality abnormality in alcohol-dependent patients.

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