Using the Temperament and Character Inventory (TCI) to Predict Outcome after Inpatient Detoxification during 100 Days of Outpatient Treatment

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Abstract — Aims: The aim was to evaluate TCI (Temperament and Character Inventory) scales in identifying personality traits for predicting adherence to outpatient treatments and the relapse of alcohol consumption by alcoholic patients. Methods: Follow-up of 89 alcoholic patients during the 100-day outpatient treatment after their release from the hospital detoxification unit. The detoxification treatment and the follow-up take place in the same hospital unit. Results: Of the patients, 34.8% abandoned the treatment and 31.5% relapsed. The patients who abandoned treatment had lower scores on the Cooperativeness scale. The length of time until the abandonment of the treatment was greater for those with scores >50 for the Self-directedness or Cooperativeness scales. Patients with scores >50 on the Persistence scale were more often abstinent; however, they took the same time to relapse. Conclusions: Higher scores on the TCI personality scales of Persistence, Self-directedness and Cooperativeness predict a better therapeutic evolution, especially with regard to adherence during outpatient treatment after detoxification.

INTRODUCTION

The relationship between personality and substance addiction has been controversial for many years, but longitudinal studies have ruled out the existence of a specific personality type that predicts future addictions (Vaillant and Milofsky, 1982; Vaillant et al., 1982; Vaillant, 1983a, 1983b). However, it has been found that there are some personality structures with a greater risk of developing substance addiction, antisocial personality disorders (Knop et al., 2003) being the most common. Despite this, the attitude of individuals towards drugs should be understood more as a product and complex interrelation of multiple risk factors, which can also include crises and abuse in childhood (Knop et al., 2003), the high expectancies of alcohol use versus different alternatives (Levy and Earleywine, 2004), the capacity to cope without alcohol (Kjobli et al., 2004) or genetic predisposition (Hesselbrock, 1995), amongst others.

At the clinical level, personality disorder risks are being over-diagnosed in alcoholic patients or dependents on other drugs (Dawson et al., 2005), because some of the criteria of personality disorders include substance abuse or may be the result of substance abuse, especially those of B-cluster type, such as antisocial and limit-setting disorders (Rounsaville et al., 1998). Many personality traits or chronic psychiatric symptoms can reflect the way that addictive behaviour shapes the individual since adolescence, confusing the concept of cause and effect.

Diagnostic classification systems, such as Axis II of DSM-IV, have the problem that many symptoms overlap and are not exclusive among disorders and also, in many cases, are not exhaustive.

In the case of personality questionnaires, profile combinations of different scales are used. This system has the advantage of gathering various personality dimensions, placing them in a continuum of severity and presenting them in different measures and combinations within all the potential personality structures (Svrakic et al., 1993, 2002).

Although it is obvious that there are profile differences between psychiatric and normal subjects (Svrakic et al., 2002), between alcoholics, depending on when their dependence started (Basiaux et al., 2001), and between the consumers of different drugs (Le Bon et al., 2004), these are not specific. This is because mixing aetiology with the psychological consequences of dependence and the use of global profiles are of little use clinically, as their objective is to support theoretical conceptualizations of dependencies.

Given these circumstances, our intention is neither to explore the personality profiles of alcoholic patients or compare them with those of other groups of patients, nor to study the properties of the different classification systems.

Our aim is to corroborate the usefulness of the different TCI (Temperament and Character Inventory) scales in identifying simple personality traits that might be useful for predicting adherence to treatment and the risk of relapse in the consumption of alcohol by alcoholic patients undergoing treatment.

The hypothesis under study is that the TCI scales, which could be of prognostic use, are those of Persistence (P), reflecting a tendency to persevere despite frustration, and Self-directedness (SD), a measure of the ability to control, regulate and adapt one’s behaviour according to chosen goals and values.

MATERIALS AND METHODS

A cohort of 89 alcoholic patients was recruited from patients admitted consecutively for alcoholic detoxification in a hospital ward of the Alcohol Unit of the Hospital Clinic in Barcelona (UA-HCB) and followed for 100 days after discharge.

Criteria for inclusion: alcohol dependence according to DSM-IV criteria.

Criteria for exclusion: inability to answer the questionnaire, self-discharge before the end of the detoxification period, alcohol not the main drug that led to admission, re-admission.
during the same period as the study or following post-release treatment at another Drug Dependency Centre. Dependence or abuse of other psychoactive substances was not a reason for exclusion so long as the principal dependence was alcohol.

We did not exclude patients who presented with personality disorders, other co-morbid psychiatric disorders not associated with chronic alcohol consumption or serious organic diseases.

Outcome measures

The outcome measures taken of the results are (i) qualitative: abandonment/completion of treatment, abstinence/relapse in alcoholic consumption, and (ii) quantitative: days until the abandonment of treatment (TDA), days until first drink of alcohol (time to first relapse: TFR) and cumulative abstinence duration (CAD), made up of days of abandonment of treatment plus days of alcohol consumption. An alcoholic relapse is regarded as the consumption of any amount of alcohol, excluding minimal alcohol content (alcohol-free) drinks. Dropout from treatment was recorded as one outcome.

Procedure

Hospital admittance for detoxification was programmed by the UA-HCB itself and took place in an Internal Medical Ward at the hospital. Admittance lasted 7 days on average, during which the detoxification of alcohol and/or other toxins consumed by the patient was carried out. Detoxification was carried out in a general ward, during a 7-day stay, using benzodiazepine drugs, vitamins and the administration of disulfiram when considered necessary. An alcoholic and general psychiatric assessment was also made, following DSM-IV criteria, by a team involving a psychiatrist, a psychologist, a social worker, all of which were members of the UA-HCB, and an organic assessment by an internist doctor.

The presence of depression and anxiety disorders according to DSM-IV Axis I criteria was assessed. No other psychometric instruments were used for this purpose. Diagnosis of depression, anxiety and other acute disorders at the moment of the psychometric evaluation would have excluded the patient, but we found that, in all our patients who had presented with depression or anxiety associated with their chronic alcohol consumption, the symptoms had disappeared by the time of the research assessment.

Patients received individual psychotherapy everyday and group therapy on alternate days. Daily monitoring of drugs in urine samples were recorded. The TCI was administered on an individual basis, between Days 4 and 6 of admittance, in order to establish whether the patient had full functional capacities to take test.

Finally, habit-breaking treatment was started, centred on understanding and accepting the disease, adopting a commitment of abstinence, looking at the behavioural and social changes necessary to continue abstinence, and starting to identify and modify the psychological factors that may interfere with this change.

After discharge from hospital all patients are offered outpatient treatment in the same detoxification unit with psychological and psychiatric consultations and group therapy when suitable.

At 100 days, adherence treatment and duration of abstinence were recorded.

Instruments

The TCI is a self-administered psychometric instrument (Cloninger et al., 1993) validated in our environment (Gutierrez et al., 2001), which measures seven personality dimensions following a theory of a psychobiological and dimensional model that integrates the role of certain neurotransmitters (serotonin, dopamine, noradrenaline) in regulating behaviour.

TCI scores were converted into T-scores according to published normative data (Cloninger et al., 1994). T-score has a normal distribution with a mean of 50 and a standard deviation of 10. These dimensions are divided into four scales of Temperament and three of Character.

The temperament scales are stable in time, with a genetic base, and measure the adaptation of four psychobiological mechanisms of the individual to the variations in his/her environment.

1. Harm avoidance (HA): tendency to anxiety, tendency to shyness, worry and avoidance of punishment (hypothetically related to serotoninergic activity).
2. Novelty seeking (NS): tendency towards exploratory activity in response to novelty, lack of inhibition, impulsiveness (hypothetically related to dopaminergic activity). Affecting the level of control or excitability.
3. Reward dependence (RD): attachment and social attachment systems (hypothetically related to the activity of oxytocin). Associated with attachment to and/or dependence on external approval; being easily influenced; sentimentality/coldness.
4. Persistence (PER): capacity to maintain behaviour in adverse conditions (hypothetically related to noradrenergic activity). Characterized by making demands upon self, hard working, striving for excellence.

The Character scales:

1. Self-directedness (SD): maturity, strength and self-sufficiency. Capacity to manage behaviour guided by goals chosen voluntarily and individually and not by circumstances, impulses or external stimulus.
2. Cooperativeness (C): reveals an inclination towards social tolerance, empathy, friendliness, altruism, respect for others.
3. Self-transcendence (ST): reflects a tendency towards spirituality, idealism, religious or mystical feelings and identification with the wider world, as well as the ability to accept ambiguity and uncertainty, and a sense of communion with others.

Statistical analysis

Student’s t-test was used to compare averages and the Chi square ($\chi^2$) was used for comparisons between qualitative variables.

Survival analysis until abandonment of treatment (TDA) or first consumption of alcohol (TFR) was conducted, these being considered as events analysed according to the Kaplan–Meier method, with comparisons of survival between different groups according to log-rank statistics.

Evaluation of differences in survival until TDA and TFR in terms of the various TCI scales was done using the Cox proportional hazards survival regression method.
RESULTS

Sample description
Males comprised 60.7% of the sample; average age was 46.7 (range 29–74) (s.d. = 9.1) years, with no differences between the sexes.

Of the sample, 41.6% had a second drug involved in their admittance and another 10.1% had a third (not including tobacco). Benzodiazepines (BZD) were consumed problematically by 32.5% of the patients, cocaine by 10.1% and cannabis by 6.7%.

Of the patients, 44.9% had a second neuropsychiatric diagnosis (excluding tobacco addiction) besides alcohol dependence, 14.6% had a third and 2.2% had a fourth; 82% of these diagnoses were the abuse of or dependence on other drugs (44.6% BZD, 21.4% cocaine and 9% cannabis) and 10.7% were for personality disorders; 25.8% of the patients had been admitted previously to the same UA-HCB, six of them on two occasions and four on three occasions.

Table 1 shows the average T-scores of the TCI questionnaire.

Follow-up after 100 days
After 100 days, 34.8% of patients had abandoned treatment and 31.5% had relapsed (during the time they were following the treatment); 9% had relapsed and also dropped out. Seven of the patients who abandoned the treatment had not attended any sessions, and 38.2% continue in treatment without any relapse.

With the data available, the two events do not appear to be related, but obviously we are unaware whether the patients who dropped out did so because of a relapse after the last assessment, so this is unknown.

The probability of continuing without relapsing until Day 100 was 62.2%. At the end of the follow-up study, the average CAD was 68.5 days (s.d. = 37), counting the days that treatment was abandoned as being days of alcohol consumption.

Comparison of TCI scores in relation to the abandonment of treatment or relapse
Table 1 shows the TCI-T-scores of patients in terms of relapse or abandonment of treatment. Only the C scale shows significantly lower scores among patients who dropped out against those who continued treatment for 100 days. In the case of relapses, there is no difference.

Separate men and women did not reveal any differences in TCI scores with regard to relapse or abandonment of treatment. On the other hand, when stratifying according to previous detoxification admittance, patients who were on their first admittance and did not relapse showed higher P-scale scores [45.7 (s.d. = 9) versus 39.9 (s.d. = 11); t = 2.3; P = 0.04] and patients who did not dropout showed a greater level of C scores [49.5 (s.d. = 7) versus 42.6 (s.d. = 9); t = 2.7; P = 0.002]. Among the patients who had been admitted before, the NS score was lower [43.4 (s.d. = 4) versus 51.9 (s.d. = 7); t = 2.2; P = 0.008] and the RD score was higher [53.1 (s.d. = 5) versus 46.6 (s.d. = 8); t = 2.5; P = 0.05] among patients who relapsed.

If we make a separate analysis of the patients who consume alcohol and those who consume other drugs there are no differences in the TCI T-scores with regard to relapses or abandonment of treatment.

Table 2 shows the percentage of patients who relapsed and who abandoned treatment according to the T-scores in the different TCI scales either above or below 50. It can be seen that the percentages for abandonment are much higher among patients who had SD and C scores below 50.

In addition, 68.4% of patients with scores >50 in SD were still in treatment and abstinent at Day 100, against only 30% of those who got scores <50 (Chi square = 9.5; P = 0.04).

The percentages of relapses were not significantly different for high or low scores on any of the TCI scales.

Comparison between TFR, TDA and CAD in terms of TCI scores
The comparison, by means of a survival analysis up to the TFR, between patients with scores on the TCI scales higher or lower than 50 does not show any significant differences in the TFR.

The same analysis, taking into account the time taken until abandonment of treatment (TDA), shows that patients with SD or C scores >50 (Figs. 1 and 2) stayed in treatment much longer (74 versus 90 days on average; log rank = 3.6; P = 0.05 and 72 versus 86 days on average log rank = 3.7; P = 0.05, respectively).

The comparison of the CAD with regard to dichotomized TCI scales (see Table 2) shows a higher CAD among patients with scores >50 on the P scale.

Pearson’s correlation, used to analyse the potential relationship between scores on the TCI scales and the different quantitative measures of outcome (CAD, TFR, TDA), only shows the existence of a direct correlation between P scores and TFR (r = 0.278; P = 0.008).

On the other hand, as expected, all the outcome measures are closely correlated between themselves.

Prediction of TFR and TDA
The aim was to estimate a model to predict TFR and TDA with regard to all the TCI scales, in addition to age, sex, background of previous admittance, and diagnosis or suspicion of personality disorder, by the Cox regression analysis.

Although individually none of the TCI scales has a direct and significant correlation with the TFR and TDA, by entering all the variables mentioned in the equation by the backward stepwise method, we get a model in which the Persistence variable [Odds Ratio: 0.95; P = 0.018; IC 95%: (0.91–0.99)], adjusted according to ST [Odds Ratio: 1.03; P = 0.06; IC 95%: (0.99–1.07)] and the existence of a personality disorder [Odds Ratio: 0.32; P = 0.06; IC 95%: (0.09–1.09)], is related to TFR.

Personality disorder by itself is not related to TFR. The absence of any co-morbidity was not more strongly associated with good outcome than any of the TCI dimensions.

DISCUSSION
Firstly, the results indicate that TCI scales may assist the prediction of the abandonment of treatment more than the prediction of a relapse to drinking. In particular, the TFR is not related in a simple way to any of the scales studied.

According to this, relapse is a singular phenomenon, but related to different and multivariate factors, while adherence to treatment can be better predicted by TCI values, because it is more related to stable behavioural patterns.
### Table 1. Means and standard deviations (s.d.) in T-scores (TS) and comparison of scores between patients with regard to relapse and abandonment of treatment \((N = 89)\)

<table>
<thead>
<tr>
<th>Basic TCI scales</th>
<th>Relapsed before day 100 (N = 28) (s.d.)</th>
<th>Did not relapse before day 100 (N = 61) (s.d.)</th>
<th>Abandoned treatment (N = 31) (s.d.)</th>
<th>Did not abandon treatment (N = 58) (s.d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA (Harm Avoidance)</td>
<td>62.5 (9.5)</td>
<td>62.7 (10)</td>
<td>62.1 (10)</td>
<td>63 (9)</td>
</tr>
<tr>
<td>NS (Novelty Seeking)</td>
<td>50.2 (9.8)</td>
<td>49.2 (10)</td>
<td>50.8 (10)</td>
<td>49.2 (10)</td>
</tr>
<tr>
<td>RD (Reward Dependence)</td>
<td>49.4 (8.8)</td>
<td>49.2 (8)</td>
<td>48.8 (9)</td>
<td>49.3 (8)</td>
</tr>
<tr>
<td>P (Persistence)</td>
<td>43.9 (10.4)</td>
<td>41 (11)</td>
<td>42.7 (9)</td>
<td>43.9 (11)</td>
</tr>
<tr>
<td>SD (Self-directedness)</td>
<td>41 (10.3)</td>
<td>41.8 (8)</td>
<td>41.1 (9)</td>
<td>42.4 (10)</td>
</tr>
<tr>
<td>C (Cooperativeness)</td>
<td>46.1 (9)</td>
<td>46.7 (9)</td>
<td>45 (9)</td>
<td>48.7 (7)*</td>
</tr>
<tr>
<td>ST (Self-transcendence)</td>
<td>44.8 (9,9)</td>
<td>45.8 (11)</td>
<td>42.6 (10)</td>
<td>44.7 (9)</td>
</tr>
</tbody>
</table>

*\(P < 0.05\).

s.d.: standard deviation, TS: T-score.

Student's t-test for comparison of means.

### Table 2. Percentage of patients who relapsed or abandoned treatment and CAD (cumulative abstinence duration) in terms of TCI scales higher or lower than the T-score (TS) of 50

<table>
<thead>
<tr>
<th>Basic TCI scales</th>
<th>Relapsed before day 100</th>
<th>Abandoned treatment</th>
<th>CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TS &lt; 51</td>
<td>TS &gt; 50</td>
<td>TS &lt; 51</td>
</tr>
<tr>
<td>HA (Harm Avoidance)</td>
<td>50%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>NS (Novelty Seeking)</td>
<td>34.7%</td>
<td>27.5%</td>
<td>34.7%</td>
</tr>
<tr>
<td>RD (Reward Dependence)</td>
<td>34.9%</td>
<td>28.3%</td>
<td>34.9%</td>
</tr>
<tr>
<td>P (Persistence)</td>
<td>31.3%</td>
<td>32%</td>
<td>39.1%</td>
</tr>
<tr>
<td>SD (Self-directedness)</td>
<td>34.3%</td>
<td>21.1%</td>
<td>40%</td>
</tr>
<tr>
<td>C (Cooperativeness)</td>
<td>27.5%</td>
<td>36.8%</td>
<td>43.1%</td>
</tr>
<tr>
<td>ST (Self-transcendence)</td>
<td>26.6%</td>
<td>44%</td>
<td>34.4%</td>
</tr>
</tbody>
</table>

*\(P < 0.05\).

s.d.: standard deviation, TS: T-score.

The Chi square test for the comparison of percentages and Student’s t-test for comparison of means.

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![Fig. 1. Time taken until the abandonment of treatment (TAD) of patients in terms of a score on the TCI Self-directedness (SD) scale higher or lower than/equal to 50.](image-url)
Secondly, it was seen that the personality characteristics that may predict a relapse in alcohol consumption differ from those that may predict the abandonment of treatment:

(i) The CAD is greater in patients with scores > 50 on the P scale. Similarly, relapse is less probable among patients with higher scores on the P scale of the TCI, especially among those admitted for the first time. When there had been previous admissions, the lower scores in NS and higher scores in RD were associated with a greater likelihood of relapse. Higher P scores are also a factor associated with protection against relapse when there are personality disorders.

(ii) Abandonment of treatment appears to be more likely in patients with lower scores on the C scale of the TCI, a tendency that is more marked when we focus on patients who were admitted for the first time. Also, scores > 50 in C and SD corresponded to lower abandonment percentages, SD being particularly notable in patients who have neither relapsed nor abandoned treatment. Likewise, SD and C scores over 50 predicted that the treatment was maintained for much longer.

(iii) Scores > 50 in SD are, for practical purposes, a cut-off point that allows patients who will not drop out to be better identified. Due to the fact that their average score (41) is far from 50 and much lower than that for C (46.1) reliable patients with scores > 50 in SD are easy to be detected. Indeed, low C and SD scores

The third discovery was that only three TCI scales have a use in prognosis: Persistence, Cooperativeness and Self-directedness.

(i) A P score over 50 corresponds to greater CAD. CAD is a measurement that increases despite one-off relapses if the patient stops drinking again and does not abandon the treatment. A high P score may typify patients who, though not having a great capacity to remain in treatment if they are progressing well, in the case of a relapse are more demanding of themselves and make a greater effort to keep up with the treatment and return to abstinence. However, the P score seems to have less effect with people who have a lower level of psychological suffering (i.e. without personality disorders) perhaps due to a minor motivation.

(ii) A high C score is what most clearly separates the patients who remained on the treatment from those who dropped out.

(iii) Scores > 50 in SD are, for practical purposes, a cut-off point that allows patients who will not drop out to be better identified. Due to the fact that their average score (41) is far from 50 and much lower than that for C (46.1) reliable patients with scores > 50 in SD are easy to be detected. Indeed, low C and SD scores
are central traits of personality disorders (Svrakic et al., 1993).

The final discovery was the non-existence of a linear relationship between the TCI scores and the TFR of alcohol, the TDA or the CAD.

This can almost certainly be explained by the fact that many patients were atypical cases (outliers), for whom the predictive power of TCI was low and for whom other factors need to be taken into consideration.

Although the possible influence of other variables has been studied, such as age, sex, consumption of other drugs, number of previous admissions or the existence of personality disorders, without any significant effect having been found, it is very likely that there are subgroups of patients for whom the instrument used is of lesser use, as it is evident that some people may have difficulties in understanding or interpreting the sentences, giving distorted replies, whether intentionally or as a result of their low levels of insight.

Prior studies with this approach, which have used the TPQ questionnaire, have obtained disparate results in the scales that may predict a relapse: NS (Meszaros et al., 1999) and P (Cannon et al., 1997).

However, both studies differ a great deal in the realities of our clinical practice. They consist of biased samples which are not very representative for alcoholics with standard treatment in outpatient departments in Spain and have multiple selection criteria: one study has very seriously ill alcoholics who had been recruited by economic incentives (Cannon et al., 1997), and another consists of a group of younger alcoholics, excluding alcoholics with clinical medical illness (Meszaros et al., 1999). Follow-up is also different: patients are followed-up by telephone localization after a period of time (Cannon et al., 1997), or with little demand for abstinence or exaggerated criteria for defining a relapse (consumption of five drinks in 1 day for >4 days a week or >12 units a day) (Meszaros et al., 1999). Finally, in some cases the results are only applicable to the men in the study sample (Cannon et al., 1997).

In summary, these data confirm a promising way of studying specific personality dimensions in depth, especially Persistence, Cooperativeness and Self-directedness, which are relevant to adherence and compliance with treatment in general and drug-dependent patients in particular.

Administration of TCI between Days 4 and 6 of inpatient detoxification, when the patient has no other psychiatric diagnosis, might assist the psychotherapeutic team to identify patients with poor prognosis and those areas (Persistence, Cooperativeness and Self-directedness) that might be therapeutic targets.

In any event, in themselves they can never completely predict the behaviour of our patients, as there is still the influence of other factors that are not directly related to personality, such as the awareness of the disease, the capacity to identify and face up to situations that pose the risk of relapse or simply the level of motivation to remain abstinent, which can also modify the prognosis and mean that there are groups of patients with similar scores on the personality scales who respond to treatment in different ways.

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REFERENCES


