Examining the Relationship of Personality Functioning and Treatment Completion in Substance Misuse Treatment

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ABSTRACT

BACKGROUND: Treatment retention is a major factor contributing to favourable outcome in the treatment of substance misuse, but the literature remains very limited. Despite evidence of the association of personality with drug use experimentation and relapse, surprisingly little is known about its role in the treatment process. Clients' personality functioning as measured by malleable and context sensitive characteristic adaptations in treatment are of concern.

AIMS: This study examines whether, and to what extent, personality functioning contributes to or hinders treatment completion. This paper examined the extent to which service users' characteristic adaptations may be potential determinants of treatment completion.

METHODOLOGY: A longitudinal multi-site design was utilised, examining the therapy process in a naturalistic setting in five inpatient treatment units. The study examined whether service users' characteristic adaptations (SIPP-118) predict completion, while controlling psychosocial, motivational and treatment engagement indicators involving n = 340 participants from 5 inpatient centres. **Multivariate regression analyses** were applied to examine the predictive role of characteristic adaptations on treatment completion.

RESULTS: Findings indicated that certain dysfunctional characteristic adaptations emerged as strong predictors of treatment completion. Dysfunctional levels on Self-control and Social concordance were significant predictors of drop out from treatment. Individuals with low capacity to tolerate, use and control one's own emotions and impulses were almost three times more likely to drop-out compared to those without [OR] = 2.73, Wald = 6.09, $P = .014$, 95% CI [1.2, 6.0]. Individuals with dysfunctional levels on the ability to value someone's identity, withhold aggressive impulses towards others and work together with *others* were 2.21 more times more likely to complete treatment [OR] = 2.21, Wald = 4.12, $P = .042$, 95% CI [1.0, 4.7]. The analysis at the facet level provided additional insight. Individuals with higher adaptive levels on Effortful Control were 46% more times likely to complete treatment than the group [OR] = 4.67, Wald = 10.231, $P = .001$, 95% CI [1.81, 12.04], 47% more likely on Aggression regulation [OR] = 4.76, Wald = 16.68, $P < .001$, 95% CI [2.1, 10.3], and 26% more likely on Stable self-image [OR] = 2.62, Wald = 6.75, $P < .009$, 95% CI [0.9, 3.0].

CONCLUSIONS: These findings extend our knowledge of the predictive role of characteristic adaptations in treatment completion and highlight the clinical utility of capturing these individual differences early on. Delineating the role of characteristic adaptations in treatment may provide the basis for enhancing treatment effectiveness through individualized interventions that are scientifically driven and may open new avenues for the scientific enquiry of personality and treatment.

KEYWORDS: treatment completion, personality functioning, drop-out, characteristic adaptations, dimensional diagnosis

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Introduction

Treatment effectiveness has been related to the length of time that patients spend in treatment and to the provision of sufficient services that adequately correspond to their needs.[1] Substance misuse treatment is still characterised by high drop-out rates.[2,3] Unfortunately, research has not produced consistent evidence of a profile or group of individual's characteristics that could discriminate those who are prone to drop out from those who are more likely to remain in treatment. A body of evidence indicates conflicting findings regarding correlates and predictors of retention (see for reviews).[4,5] Overall, different client factors have been found as predictors of retention, but no single factor has been consistently identified.[6] Despite previous efforts to identify clear-cut factors of the specific mechanisms of change during treatment, findings have been inconclusive and inconsistent.

There are important controversies raised in the literature regarding the influence of specific client level factors on treatment completion. Several studies report that the presence of additional diagnosis decreases retention.[7,8] On the contrary, other studies found no such relationship[9] or even the opposite findings.[10] Meier and Barrowclough[11] in their systematic review identified 58 previous studies that examined the relationship between mental health problems and retention in drug treatment. Although the findings indicated there were no significant differences in retention among clients with dual diagnosis and those without, contradictory results were reported in regards to psychological dysfunction and treatment retention.

While several studies found no important relationship between clients' psychological symptoms and retention,[12-15] other studies identified sufficient evidence that high level of clients' problem severity is related to treatment drop-out.[16-18]

Research indicates that personality pathology is common among Substance Use Disorder (SUD) patients, which means that knowledge of the Personality Disorder (PD) treatment field might be a valuable contribution to SUD treatment. In these studies, a large portion of SUD patients meet criteria for personality disorder.[19,20] Moreover, the above-mentioned studies show that even though the distribution of psychiatric diagnoses was comparable between completers and non-completers, clients with personality disorder were more likely to dropout.

Furthermore, studies on psychiatric samples demonstrate that dual diagnosis is strongly associated with poor compliance and non-engagement (see for reviews).[21,22] Overall, findings indicate that clients with specific dysfunctional dimensions of personality, such as behavioral disinhibition, low impulse control, urgency and hostility were found to be less involved in treatment and more likely to drop out.[17]

Well-established problems with categorical classification system such as low reliability, diagnostic comorbidity and within-disorder heterogeneity complicate research and treatment.[23] The transition from the categorical model which has proven to be empirically problematic and of limited clinical utility, towards a dimensional evidence-based and clinically useful model for classifying personality dysfunction has been acknowledged by numerous prominent authors.[24-26] Such shortcomings include, but are not limited to, high comorbidity rates, excessive heterogeneity within PDs, and a lack of empirical support for categorical taxonomic structure.[27]

Challenging the traditional psychiatric nosology, conceptual models of the DSM-5 such as the Alternative Model of Personality Disorders (AMPD) assume a degree of paradigmatic pluralism and further aim towards dimensionalisation and pantheoretical focus,[28] fostering clinical utility and treatment specificity.[29] The Criterion A, a severity dimension of personality dysfunction measured with the level of personality functioning (LPF), integrates constructs within broad domains of identity, self-direction, empathy, and intimacy. The Criterion B involves placement along pathological personality traits (five broad domains and 25 more narrow facets), taken from clinical ratings or instruments such as the Personality Inventory for DSM–5.[30]

The conceptual distinction between Criterion A and B has lately received empirical support.[31,32] From this perspective, the distinct conceptual heritages of Criterion A and B suggest they could reflect different degrees of trait, characteristic adaptation, and narrative identity constructs. Numerous difficulties in drawing clear distinctions between traits and observable behaviours, as well as conceptual confusion and inaccuracy in operationalisation and measurement, cause major discrepancies in the literature.

Throughout the development, personality traits serve as a basis for the development of more individualised personality characteristics. McCrae and Costa, 1995[33] distinguished basic tendencies (personality dispositions or traits) from characteristic adaptations, which refer to specific behavioural patterns influenced by dispositional traits and situational variables.[1] For example, Cantor[34] separated the 'having' side of personality dimension which is the basic tendencies or source traits from the 'doing' side, which may correspond to those features of personality termed differently across schools of thought as schemas,[35] coping skills strategies and distal characteristics,[36] epigenetic derivates[37] or interpersonal strategies.[38]

It is primarily the trait profile that determines the style of adaptation, whereas the adaptations themselves determine the level of (mal)adjustment to the environment.[39] The changeability of personality is likely to be more pronounced for the adaptations than for the traits. This implies, that although socialization agents have little or no impact on personality traits, they can influence their behavioural manifestation through individuals' characteristic adaptation. Acknowledging individuals' vulnerability on a trait level, it appears that dysfunction results from their phenotypic expression in the social environment.

Thus, conceptual distinction between basic tendencies and adaptive capacities may have clinical significance in treatment of substance misuse. This might be especially important for understanding the role of personality in treatment and formulating individualized treatment planning. In light of research findings provided, there is a need to further explore whether and how personality functioning is associated with or likely to influence individuals' treatment responses. This study aims to fill this gap.

A general shortcoming in personality research so far is the disproportional focus on service users' personality traits. Only a handful of studies have examined the role of characteristic adaptations in treatment and they were conducted only in mental health settings.[40] Research and treatment strategies targeting dysfunctional characteristic adaptations in substance misuse treatment services are equally important to ensure the provision of 'best-practice guidance' based on empirical evidence. Further investigation of the role of personality dimensions in treatment process is of vital importance, since potential clinical improvements could be achieved if therapeutic interventions were tailored to individual differences.

This study seeks to fill the gap in the research concerning the extent to which personality functioning measured by characteristic adaptations may influence treatment completion. It is hoped that findings will help explain major inconsistencies found in the literature and potentially contribute to the development of more personalised treatment planning strategies, considering clients' pre-existing vulnerabilities.

From the clinical perspective, delineating the role of personality functioning within treatment process provides an

important opportunity to advance the understanding that could contribute to the identification of individual attrition vulnerabilities, so that they could be adequately addressed early on and to prevent premature termination. Practically, this would imply that despite personality traits stability, treatment interventions could moderate the degree of dysfunctional behavioural phenotypes by targeting the partially context-sensitive characteristic adaptations.

Research question

Do individuals' characteristic adaptations differ significantly among individuals who complete treatment and those who drop out?

Hypothesis

Higher levels of personality dysfunction assessed by characteristic adaptations predict less treatment completion rates.

Methods

Design

The present paper represents part of a large study in which the therapy process was examined in naturalistic treatment settings in Greece. A quantitative multi-site design was utilised to explore the relationship between service users' characteristic adaptations and their treatment responses in a number of treatment sites, covering both Therapeutic Community (TC) and Psychosocial Rehabilitation (PR). This paper investigates only the relationship of characteristic adaptation with treatment completion. The sample includes 340 individuals who were enrolled at the inpatient settings and where assessed during the 3rd to 5th week of the inpatient treatment.

Treatment services

The study recruited major publicly funded treatment facilities that provide free of charge, comprehensive psychosocial care for alcohol and substance misuse and have the largest number of individuals seeking therapy, jointly covering more than 80% of the treatment demand in Greece.[41] Of these, four treatment units in dispersed geographical locations were selected (Athens, Piraeus, Salamina, Thessaloniki). For this part of the study two inpatient Therapeutic Communities (TCs) were recruited from an organisation that provides a nation-wide network of TC services. Three Psychosocial Rehabilitation (PR) units were also recruited, which offers hospital-based inpatient individual and group counselling by a mix of psychologists, psychotherapists and social workers. The treatment entry procedure for accessing inpatient treatment in both organizations involved an outpatient preparation phase. In both treatment types, after two weeks of individual counselling, clients engage in a more intensive format, including group therapy and individual sessions. The duration of the preparation phase is the same for TC and PR - ranging from 6 to 12 weeks prior to inpatient treatment entry, with the residential phase of therapy lasting approximately 6-9 months.

The study received ethics approval from University of Sheffield. Since data collection involved clients undergoing substance misuse treatment, the study also obtained approval by the Institutional Review Board of the organizations involved in the study. These organizations are authorised by the Greek Ministry of Health to approve research conducted in their facilities.

Assessment procedure and measurements during intake

Demographic and substance use information. All individuals entered the inpatient treatment at the time of the study were considered potential participants. The eligibility criteria were: (1) at least 18 years old, (2) used illicit drugs during the past 90 days, (3) able to read and speak Greek fluently, (4) no current or previous experience of psychotic symptoms and (5) no serious developmental disabilities or cognitive disturbances. Eligibility was determined through pre-screen data and information supplied by the treatment providers. This paper focuses on the inpatient phase only. Eligible inpatients who read the study information and signed the consent form were included in the research.

During treatment procedure and measurements

Clinical and demographic information. Clinical data were collected by the treatment service providers and included clients' notes, the Treatment Demand Indicator[42] and the Addiction Severity Index scores.[43,44] These measures provided information regarding service users' demographic (sex, age, marital status, level of education, current employment status), as well as substance use information (primary and secondary drug of choice, frequency of drug use and route of drug administration).

TCU CEST Client Evaluation of Self and Treatment (CEST, 45) is a self-completion questionnaire developed by the Texas Christian University. CEST consists of four domains: (a) Psychological functioning (4 scales), (b) Social functioning (3 scales), (c) Treatment motivation (4 scales) and Treatment engagement subscales related to Treatment satisfaction (7 items), Counselling rapport (14 items), (3) Treatment participation (12-items), as well as scales on Peer support (5 items) and Social support (9 items). Item examples are: 'I am satisfied with this program' (treatment satisfaction), 'I trust my counsellor' (counselling rapport), and 'I am following my counsellor's guidance' (treatment participation). Items are rated on a 5-point Likert type scale ranging from 1= 'Strongly Disagree' to 5= 'Strongly Agree'.

Scores for each of the subscales are obtained by summing responses to the set of items (after reversing scores on reflected

items by subtracting the item response from '6'), dividing the sum by number of items included (yielding an average) and multiplying by 10 in order to rescale final scores so they range from 10 to 50 (e.g., an average response of 2.6 for a scale becomes a score of '26').[45] Higher scores indicate more confidence in the particular factor being measured. Scores above 40 are considered high treatment scores. The psychometric properties of CEST have been tested in the TCU National Sample including 1700 clients from 87 programmes from a US sample and the reliability and validity of these scales have been confirmed with subscale coefficient alpha ranging from .86 to .96.[46] CEST was administered during the 3rd-5th week within the inpatient setting.

Severity Indices of Personality Problems (SIPP-118, 47) is a 118-item dimensional self-report measure to assess the core components of personality pathology (i.e., characteristic adaptations). It was developed for the measurement of structural personality changes in treatment studies. The measure comprises 16 facets; these facets are clustered into five higher-order domains named *Social Concordance, Relational functioning, Self-control, Responsibility*, and *Identity Integration*. High scores in the facets indicate better adaptive functioning. The SIPP has demonstrated good validity across several countries and in clinical and non-clinical populations.[47-50]

The timing of the assessment was decided in accordance with the literature and clinical practice in the relevant services. Given that problem severity (measured by CEST) and personality functioning (measured by SIPP-118) are malleable to change during treatment, it was considered appropriate to capture these dimensional indicators very early on and during mid phase of treatment. The assessment team was notified by clinical staff when new clients sought treatment. Following the brief description of the study and the study info sheet, only those who signed the consent form participated in the assessment process. The approximate time required for completion of the first assessment battery was 45-75 minutes for completing both tools. For the purposes of the study, both questionnaires CEST and SIPP-118 were translated into Greek language following the appropriate translation procedures, that is, back translation, professional assistance by an expert in the field and consultation by Greek – English professional translator. Investigation of Cronbach's alpha indicated moderate to acceptable reliability for the SIPP-118 facets ranging between 68-.86 and acceptable to high reliability levels for the CEST ranging between 86 and 96.

Analytic strategy

Comparison between the treatment completion and drop out group. Service users were classified into two main groups: (a) the treatment completion group, defined as treatment discharge upon successful completion of treatment goals according to the therapeutic plan; and (b) the drop-out group defined as unplanned dropout from treatment, individual treatment leave against treatment advice. Student's *t*-tests were employed to compare the means for the groups on continuous variables and chi-square analyses were used for categorical variables (employment, marital status, gender, ethnicity and drug use). More specifically, following the descriptive information, comparative analyses were performed to determine how service users who completed treatment differ from those who dropped out on identified pre-treatment variables. A logistic stepwise regression was utilised to examine any significant differences of characteristic adaptations between the two groups.

After examining the frequency distributions and inter-correlations (to assess potential collinearity) among the candidate predictor variables, univariable logistic regression analysis was conducted, with treatment completion /dropout group as the dependent variable. Client-related factors (i.e., gender, motivational levels, psychosocial functioning), engagement levels were entered into the first block and the predictors of interest, the characteristic adaptations, into the second block. Odds ratios and 95% confidence intervals (CI) are reported in the multivariable model. In order to control for any potential effects of the treatment, the five treatment sites were converted into dummy coding; the four were included as covariates in the model and the one was used as reference group. In analysis, each dummy-coded variable was compared with the reference group. Although this study did not set out to examine differences by treatment service, treatment units were also included as covariates in order to control for any introduced variation.

To construct a parsimonious model, variables that differed at the $P < .10$ significance level were then entered into a multivariate logistic regression model. Predictors with p-values less than 0.05 were considered statistically significant. Nagelkerke's R^2 (a 'pseudo' R^2) for logistic regression[51,52] was calculated to assess relative improvement in prediction over the null model (i.e., intercept only model). Gender and Age and Treatment sites were included in the model as covariates with the Enter mode at block one. Variables significant in the initial (univariate) regression analyses were simultaneously entered into the final logistic regression model (Enter mode), designed to determine whether these predictors were independently associated with treatment drop-out above and beyond the engagement and motivational variables. Multicollinearity diagnostic statistics for the logistic model (tolerance values and VIF) were examined to exclude multicollinearity due to interdependency between the predictor variables.

Similar procedures were used to construct the final multivariate logistic regression for the facet level adaptation as predictors of treatment completion. The results obtained from the univariate comparisons, identified six predictors for the multivariate model: *Effortful Control, Aggression regulation, Stable Self Image, Enjoyment, Intimacy*, and *Respect* (summarized in the Table 1). As covariates, beyond Gender and Age, Treatment sites were included into the model with the ENTER mode at block one. Variables significant in the initial (univariate) regression analyses were simultaneously entered into the final logistic

regression model (ENTER mode), designed to determine whether these predictors were independently associated with treatment drop-out, exceeding the engagement and motivational variables. The classification accuracy of the final model was calculated. All analyses were performed using SPSS, version 24.0.

Results

Sample socio-demographics and substance use patterns

Inpatient Sample (N=338): The average age was 33.37 years (SD = 6.05). The majority were males (84.9%, n = 287), single (55.4%, n = 160) and unemployed (72.7%, n = 192), while 34.5% (n = 91) graduated high school. With regard to drug use patterns, the majority reported heroin as the primary drug of choice (76.5%, n = 200) with the 39.0% (n = 103) injecting and 34.1%, (n = 90) snorting as the main route of administration. (see for details Table 2).

Furthermore, 36.0% reported daily use of the primary drug of choice (n = 95) and 30.1% had engaged in needle/syringe sharing (n = 71) at some point in their lives. Around 60% had been arrested (n = 147), while 23.9% have been convicted (n = 58). Overall, from the 338-inpatient sample, 57.1% (n= 193) successfully completed the treatment program, while the 42.9% (n = 145) dropped out from treatment.

Comparison of treatment completers and those who dropped out by demographic, psychosocial, motivational and treatment engagement component

Table 3 demonstrates the results obtained from the *t*-test comparison between treatment completers and drop out group on Psychosocial functioning, Motivation and Treatment engagement. Results indicated that the treatment completion group had significantly higher motivation levels for treatment, with significantly higher scores on *Desire for Help* (M = 43.64, SD = 4.23) and *Treatment Readiness* (M = 42.15, SD= 4.25) as compared to the drop out group (M = 42.63 SD = 4.26), t (336) = -2.15, $P < .001$ and (M = 36.52, SD = 5.72), t (336) = -9.97, $P < .001$ respectively. For the psychosocial functioning, treatment dropouts had significantly higher levels of *Depression* (M = 29.57, SD = 7.35), and *Anxiety* (M = 32.68, SD = 6.79) than treatment completers (M = 25.06, SD = 7.70), $t(336) = 5.40$, $P < .001$ and (M = 28.93, SD = 8.20), $t(336) = 4.58$, $P < .001$ respectively.

Finally, treatment dropouts were more likely to experience significantly higher levels of Hostility (M = 33.35, SD = 6.46), compared to treatment completers (M = 26.66, SD = 6.75), $t(336) = 9.15$, $P < .001$. Regarding treatment engagement, treatment completers had significantly higher *Counselling Rapport* (M = 42.88, SD = 4.21) than the drop out group (M = 35.78, SD = 5.31), $t(336) = -13.21$, $P < .001$ and *Treatment Participation* (M = 42.29, SD = 4.00) as compared to the drop out group (M = 37.08, SD = 4.77) $t(336) = -10.85$, $P < .001$. Finally, treatment completers were more satisfied with the treatment (M = 41.27, SD = 4.63) compared to dropouts (M = 35.63, SD = 5.38), $t(336) = -10.30$, $P < .001$.

Comparison of treatment completers and drop out group by the broad and facet level characteristic adaptations

The results of the *t*-test analysis between treatment completers and the drop out group at the broad and facet level can be compared in Table 1. The results indicated that there were significant group differences in all five-broad characteristic adaptations. The highest mean differences between the two groups were on the *Social Concordance* domain - *the ability to value someone's identity, withhold aggressive impulses towards others and work together with others, the* treatment completers (M = 5.58, SD = .684) were associated with statistical significant larger mean than those who dropout from treatment (M = 4.87, SD =.786), t (316) = -9.13, $P < .001$). The two groups were also significantly different in the *Self-control*, with significant larger mean of Treatment completers (M = 4.75, SD = .786) than dropout group (M = 3.88, SD = .737), t (315) = -10.15, $P < .001$.

The analysis at the facet level of characteristic adaptations confirmed the previous reported differences at the broad domains between the two groups (Please see Table 1). For the *Self-control*, the treatment completers had significant more adaptive levels on *Emotional Regulation* (M = 2.66, SD = .47) compared to the drop out group (M = 2.15, SD = .38), t = (315) = -8.54, $P < .001$) and on *Effortful Control* (M = 2.47, SD = .55), as compared to the drop out group (M = 1.97, SD = .48), t (315) = -8.97, $P < .001$. The dropout group had significantly lower means and members of this group were thus more dysfunctional on all five facets of the *Identity* domain than the treatment completers. For example, the treatment completers had significantly higher mean levels on *Stable self-image* (M = 2.38, SD = .56) than the drop out group (M = 2.83, SD = .54), t = (316) = -7.24 $P < .001$ as well as on *Self-Respect* (M = 2.66, SD = .59) as compared to the drop out group (M = 3.01, SD = .56), t (323) = -5.37, $P < .001$. (see Table 1 for all facets). In regards to *Relational* capacities, the drop out group had more maladaptive lower scores than the treatment completers on *Intimacy* (M = 2.58, SD = .46) versus (M = 2.92, SD = .51), $t(323) = -6.20$, $P < .001$; *Enduring relationships* (M = 2.55, SD = .50) versus (M = 2.88, SD= .51), $t(323) = -5.80$, $P < .001$; and *Feeling recognized* (M = 2.54, SD = .52) versus (M = 2.92, SD = .48), $t(323) = -6.80$, $P < .001$).

Hierarchical multiple logistic regressions of characteristic adaptations and treatment completion

A test of the full model against a constant only model was statistically significant, indicating that the predictors as a set reliably distinguished between the treatment completers and the drop out

Table 1. Characteristic adaptations in treatment completion and dropout group: Univariate comparison.

	DROP OUT GROUP (N = 138)				COMPLETERS (N = 180)					MEAN DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
	MEAN	SD	95% CI		MEAN	SD	95% CI		*T*		LOWER	UPPER
			LOWER	UPPER			LOWER	UPPER				
Broad domains												
Self- control	3.88	.737	3.75	4.00	4.75	.786	4.64	4.87	– 10.15**	–.88	–1.05	–.709
Effortful control	1.97	.485	1.89	2.05	2.47	.555	2.39	2.54	–8.97**	–49	–.609	–.390
Emotional regulation	2.15	.382	2.07	2.74	2.66	.469	2.58	2.74	–8.54**	–.50	–.625	–.391
Social concordance	4.87	.786	4.76	4.99	5.58	.690	5.48	5.68	–9.13**	–.71	–.865	–.559
Aggression regulation	2.53	.714	2.42	2.66	3.17	.574	3.11	3.28	–8.70**	–.64	–.786	–.496
Frustration tolerance	2.21	.382	2.16	2.29	2.59	.469	2.51	2.65	–7.89**	–.37	–.466	–.280
Cooperation	2.69	.477	2.61	2.77	3.05	.494	2.99	3.13	–6.62**	–.36	–.473	–.256
Respect	2.70	.445	2.62	2.77	3.00	.431	2.94	3.07	–6.14**	–.30	–.397	–.204
Identity	3.67	.560	3.58	3.77	4.20	.610	4.11	4.29	–7.81**	–.52	–.654	–.391
Stable self-image	2.38	.562	2.29	2.48	2.83	.538	2.75	2.91	–7.24**	–.45	–.573	–.328
Enjoyment	2.37	.483	2.29	2.46	2.74	.527	2.67	2.82	–6.52**	–.32	–.484	–.260
Self-reflexive functioning	2.30	.486	2.22	2.38	2.68	.571	2.68	2.76	–6.24**	–.37	–.498	–.259
Purposefulness	2.68	.480	2.60	2.76	2.97	.464	2.90	3.04	–5.43**	–.28	–.394	–.184
Relation	3.93	.589	3.83	4.03	4.45	.638	4.36	4.55	–7.56**	–.52	–.667	–.392
Intimacy	2.58	.459	2.52	2.68	2.92	.512	2.87	3.01	–6.20**	–.34	–.448	–.232
Enduring relationships	2.55	.500	2.47	2.64	2.88	.518	2.82	2.97	–5.80**	–.33	–.444	–.233
Feeling recognized	2.54	.525	2.46	2.64	2.92	.480	2.86	3.00	–6.80**	–.38	–.490	–.270
Responsibility	3.80	.655	3.69	3.91	4.37	.737	4.26	4.48	–7.17**	–.57	–.728	–.414
Responsible industry	2.40	.501	2.32	2.50	2.83	.568	2.75	2.92	–7.08**	–.43	–.549	–.310
Trustworthiness	2.60	.466	2.53	2.69	2.91	.525	2.83	2.98	–5.54**	–.31	–.421	–.200

*$p = < 0.05$; **$p = < 0.001$.

Table 2. Participant characteristic by treatment phase.

CHARACTERISTIC	COMPLETION STATUS BY TREATMENT PHASE	
	OUTPATIENT	INPATIENT
	TOTAL (N = 217)	TOTAL (N = 338)
Age (M+SD)	33.70 (SD 6.27)	33.37 (SD 6.05)
Gender %		
Male %	87.3 (n = 186)	84.9 (n = 287)
Female %	12.7 (n = 27)	15.1 (n = 51)
Total count	(n = 217)	(n = 338)
Marital Status %		
Single	65.9 (n = 120)	55.4 (n = 160)
Married	8.8 (n = 16)	9.3 (n = 27)
Divorced	10.4 (n = 19)	9.0 (n = 26)
Windowed	1.1 (n = 2)	1.4 (n = 4)
Living together	12.1 (n = 22)	17.6 (n = 51)
Unknown	1.6 (n = 3)	7.3% (n = 21)
Total	(n = 182)	(n = 289)
Labour Status %		
Occasionally employed	11.5 (n = 21)	11.4 (n = 30)
Regularly employed	7.1 (n = 13)	6.1 (n = 16)
Student	3.3 (n = 6)	1.9 (n = 5)
Unemployed	74.2 (n = 135)	72.7 (n = 192)
Receiving social benefits	1.6 (n = 3)	1.5 (n = 4)
Not know	2.2 (n = 4)	6.4 (n = 17)
Total	(n = 182)	(n = 264)
Highest educational level completed %		
Few classes of secondary education	7.1 (n = 13)	3.8 (n = 10)
Few classes of high level education	2.7 (n = 5)	1.1 (n = 3)
Graduate Technical school	6.6 (n = 12)	9.1 (n = 24)
Graduate high school	34.6 (n = 63)	34.5 (n = 91)
Graduate primary school	14.8 (n = 27)	10.6 (n = 28)
Graduate secondary school	23.1 (n = 42)	24.2 (n = 64)
Graduate high-level education	2.7 (n = 5)	5.7 (n = 15)
Never went to school	1.6 (n = 3)	1.1 (n = 3)
Graduate University	1.1 (n = 2)	0.8 (n = 2)

(Continued)

Table 2. (Continued)

CHARACTERISTIC	COMPLETION STATUS BY TREATMENT PHASE	
	OUTPATIENT	INPATIENT
	TOTAL (N = 217)	TOTAL (N = 338)
Student	0.5 (n = 1)	0.8 (n = 2)
Unknown	4.9 (n = 9)	8.3 (n = 22)
Total	(n = 182)	(n = 264)
Primary Drug of Choice %		
Flunitrazepam	1.1 (n = 2)	1.9 (n = 5)
Speedball	0.5 (n = 1)	1.1 (n = 3)
Morphine	1.1 (n = 2)	0.4 (n = 1)
Cocaine	4.9 (n = 9)	3.8 (n = 10)
Heroin	76.4 (n = 139)	76.5 (n = 200)
Buprenorphine misused	0.5 (n = 1)	1.1 (n = 3)
Cannabis	11 (n = 20)	6.8 (n = 18)
Methamphetamines	0.5 (n = 1)	0.4 (n = 1)
Unknown medicine	0.5 (n = 1)	0.4 (n = 1)
Benzodiazepines	1.1 (n = 2)	0.0 (n = 0)
Other opioids	2.2 (n = 4)	6.4 (n = 17)
Total	(n = 182)	(n = 264)
Root of administration primary drug %		
Smoke/inhale	19.8 (n = 36)	15.5 (n = 41)
Inject	36.3 (n = 66)	39.0 (n = 103)
Eat/drink	4.9 (n = 9)	3.8 (n = 10)
Sniff	36.8 (n = 67)	34.1 (n = 90)
Not known	2.2 (n = 4)	7.6 (n = 20)
Total	(n = 182)	(n = 264)
Frequency of use (primary drug)		
Not used in the last 30 days	14.8 (n = 27)	26.1 (n = 69)
Daily	48.4 (n = 88)	36.0 (n = 95)
2-6 days per week	19.2 (n = 35)	17.8 (n = 47)
0-1 day per week	7.1 (n = 13)	8.7 (n = 23)
Not known	10.4 (n = 19)	11.4 (n = 30)
Total	(n = 182)	(n = 264)

(Continued)

Table 2. (Continued)

CHARACTERISTIC	COMPLETION STATUS BY TREATMENT PHASE	
	OUTPATIENT	INPATIENT
	TOTAL (N = 217)	TOTAL (N = 338)
Needle/syringe sharing %		
Yes	29.7 (n = 49)	30.1 (n = 71)
No	70.3 (n = 116)	69.9 (n = 165)
Total	(n = 165)	(n = 236)
Arrested %		
Yes	59.8 (n = 104)	60.0 (n = 147)
No	40.2 (n = 70)	40.0 (n = 98)
Total	(n = 174)	(n = 245)
Convicted %		
Yes	30 (n = 51)	23.9 (n = 58)
No	70 (n = 119)	76.1 (n = 185)
Total	(n = 170)	(n = 243)
Prison %		
Yes	17.7 (n = 29)	18.0 (n = 41)
No	82.3 (n = 135)	81.6 (n = 186)
Unknown	—	0.4 (n = 1)
Total	(n = 164)	(n = 228)

TREATMENT PROGRESS BY UNITS	TC1	TC2	PR1	PR2	PR3	TOTAL
Completed	27.5% n = 53	22.3% n = 43	24.9% n = 48	16.6 % n = 32	8.8 n = 17	193 n = 57.1
Drop out	45.5% n = 66	29.7% n = 43	12.4% n = 18	9.7% n = 14	2.8 n = 4	145 n = 42.9
Total	35.2% n = 19	25.4% n = 86	19.5% n = 66	13.6% n = 46	6.2% n = 21	100% n = 338

group ($\chi^2 = 23.58$, df = 5; $P < .001$). Nagelkerke's R^2 of 67.1 indicated that the predictors with the control variables explained about 67% of the total variance in treatment drop-out. The final model indicated that after adjusting for the other predictors, those with higher maladaptive range on *Self-Control* are almost three times more likely to drop-out compared to those without [OR] = 2.73, Wald = 6.09, $P = .014$, 95% CI [1.2, 6.0]. It can be seen from the data in Table 4 that when *Social Concordance* is raised by one unit, the odds ratio is 2.21 times as large and therefore individuals with more adaptive functioning on *Social Concordance* were 2.21 more times likely to complete treatment [OR] = 2.21, Wald = 4.12, $P = .042$, 95% CI [1.0, 4.7].

The standardised beta-coefficients, Wald statistics and significance levels for the predictors included in the two models are displayed in Table 4. From the first block of predictors, Treatment engagement and specifically *Counselling Rapport* [OR] = 1.15, Wald = 9.24, $P = .002$, 95% CI [1.0, 1.2] and *Treatment Participation* [OR] = 1.21, Wald = 13.82, $P < .001$, 95% CI [1.0, 1.3], were the most influential predictors of Treatment completion. Surprisingly, no significant differences were found for *Treatment satisfaction* in the multivariate analyses. Individuals with high levels on *Counselling Rapport* and on *Treatment Participation were 1.15 and 1.21* respectively more times likely to complete treatment. From the motivational variables, *Treatment Readiness* OR] = 1.15, Wald = 10.27, $P < .001$, 95% CI [1.0, 1.2], and *Treatment Needs* [OR] = .915, Wald = 6.54, $P = .011$, 95% CI 0.8, 0.9], accounted for a significant amount of variance.

Table 3. Psychosocial functioning, motivation and engagement in treatment completion and dropout groups: Univariate comparison.

COVARIATES CEST	TREATMENT PROGRESS	N	MEAN	SD	*T*	MEAN DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
							LOWER	UPPER
Psychosocial variables								
Self-efficacy	Drop-outs	144	30.96	4.63	–7.02**	–3.71	–4.78	–2.67
	Completers	192	34.68	4.91				
Self-esteem	Drop-outs	144	29.74	6.69	–6.20**	–4.43	–5.84	–3.03
	Completers	192	34.18	6.33				
Risk taking	Drop-outs	144	34.07	6.17	4.06**	3.02	1.52	4.53
	Completers	192	31.04	7.46				
Hostility	Drop-outs	144	33.35	6.46	9.15**	6.69	5.25	8.12
	Completers	192	26.66	6.75				
Depression	Drop-outs	144	29.57	7.35	5.40**	4.50	2.86	6.14
	Completers	192	25.06	7.70				
Anxiety	Drop-outs	144	32.68	6.79	4.58**	3.75	–3.09	–1.08
	Completers	192	28.93	8.20				
Motivational variables								
Pressure for treatment	Drop-outs	144	31.37	7.60	1.46*	1.22	–.41	2.87
	Completers	192	30.14	7.59				
Treatment readiness	Drop-outs	144	36.52	5.70	–9.97*	–5.64	–6.67	–4.53
	Completers	192	42.17	4.25				
Desire for help	Drop-outs	144	42.63	4.26	–2.15*	–1.00	–1.92	8.12
	Completers	192	43.64	4.23				
Treatment needs	Drop-outs	144	39.44	5.65	3.71**	2.55	1.20	3.91
	Completers	192	36.88	6.66				
Treatment engagement								
Counselling rapport	Drop-outs	144	35.78	5.31	–13.21**	–7.09	–8.15	–6.04
	Completers	192	42.88	4.21				
Treatment satisfaction	Drop-outs	144	35.63	5.38	–10.30**	–5.64	–6.72	–4.56
	Completers	192	41.27	4.63				
Treatment participation	Drop-outs	144	37.08	4.77	–10.85**	–5.20	–6.15	–4.26
	Completers	192	42.29	4.00				

*$p = < 0.05$; **$p = < 0.001$.

For every unit increase on *Treatment Needs* the odds ratio was 0.915, that is, for an additional unit of *Treatment Needs* the odds for completing treatment is lower by 8.5%. Finally, as indicated in the Table 4 (below), no significant differences were found between the two groups on the psychological wellbeing. *Anxiety* and *Depression* were not significant predictors in the final model.

Facet level characteristic adaptations as predictors of treatment completion. The analysis at the facet level, the full model against a constant model was statistically significant, reliably distinguishing the treatment completers and the drop out group χ^2 (chi square = 37.945, $P < .001$ with $df = 3$) (please see Table 5). In the final model, the overall predictive accuracy was 87.0% (89.9% for treatment completers and 83.5% for

Table 4. Multivariate logistic regression model for predicting treatment completion by broad domains characteristic adaptations (N = 315).

	UNADJUSTED						*ADJUSTED MODEL (STEPWISE ENTRY)*					
	β	SE	WALD χ^2	*P*	OR	95% CI	β	SE	WALD χ^2	*P*	OR	95% CI
Demographic variables												
Age of birth	0.55	0.20	7.83	.005	1.05	(1.01, 1.09)	0.31	.03	1.04	.307	1.03	(0.9, 1.5)
Gender	−0.17	0.31	0.33	.564	0.83	(0.45, 1.53)	0.36	0.53	0.47	.492	1.43	(0.5, 4.0)
Marital Status	1.28	0.76	2.80	.094	1.13	(0.97, 1.32)	—					
Educational level	–	0.08	0.46	.496	0.94	(0.80, 1.11)	—					
Prim Drug of Choice	−0.92	0.46	3.95	.047	0.39	(0.81, 1.06)	—					
Injected	0.22	0.59	0.14	.706	1.25	(0.39, 3.98)	—					
Legal problems	0.27	0.27	0.99	.420	1.31	(0.76, 2.26)	—					
Psychological wellbeing												
Depression	−0.07	0.01	25.18	.000	0.92	(0.89, 0.95)	0.19	0.35	.304	.582	1.01	(0.9, 1.0)
Anxiety	−0.06	0.01	17.91	.000	0.93	(0.91, 0.96)	−.00	0.03	0.02	.866	0.99	(0.9, 1.0)
Motivational variables												
Desire for help	0.05	0.02	4.52	.033	1.05	(1.00, 1.11)	−0.93	0.05	3.26	.071	0.91	(0.8, 1.0)
Treatment readiness	0.23	0.29	62.63	.000	1.25	(1.18, 1.33)	0.15	0.04	10.27	.001	1.15	(1.0, 1.2)
Pressures for treatment	−0.02	0.01	2.14	.143	0.97	(0.95, 1.00)	.022	0.02	0.81	.368	1.02	(0.9, 1.1
Treatment needs	−.067	.019	12.81	.000	.935	(0.90, 1.00)	−.089	0.01	6.54	.010	0.91	(0.8, 1.0)
Treatment engagement												
Counselling rapport	0.31	0.34	81.36	.000	1.36	(1.27, 1.46)	0.14	0.04	9.24	.002	1.15	(1.0, 1.2)
Treatment participation	0.28	0.35	64.77	.000	1.32	(1.23, 1.42)	0.19	0.52	13.82	.000	1.21	(1.0, 1.3)
Treatment satisfaction	0.22	0.02	63.37	.000	1.25	(1.18, 1.32)	0.07	0.04	2.84	.092	1.07	(0.9, 1.1)

(Continued)

Table 4. (Continued)

	UNADJUSTED						*ADJUSTED MODEL (STEPWISE ENTRY)*					
	β	SE	WALD χ^2	*P*	OR	95% CI	β	SE	WALD χ^2	*P*	OR	95% CI
Treatment modality												
Unit TC Ith^							1.54	.354	25.70	.567	0.23	(2.6, 6.9)
Unit PR Ex^							1.22	.235	21.97	.345	0.66	(2.1, 6.0)
Unit PR Ar^							1.25	.158	3.70	.267	1.73	(2.6, 6.9)
Unit TC No^							1.20	.246	4.29	.089	3.46	(2.1, 6.0)
Characteristic adaptations broad domains (IV)												
Self-Control	1.51	0.19	60.73	.000	4.56	(3.11, 6.68)	0.98	0.41	6.09	.014	2.73	(1.2, 6.0)
Identity Integration	1.49	0.22	44.09	.000	4.45	(2.86, 6.92)	−0.30	0.55	0.30	.581	0.73	(0.2, 2.1)
Responsibility	1.14	0.18	39.47	.000	3.12	(2.19, 4.46)	−0.41	0.35	1.37	.240	0.65	(0.3, 1.3)
Relational capacities	1.38	0.21	41.80	.000	3.98	(2.62, 6.06)	−0.22	0.41	0.30	.584	0.79	(0.3, 1.7)
Social concordance	1.48	0.20	54.06	.000	4.42	(2.97, 6.57)	0.80	0.39	4.12	0.42	2.21	(1.0, 4.7)

Key: IV = independent variable, — = variables not entered in multivariate model; NS = variables were entered in multivariate model but not selected by stepwise method. *Notes*: Sample size for multivariate analyses N = 315. ^ 5 Treatment units transformed into Dummy variables and the coefficients are estimated to the reference. Stepwise Forward entry criterion $P < 0.05$. Stepwise model F (8,315) = 21.432, $P < 0.00$, $R^2 = 0.41$, adjusted $R^2 = 0.39$,5.

Table 5. Multivariate logistic regression model for predicting treatment completion by facet level characteristic adaptations (N = 315).

	UNADJUSTED						*ADJUSTED MODEL (STEPWISE ENTRY)*					
	β	SE	WALD χ^2	*P*	OR	95% CI	β	SE	WALD χ^2	*P*	OR	95% CI
Demographic variables												
Age of birth	0.55	0.20	7.83	.005	1.05	(1.01,1.09)	0.39	0.28	1.91	.166	1.04	(0.9, 1.1)
Gender	−0.17	0.31	0.33	.564	0.83	(0.45,1.53)	0.37	0.45	0.68	.408	1.45	(0.5, 3.5)
Marital Status	1.28	0.76	2.80	.094	1.13	(0.97, 1.32)	—					
Educational level	–	0.08	0.46	.496	0.94	(0.80, 1.11)	—					
Prim Drug of Choice	−0.92	0.46	3.95	.047	0.39	(0.81, 1.06)	—					
Injected	0.22	0.59	0.14	.706	1.25	(0.39, 3.98)	—					
Legal problems	0.27	0.27	0.99	.420	1.31	(0.76, 2.26)	—					
Psychological wellbeing												
Depression	−0.07	0.01	25.18	.000	0.92	(0.89, 0.95)	—					
Anxiety	−0.06	0.01	17.91	.000	0.93	(0.91, 0.96)	—					
Motivational variables												
Desire for help	0.05	0.02	4.52	.033	1.05	(1.00, 1.11)	−.050	.051	.984	.321	1.10	(0.9, 1.3)
Treatment readiness	0.23	0.29	62.63	.000	1.25	(1.18, 1.33)	.159	.046	11.94	.001	1.17	(1.1, 1.3)
Pressures for treatment	−0.02	0.01	2.14	.143	0.97	(0.95, 1.00)	−0.03	0.02	1.91	.167	0.91	(0.9, 1.0)
Treatment needs	−.067	.019	12.81	.000	.935	(0.90, 1.00)	−.096	.033	8.48	.004	.908	(0.8, 1.0)
Treatment engagement												
Counselling rapport	0.31	0.34	81.36	.000	1.36	(1.27, 1.46)	.195	.048	16.49	.000	1.21	(1.1, 1.3)
Treatment participation	0.28	0.35	64.77	.000	1.32	(1.23, 1.42)	.205	.049	17.42	.000	1.22	(1.1, 1.3)
Treatment satisfaction	0.22	0.02	63.37	.000	1.25	(1.18, 1.32)	.065	0.03	2.79	.095	1.06	(0.9, 1.1)
Treatment modality												
Unit TC Ith^							1.54	.354	25.70	.567	0.23	(2.6, 6.9)
Unit PR Ex^							1.22	.235	21.97	.345	0.66	(2.1, 6.0)
Unit PR Ar^							1.25	.158	3.70	.267	1.73	(2.6, 6.9)
Unit TC No^							1.20	.246	4.29	.089	3.46	(2.1, 6.0)

(Continued)

Table 5. (Continued)

	UNADJUSTED						*ADJUSTED MODEL (STEPWISE ENTRY)*					
	β	SE	WALD χ^2	*P*	OR	95% CI	β	SE	WALD χ^2	*P*	OR	95% CI
Characteristic adaptations broad domains and facet levels (IV)												
Self-Control												
Emotion Regulation	1.84	.263	49.57	.000	6.34	(3.7, 10.6)						
Effortful Control	2.13	.297	51.69	.000	8.44	(4.7, 15,0)	1.54	.482	10.23	.001	4.67	(1.8, 12,0)
Identity Integration												
Self-Respect	1.03	.208	24.80	.000	2.81	(1.8, 4,2)	—					
Stable self-image	1.48	.236	39.51	.000	4.41	(2.7, 7,0)	1.34	.516	6.75	.009	2.62	(0.9, 3.0)
Self - reflective functioning	1.32	.236	31.57	.000	3.77	(2.3, 6,0)	—					
Enjoyment	1.44	.249	33.70	.000	4.23	(2.6, 6.9)	—					
Purposefulness	1.29	.260	24.92	.000	3.66	(2.1, 6.0)	—					
Responsibility												
Responsible industry	1.43	.230	39.07	.000	4.211	(2.6, 6.6)	—					
Trustworthiness	1.24	.243	26.11	.000	3.46	(2.1, 5.5)	—					
Relational capacities												
Intimacy												
Enduring relationships	1.26	.239	28.13	.000	3.54	(2.2, 5.6)	—					
Feeling recognized	1.53	.256	35.75	.000	4.62	(2.7, 7.6)	—					
Social concordance												
Aggression regulation	1.49	.204	53.67	.000	4.45	(2.9, 6.6)	1.56	.397	16.68	.000	4.76	(2.1, 10,3)
Frustration tolerance	1.99	.302	43.37	.000	7.31	(4.0, 13.2)	—					
Cooperation	1.50	.254	34.98	.000	4.50	(2.7, 7.4)	—					
Respect	1.55	.279	31.00	.000	4.74	(2.7, 8.1)	—					

Key: IV = independent variable, — = variables not entered in multivariate model; NS = variables were entered in multivariate model but not selected by stepwise method. *Notes*: Sample size for multivariate analyses N = 315. ^5 Treatment units transformed into Dummy variables and the coefficients are estimated to the reference. Stepwise Forward entry criterion $P < 0.05$. Stepwise model F 11,315) = 37.945, $P < 0.01$, $R^2 = 0.69.6$, adjusted $R^2 = 0.69$.

drop out group). The Wald criterion demonstrated that *Effortful Control* ($P = .001$), *Aggression Regulation* ($P < .001$) and *Stable Self-Image* ($P = .009$) made a significant contribution to the prediction of Treatment completion. EXP(B) value indicated that when *Effortful Control* is raised by one unit, the odds ratio is 4.67 times as large and therefore individuals with higher adaptive levels on *Effortful Control* were 46% more times likely to complete treatment than the group with low adaptive levels [OR] = 4.67, Wald = 10.231, $P = .001$, 95% CI [1.81, 12.04].

After accounting for the other predictors in the model, service users with higher more adaptive levels of *Aggression Regulation*, have 4.76 time greater odds to complete treatment than those with low scores. This means that those individuals with high maladaptive range of *Aggression Regulation* have an increased risk to drop-out compared to those without maladaptive functioning on this dimension [OR] = 4.76, Wald = 16.68, $P < .001$, 95% CI [2.1, 10.3]. Finally, *Stable Self-Image* was significant predictor of treatment completion, hence service users with higher adaptive levels on *Stable Self-image* have 2.62 time greater odds to complete treatment that those with low scores. Individuals with high maladaptive levels on *Stable Self-image* have an increased risk to drop-out compared to those without maladaptive scores [OR] = 2.62, Wald = 6.75, $P < .009$, 95% CI [0.9, 3.0].

The probability of Treatment completion is contingent on individuals' engagement levels. As demonstrated in the Table 5, individuals with high scores on *Counselling rapport* were 1.21 time more likely to complete treatment than those with low scores [OR] = 1.21, Wald = 16.49, $P < .001$, 95% CI [1.1, 1.3]. Similarly, individuals with high *Treatment Participation* were 1.22 more likely to complete treatment [OR] = 1.22, Wald = 17.42, $P < .001$, 95% CI [1.1, 1.3]. Finally, significant Individuals with high scores on *Treatment Readiness* were 1.17 times more likely to complete treatment than those with low [OR] = 1.17, Wald = 11.94, $P = .001$, 95% CI [0.1, 1.3]. Similarly, individuals with higher levels of *Desire for Help* were 1.10 times more likely to complete treatment, than those with low *Desire for Help*. As indicated in the Table 5, increased levels of *Treatment Needs* significantly predicted drop out from treatment. For every unit increase on *Treatment Needs*, the odds ratio was 0.908. Finally, no significant difference between the two groups was evident for *Pressures for treatment*.

Discussion

It was hypothesised that more dysfunctional characteristic adaptations will be negative prognostic indicators for treatment completion. This study contributes to the scientific literature and provides additional evidence on the strong association of service users' personality functioning and treatment completion. Findings from the multivariate analysis indicated that dysfunctional levels of *Self-control* and *Social concordance* were significant predictors of drop out from treatment. The analysis at the facet level confirmed and provided additional insight of the predictive role of *Aggression regulation* a facet of *Social concordance, Effortful control* from *Self-control* and *Stable self-image* form *Identity integration* domain on treatment drop out.

Social concordance domain indicating '*the ability to value someone's identity, withhold aggressive impulses towards others and work together with others*', that is associated with low FFM *Agreeableness, Dissocial Behaviour* (DAPP-BQ;); *Antagonism* (PID-5; 27), remained one of the most significant predictors of drop out. It has been supported that individuals who have dysfunctional levels on this domain are expected to be among the most difficult patients to treat.[53]

A large portion of SUD patients meet criteria for an axis II-diagnosis.[20,54,55] This is of concern, because dual diagnosis is strongly associated with poor compliance and non-engagement,[56] (see for reviews).[21,22] Additionally, by using different assessments, studies on individuals with SUD, consistently demonstrated that high levels of *Hostility* and antisocial related traits were significant predictors of drop out.[17,57]

In the alternative criteria for PDs in the Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM-5, it is proposed that PDs are characterised by significant impairments in self- (identity and self-direction) and interpersonal (empathy and intimacy) functioning.[58] Mapping individual maladaptive relational capacities, identity disturbance and inner regulatory processes such as *Self-Control* or *Behavioural Disinhibition* may decode major individual vulnerabilities of responding to the contextual demands. This study is the first of its' kind, as it examined the role of personality functioning based on these dimensional characteristic adaptations in treatment initiation,[59] treatment engagement.[60]

This study supports previous findings and provides additional evidence of how these individual characteristic adaptations are related to drop out. In this study, dysfunctional level of *Aggression Regulation* was a significant predictor of drop out from treatment. The previous phase of the study[60] provided additional insight into the role of maladaptive range of *Social concordance* in treatment, since it was the strongest predictor of low *Counselling Rapport*, indicating problems in developing a relationship with the counsellor, as well as low *Treatment Participation*.

Likewise, *Self-control* that is associated with *Negative affectivity* and the internalised spectrum, was also a significant predictor of drop out in the study. *Self-control* that is *'the capacity to tolerate, use and control one's own emotions and impulses'* was a significant predictor of both *Treatment Participation* and *Counselling Rapport*.[60] This study provided evidence that individuals with dysfunctional scores on *Effortful Control*, assessing '*the ability to focus concentration and direct impulses through conscientious effort*, a facet of *Self-control* were significantly less likely to complete treatment.

In this study, psychological functioning in terms of mood disorders (*Depression* and *Anxiety*) and psychosocial functioning were not significant predictors of treatment completion. Likewise, *Social concordance* that is associated with affect regulation, aggression, asocial, pro-social functioning and overall,

with the externalizing spectrum, was the main predictor of drop out. These findings are interesting and compelling since they extend knowledge and shed light on some of the contradictory evidence on the role of clients' problem severity and drop out. Another possible explanation of the contradictory findings related to clients' problem severity and treatment completion, is that studies used different terminologies, measurements and operationalisation of what constitutes client problem severity. These important inconsistencies regarding client severity and retention have been a subject of other studies as well.[61]

According to the latest revision of the Diagnostic and Statistical Manual (DSM-5), the concept of *Identity* and *Relational functioning* is seen as one of the core markers of personality pathology. Many theories of personality pathology note that both these aspects (self and other representations) are in need of clinical attention.[62] Problems in self and interpersonal functioning are indicators of the severity of personality pathology and have been shown to be one of the most important predictors of dysfunction.[63] The PFS scale is directly informed by the Psychodynamic Diagnostic Manual (PDM Task Force, 2006),[64] which assumes that an assessment of Identity and Relational Capacities is of crucial importance for assessing severity of personality pathology.[27] Interestingly, it has been suggested that the DSM-5 Level of Personality Functioning Scale was introduced to capture the core impairments in personality pathology that would be able to predict possible alliance problems in therapy and to be indicative of the expected outcome in treatment.[65]

Thus, our study further supports this hypothesis, since the results clearly describe for the first time that higher maladaptive range on *Identity Integration* and specifically the facet *Stable self-image* significantly predicted drop from treatment. Individuals with lower capacities *to experience an inner sense of continuity/sameness of self across time and situations*, were more likely to drop out form treatment. According to Kernberg, this state of *Identity diffusion* is a core feature determining the cohesiveness of personality organization and leads to severe difficulties in developing a sense of self with attitudes and life goals that are stable and reliable over time.[66] The findings of this study corroborate this theoretical framework, that suggests low *Stable self-image* hinders individuals' retention in treatment. This study provides evidence that service users with low levels of *Stable self-image* were significantly more likely to drop out from treatment.

In this line, current research is evolving towards the recognition that a number personality traits and personality dysfunction commonly observed in drug users do not necessarily reflect diagnosis of personality disorder pathology.[25] This provides a more comprehensive assessment of pathological personality trait domains and trait facets as well as a 'Level of Personality Functioning-Scale', as an overall measure of the severity of personality dysfunction.[67] This approach is a significant step towards improving the clinical utility of the diagnostic manual as it provides a detailed description of individuals' personality profile including personality traits and characteristic adaptations. Thus, disentangling traits from disorders based on a continuum of their intensity and severity indicates the clinical utility of dimensional approach, as it may improve individualised assessments, enhance treatment specificity and facilitate appropriate personalised-informed interventions. In addition, a flexible (dimensional) classification would offer a more reliable, valid, and explicitly defined basis for making important social and clinical decisions

Other predictors of treatment completion

The findings of this study support prior research on the important role of treatment engagement in treatment completion. Previous studies provided evidence that engagement is directly linked with therapeutic progress and predicts better retention.[68,69] Adopting a multivariate conceptualisation of Treatment engagement, defined as clients' overall behavioural, interpersonal, and cognitive commitment towards achieving treatment benefits, current findings indicated that treatment engagement was one of the most significant predictors of *Treatment completion*. More specifically, *Counselling Rapport* and *Treatment Participation* account for most of the variance explained of the prediction model.

Strong empirical evidence shows that motivation plays a crucial role in the treatment, as it is positively associated with treatment retention, formation of Counselling rapport and *Treatment participation* and *Treatment Satisfaction.*[70] Likewise, lack of motivation for treatment or readiness to change is one of the most cited reasons for lack of engagement, failure to comply and drop-out across settings.[71,72] The findings of this study bring additional evidence on the key role of motivation in treatment since *Treatment readiness* and *Desire for help* were among the strongest predictors of *Treatment completion*. Individuals that were more ready to receive treatment and desired to be in treatment were significantly more likely to complete treatment. In future research, it would be important to examine the potential mediating or moderating effects of dysfunctional characteristic adaptations between treatment motivation and treatment completion.

Personality, programme level factors and treatment outcome

The consistency of individual indicators of treatment completion within programmes, as well as their between-programme variations deserve closer study. Unfortunately, in this study no comparative analysis was possible to examine the effects of the different treatment programmes on treatment completion or on the personality functioning as analyses would have been underpowered. This represents a limitation of the study since it cannot identify potential confounding effects of the treatment

type. It is plausible that the relationship of personality functioning and treatment completion is moderated by contextual factors, such as the different programme needs and organizational climate or staff attributes. Individuals with certain dysfunctional characteristic adaptations might be able to adjust more successfully to certain treatment settings. For example, an individual with aggressive acting out behaviour, and low affect tolerance, may feel uneasy in the highly structured and hierarchical TC environment, whilst an individual with dysfunctional levels on *Effortful control* may benefit from the participatory social learning environment of TC that promotes prosocial behaviour and collective work.

Strengths and limitations

Previous studies in the field have often analysed only specific broad domains of personality without taking into consideration the lower order traits and their significant overlap, resulting in numerous inconsistencies. It has been supported that the analysis at the facet level provides more accurate and detailed description of individual clinical condition, as well as disentangles the overlap among the facet level characteristic adaptations. Clinical research on personality pathology and treatment outcome has been driven mainly by predisposed traits as stable individual characteristics. This has certain drawbacks, since the ability of personality traits measures used to capture potential changes has been questioned by numerous prominent authors.[25,47] This study examined service users' personality functioning by using a dimensional assessment of individuals characteristic adaptations similar to the DSM-5 hybrid model of assessing personality functioning. The findings suggest that this approach would also be beneficial in other sectors beyond SUD treatment.

Several limitations of this study should be noted. These limitations may have influenced the results and need to be taken into account when considering reliability and generalisability of the findings. The sample was drawn from an inpatient substance misuse treatment which limits the ability to generalise findings across treatment settings and types of treatment. Various protocol implementation difficulties interfered with the data collection process. The timing of new client notification, space constraints, and inconsistent client attendance at the treatment facilities affected the assessment team's ability to evaluate each new client entering the treatment programme.

Service users who dropped out of treatment after only few treatment sessions posed significant challenge to the assessment team as they may not have been available for testing during the time of administration. To address this, in cooperation with the treatment staff, the researcher carefully considered the logistics of carrying out the investigation, anticipated potential problems, and worked out alternative reasonable solutions. As a result, it was possible to keep the number of individuals who dropped out before initial assessment at very low levels. Despite that, the study sample may have contained an overrepresentation of treatment completers. One strategy to deal with the premature drop outs was to change the protocol according to the treatment setting in order to minimize the risks.

This study adopted a dichotomy classification system in both phases for treatment progress, that is, those who initiated treatment versus those who dropped out at the preparation phase, and the treatment completion group versus the drop out group for the inpatient phase. This dichotomy was likely a too narrow categorisation to adequately encapsulate treatment status. An alternative classification scheme could consist of: treatment completion (i.e., service user completed treatment based upon initial or revised treatment plan), dropout (i.e., service user leaves treatment against treatment advice), therapeutic discharge (i.e., treatment is discontinued for reasons such as nonadherence with programme rules), and other (i.e., medical or psychiatric hospitalisation).[73] Furthermore, it has been suggested that these different drop-out subgroups have fundamental differences that should be examined to understand drop out patterns.[74] However, as one of the aims of this study was to assess personality functioning, as well as motivational and engagement levels were obtained for early drop out group as well.

Conclusions

Whilst there is substantial attention on the association between substance misuse and personality functioning, there has been very little research regarding the influence of personality functioning on treatment process. This study examined the relationship of service users' personality functioning on treatment completion, informed by the recent developments of the hybrid model of the DSM-5 that assesses dimensionally personality functioning. Disentangling traits from disorders based on a continuum of their intensity and severity may improve individualised assessments, enhance treatment specificity and facilitate appropriate personalised-informed interventions. The dimensional assessment of personality functioning, as measured by the SIPP-118, seems a promising tool to be applied in treatment of substance misuse. This approach can provide clinicians with valuable information on personality functioning and subsequently facilitate the development of clinical formulations and personalised-informed interventions. Utilizing treatment decisions and interventions based on the individual's adaptive and maladaptive capacities sets a more tangible and realistic intervention plan. Such knowledge can inform the design of programmatic interventions and their effectiveness, which can potentially improve retention and treatment outcomes. Empirically speaking, this study adds to the existing literature describing characteristic adaptations of service users who participate in intensive substance abuse treatment programmes and provides additional evidence on the association of

service users' dysfunctional characteristic adaptations with treatment completion.

Self -control and *Social Concordance* were significant predictors of treatment completion. However, several interesting questions remain. One of the most relevant is whether treatment interventions could be developed targeting changes on these adaptations and, if applicable, what would this imply in terms of personality functioning and quality of life, whether it would increase individuals' prognosis in treatment outcome, enabling them to function more adaptively in and out of treatment. How these changes would be maintained following treatment?

The general manner in which treatment interventions are matched to service users' needs could be anchored in the dimensional based framework detected by this study. For example, dysfunctional levels on *Social Concordance*, and especially on *Aggression Regulation, or Stable self-image from Identity integration* are a red flag for treatment drop out. Thus, providers could anticipate that these individuals would require further clinical attention on these issues and employ personality informed strategic interventions making sure that individuals' needs have been met. These findings may also provide some explanatory guidance for the aetiological factors of substance misuse, explain the association of personality pathology and SUD and highlight the clinical applicability of the dimensional based conceptualisations for treatment planning and guiding clinical interventions. To our knowledge, this is the first study that examined the associations between characteristic adaptations and treatment completion is SUD treatment.

Understanding the mechanisms of change in personality functioning and formulating treatment guidelines based on this dimensional conceptualisation, initially requires a development of detailed insight into the dynamic interplay of different characteristic adaptations with the treatment environment and identification of patterns of behavioural responses. Mapping individual maladaptive relational capacities, identity disturbance and inner regulatory processes such, may decode major individual vulnerabilities of responding to the contextual demands and facilitate the development of an eclectic modular personalised-informed and empirically-driven approach to target each dimension.

Author Contribution

FEP was responsible for the study concept/design, analysis, and manuscript preparation revisions.

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NOTE

1. 'Characteristic adaptations are characteristic because they reflect the enduring psychological core of the individual, and they are adaptations because they help the individual fit into the ever-changing social environment. Characteristic adaptations and their configurations vary tremendously across cultures, families and portions of the life span' (McCrae & Costa, p.144).[33]

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