CLINICAL ASSOCIATIONS BETWEEN SEVERITY OF IMPULSIVITY, PSYCHIATRIC MORBIDITY,
DYSFUNCTIONAL DEFENCES AND PERSONALITY DISORDER:
A COMPARATIVE STUDY WITH AXIS-I DISORDERS

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Abstract

Objective: Psychiatric morbidity, impulsive behaviour and use of dysfunctional and maladaptive defences are core features of personality disorder (PD). This study aims to evaluate the significance of the strength of the association between these three core dimensions and PD.

Method: Using a cross-sectional design, a sample of co-morbid Axis-I & -II disorders, and a sample of Axis-I disorders with no co-morbid PD were recruited at three general psychiatric mental health resource centres and then compared.

PD as dependent variable was analysed both as a categorical and as a dimensional entity using the Structured Clinical Interview for DSM-IV. The Symptoms Checklist 90-R general severity index (GSI), the Barratt Impulsivity Scale (BIS) and the Defense Style Questionnaire (DSQ) were used to measure severity of psychiatric morbidity, impulsivity and defensive style, respectively.

Results: BIS was a highly significant predictor of categorical PD (β = .13, SE = .03, p < .001), but not GSI and DSQ. BIS and GSI significantly predicted PD as a dimensional construct (β = 0.32, SE = .08, t = 4.05, p < 0.001; and β = 5.04, SE = 1.54, t = 3.28, p = 0.002, respectively). The diagnostic efficiency statistics found that BIS had greater sensitivity (.82) and specificity (.79), and overall predictive power (.87) of correctly identifying true positive and true negative PD diagnosis compared to the other two measures.

Conclusions: BIS may be used in routine clinical practice as a screening measure to identify the presence of PD in complex presentations.

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Introduction

Personality Disorder (PD) is a chronic and pervasive form of psychopathology. Its prevalence is estimated at 12% in the general population (Quirk et al., 2016; Volkert, Gablonski, & Rabung, 2018), but much higher rates are found in psychiatric clinical settings (Newton-Howes et al., 2010; Tyrer, Reed, & Crawford, 2015). The complexity of PD psychopathology translates into high hospitalisation rates, self-harming behaviors and suicidality, delinquency and functional impairment (Skodol, Pagano, et al., 2005; Tyrer, 2009). Psychiatric distressing symptoms in the areas of mood, anxiety, distorted ideation, interpersonal functioning, and impulsive behaviors such self-harm, suicidality, sexual conduct, finances, intense and volatile interpersonal relationships, as well as extensive use of maladaptive defense strategies are seen as core to the external and internal functioning of PD (Kernberg & Caligor, 2005;

Leichsenring, 1999; Links, Heisel, & Garland, 2003; Tyrer, 2009). Using a novel method of network analyses, a recent studies found that affective instability, identity, and effort to avoid abandonment were central aspects in Borderline Personality Disorder (Richetin, Preti, Costantini, & De Panfilis, 2017)

A number of studies have found that PD presents with high levels of general psychiatric distress such as depression, anxiety, psychoticism, somatization and interpersonal difficulties, which are on average significantly higher than in subjects with a psychiatric syndrome without PD (Bales et al., 2015; Bateman, Gunderson, & Mulder, 2015). This heightened level of psychiatric morbidity, which becomes chronic over time, contributes to the overall severity of PD presentation and to the difficulties in treating and managing PD within general psychiatric settings (Gunderson, 2001; Tyrer, 2018).

PD has been found to be significantly associated with

aggressiveness and impulsivity (Coccaro, Shima, & Lee, 2018; Fossati et al., 2007; Lee, 2017). Individuals with PD have a tendency to display impulsive and self-damaging behaviour in the areas of finance, sex and misuse of substances. They are also known to be at risk for recurrent suicidal and self-mutilating episodes and threats, as well as reacting with, often extreme, irritation and verbal and/or physical aggression as a result of minor slights, challenges and distorted perceptions within interpersonal relationships (Chiesa, Sharp, & Fonagy, 2011; Paris, 2005).

The nature of the defensive organization underpinning PD characteristic symptoms and behavioural manifestations, has been the object of several clinical and empirical studies. It was found that individuals with PD use specific primitive defences such as devaluation, omnipotence, idealization, denial, projective identification and splitting (Kernberg, 1975; Kernberg & Caligor, 2005). The excessive use of these primitive defences, at the expense of more mature and adaptive defences such as altruism, repression, humour and anticipation, leads to dysfunctional interpersonal relating, psychosocial impairment, and thus interferes with leading a less conflicted and fulfilling life (Zanarini, Weingeroff, & Frankenburg, 2009). A number of uncontrolled studies, using self-rated measures of defense style, have found that individuals with PD are particularly prone to use sets of dysfunctional defense mechanisms, and have found significant difference within Axis-II diagnostic categories (Bond & Perry, 2004; Perry & Cooper, 1986). In a seminal study, Zanarini (2013) compared level of defensive functioning in Borderline PD and other Axis-II disorders. While both groups showed a significant increase in the mean score for the adaptive style and a significant decrease in image-distorting and maladaptive defences, borderline PD had significantly higher scores in seven out of 18 defences, including acting out, emotional hypochondriasis, passive aggression, projection, projective identification and splitting. Relevant to our study, a Canadian-based research found that elements of impulsivity are markedly associated with level of defensive functioning in borderline PD (van Reekum, Links, Mitton, Fedorov, & Patrick, 1996).

While a number of these core PD features are shared by individuals with psychiatric syndromes without PD, it remains unclear the extent to which these psychopathological features are significantly and consistently more severe in PD than in individuals with Axis-I diagnoses only and whether they are predictive of a diagnosis of PD. Our study aims to explore possible differences in severity in these core features between Axis-I only individuals and individuals with Axis-I with co-morbid PD, and the extent to which they are predictive of PD.

The orthodox categorical model of classification of PD has been recently subjected to considerable challenge. Some authors have argued that the Axis-II classification system is very unstable, and high level of correlation between PD diagnoses have been found because of substantial overlap between PD diagnostic criteria (Skodol, 2011). Other contributions outline the limitations of conflating core PD dysfunctions with specific manifestations of particular subtypes, and place considerable weight behind the desirability of integrating the various subtypes of PD diagnoses (Huprich, 2018; Tyrer, Crawford, & Mulder, 2011). Specific PD subtypes ought to be considered only once the core pathology has been assessed and taken into account (Caspi et al., 2014; Fonagy, Campbell, & Bateman, 2016). In recent years, a new system of dimensional classification

based on personality disorder severity, which is consistently linked to impairment and outcome, has been proposed (Hopwood et al., 2018), published in DSM-5 Section III (Skodol, 2012) and implemented in ICD-11 Personality Classification (Mulder & Tyrer, 2019). The DSM-5 Alternative Model for personality disorders (AMPD) puts emphasis on the assessment of the presence of pervasive and inflexible impairment of personality functioning (criterion A) and pathological personality traits (criterion B), which are evaluated on a continuum. Level of interpersonal functioning and integrity of self are assessed in the dimensions of empathy, intimacy, identity and self-direction, using the Level of Personality Functioning Scale, a 5-point scale (0=healthy, 1=mild, 2=moderate, 3=severe, 4=extreme). Assessment of the pathological personality trait domains (negative affectivity vs emotional stability, detachment vs extraversion, antagonism vs agreeableness, disinhibition vs conscientiousness, psychoticism vs lucidity) and the corresponding 25 trait facets also occur on a dimensional scale (Skodol, 2018). These PD dimensions are best evaluated through the newly developed Structured Clinical Interview for the DSM-5 AMPD, which has been found to have satisfactory inter-rater reliability (Buer Christensen et al., 2018; Preti et al., 2018; Zimmermann et al., 2014).

In this study, we set out to compare differences in severity of impulsivity, psychiatric distress and presence/absence of maladaptive defences between a group of individuals with Axis-I and PD, and a sample of individuals with Axis-I disorders, recruited as consecutive referrals to three outpatient general psychiatric services. Significant clinical variables in the correlational analysis will be entered into a regression model to test the strength of the association with PD. Diagnostic efficiency statistics for PD will then be performed to ascertain the relative level of specificity and sensitivity of each clinical measure. PD as outcome variable will be evaluated both as a categorical and dimensional entity (Fowler et al., 2015).

In summary, the current study has three aims: 1) to compare the severity of impulsivity, psychiatric morbidity and presence of a dysfunctional defense structure in subjects with a diagnosis of psychiatric disorder only and subjects with co-morbid Axis-I and -II disorders; 2) to investigate the predictive potential for PD of the three measures used in the study and 3) to compare their specificity and sensitivity in identifying patients with personality disorder.

The results could have potential clinical implications with regard to the application in routine clinical work of the most diagnostically efficient measure to identify PD among the tree clinical measures used in the study. If found diagnostically efficient, each of these measures would have several advantages over other time consuming and labour intensive structured clinical interviews.

Method

Study sample and clinical setting

The study took place in three out-patients mental health resource centres. These secondary care services serve a population of 100,000 people, and are the first line of referrals from primary care physicians and other community health workers. Patients are assessed by general psychiatrists before a treatment plan is discussed and organised, that may entail general psychiatric treatment in out-patient, day patient, inpatient facilities

or referral to a specialist service for eating disorder, substance abuse or personality disorder pathologies.

As part of this study, 136 patients (age 18-65) consecutively lined up for general psychiatric assessment, were approached by one of 5 research assistants (2 psychiatrists and 3 psychologists) to explain the nature of their involvement for research purposes, hand them the patients information sheet with the outline of the project and seek consent for study participation. Patients with organic mental health disorders (n = 4), schizophrenia (n = 8) (but not psychosis) and schizoaffective disorder (n = 10) were excluded from the study. Eighty-five (72%) patients gave written informed consent. Within one week from consent patients were again met for the application of the diagnostic and clinical measures. The research assessors were blind to the clinical diagnoses. The study obtained ethical approval from the Bologna & Imola Health Authority Ethics Committee, protocol # 15049 issued on 25 June 2015.

The SPSS data file that support the findings of this study is openly available at the following link https://doi.org/10.5522/04/12532343 .

The average age of the subjects was 35 (SD = 11.9), the majority were of male gender (N = 52, 61.2%), single (N = 59, 76.3%) and in active employment (N = 69, 81.2%). At the time of the initial clinical assessment, all 85 patients were diagnosed as suffering from a psychiatric disorder: 47 (55.3%) met criteria for a DSM-IV Axis-I disorder on clinical ground, while 38 (44.7%) met criteria for both AXIS-I and, at least one, DSM-IV SCID-II PD diagnosis. The main psychiatric diagnosis were grouped into Mood and Anxiety disorder (N = 67, 78.8%), Eating Disorder (N = 41, 48.2%), Substance Abuse disorder (N = 34, 40%) and Psychotic disorder (N = 9, 10.6%). The PD diagnoses were Borderline (N = 26, 30.6%), Antisocial (N = 15, 17.6%), Avoidant (N = 15, 17.6%), Obsessive-compulsive (N = 10, 11.8%), Paranoid (N = 12, 14.1%), Schizotypal (N = 2, 2.4%), Schizoid (N = 3, 3.5%), Dependent (N = 5, 5.9%), Narcissistic (N = 3, 3.5%) and Histrionic (N = 1, 1.2%).

Table 1 compares demographic, diagnostic and intake severity features of the Axis-I only and co-morbid Axis-I-PD samples. The two groups were not significantly different in age, gender and marital status, but patients in the Axis-I only sample were significantly more in current employment than the comorbid sample ($\chi^2_{(2)}$ = 7.32, p = .007). In addition, the PD sample was found to have significantly greater diagnoses of substance abuse disorder ($\chi^2_{(1)}$ = 9.12, p = .002) and psychotic disorder ($\chi^2_{(1)}$ = 4.45, p = .035), compared to the Axis-I only sample.

Measures

The *Structured Clinical Interview for DSM-IV* (First, Gibbon, Spitzer, Williams, & Benjamin, 1997) was used to obtain diagnostic Axis-II profiles based on the criteria of the Diagnostic and Statistical Manual for mental disorders version IV (American Psychiatric Association, 1995), which yields 10 different categories of personality disorder diagnoses. A psychiatrist trained to the use of the SCID conducted the interview, with a second in the background independently scoring the interview. At the end the two psychiatrists met to compare notes, discuss and consensually adjust scoring discrepancies. DSM-IV Axis-I diagnostic profiles were reached on clinical ground based on DSM-IV criteria as elicited during the assessment interview and previous clinical information available in the patients' clinical

files. In this study PD was used as a categorical variable (presence/absence) and as a dimensional variable (the positive number of PD traits scored on the SCID-II).

The *Symptom Checklist-90-R* (SCL-90-R) (Derogatis, 1983), a five-point self-report clinical rating scale, was used to elicit severity of symptoms in nine areas of the patient's functioning. The SCL-90-R general severity index (GSI), obtained by dividing the total raw score by the number of items, was the mean score used in the study to report changes in the domains of subjective symptomatic distress. The GSI has very high internal consistency (alfa = .90). The Italian version of the SCL-90-R was used in this study (Prunas, Sarno, Preti, Madeddu, & Perugini, 2012).

The *Barratt Impulsiveness Scale*, version 11 (BIS-11) (Patton, Stanford, & Barratt, 1995) is a self-rated 30-item 4-point Likert scale that evaluates degree of personality/behavioural construct of impulsiveness as composed by the three sub-traits of cognitive, behaviour and planning ability. A mean impulsiveness score is derived by dividing the total score by the number of items. High impulsivity was categorised for total scores > 71. The Italian version of the BIS-11 was developed by Fossati et al. (2001), who found good level of internal consistency (alpha = .79) and test-retest reliability (r = 889, p < .001).

The *Defence Style Questionnaire* (Bond & Wesley, 1996) is an 88-item self-report measure that assesses for the presence of both defensive styles and specific defense mechanisms. It has been found to be internally consistent and to have criterion validity. Each item is rated on a 9-point Likert scale. Four defensive styles were originally derived from a factor analytic procedure: maladaptive, self-sacrificing, image-distorting and adaptive. Subjects that were found to be above the threshold (6.8, 5.6 and 5.5) for any of the three non-adaptive defense styles were scored as 'dysfunctional' in this study. The Italian version of the DSQ was used in this study (San Martini, Roma, Sarti, Lingiardi, & Bond, 2004). Two of the three non-adaptive defense styles were found to be of satisfactory internal consistency (maladaptive alpha = .85; image distorting alfa = .72), while all three had significant reliability (maladaptive r = .79, p < .001; image distorting r = .63, p < .001; self-sacrifiicing r = .68, p < .001).

Data analysis

All analyses were carried out using SPSS for window version 26.

Chi-squared tests for categorical variables and one-way analysis of variance (ANOVA) for continuous variables were used to test differences between the samples in demographic and clinical variables. Linear bivariate correlations were carried out to test for significant associations between the pooled diagnostic and clinical severity variables.

Two separate hierarchical logistic regressions with forced entry were used to test whether BIS, GSI and DSQ as independent variables, substance abuse and psychotic disorder as covariates, were predictors of a categorical diagnoses of PD. The independent variables that did not make a significant contribution to the model were removed from the equation and the logistic regression was repeated retaining only significant independent variables.

When considering a dimensional approach to PD,

Table 1. *Demographic, diagnostic and clinical features of the Axis-I only and Axis-I & -II samples*

	Axis-I (n = 47)		Axis-I & II (n = 38)		Test of significance
	n	*%*	*n*	*%*	
Female	19	40.4	14	36.8	$\chi^2_{(1)}$= .11, *p*= .736
Single	30	63.8	29	76.3	$\chi^2_{(1)}$= 1.54, *p*= .214
Employed	43	91.5	26	68.4	$\chi^2_{(1)}$= 7.32, *p*= .007
Mood Disorder	34	72.3	33	86.8	$\chi^2_{(1)}$= 2.65, *p*= .104
Psychotic Disorder	2	4.3	7	18.4	$\chi^2_{(1)}$= 4.45 *p*= .035
Substance Abuse	12	25.5	22	57.9	$\chi^2_{(1)}$= 9.17, *p*= .002
Eating Disorder	22	46.8	19	50.0	$\chi^2_{(1)}$= .09, *p*= .770
DSQ maladaptive	19	40.4	31	81.6	$\chi^2_{(1)}$= 14.69, *p*< .001
	Mean	*SD*	*Mean*	*SD*	
Age	35.77	11.75	34.34	12.08	$F_{(1)}$= .30, *p*= .585
Axis-I disorders	1.49	.66	2.13	.78	$F_{(1)}$= 17.09, *p*= .001
PD dimensional	9.21	7.76	24.63	10.29	$F_{(1)}$= 62.01, *p*< .001
GSI intake[†]	1.14	.63	1.77	.75	$F_{(1)}$= 17.65, *p*< .001
BIS intake[‡]	56.68	11.84	77.68	9.92	$F_{(1)}$= 76.23, *p*< .001

PD = personality disorder; GSI = General Severity Index; BIS = Barratt Impulsivity Scale; DSQ = Defense Style Questionnaire; PD dimensional = number of positive PD traits met.

[†]Between group effect size (d) = .92 [‡]Between group effect size (d) = 1.92

a hierarchical liner regression with forced entry was applied. BIS, GSI, DSQ and psychotic disorder were entered as independent variables, and dimensional scores for PD (the number of positive PD traits scored in the SCID-II) as dependent variable. The level of model fit was evaluated by the increase in the percentage of variance explained by each regression model (Nagelkerke R^2) and the corresponding levels of statistical significance for such increase. Overall significance, model percentage of variance explained (*B* scores) by any single variable within the regression model and Odd Ratios derived from the linear regression are reported.

The calculation of the degree of accuracy of BIS, GSI and DSQ in identifying PD was carried out. The diagnostic efficiency statistics were calculated using a programme modelled on Streiner (Streiner, 2003), applied to the classification tables obtained from each of the separate logistic regressions, to arrive at an evaluation of the sensitivity (the probability of correctly identifying positive diagnoses) and the specificity (the probability of false positives when the disorder is in fact not present) of efficiency for predicting PD. We also calculated odds ratios as an overall measure of effectiveness of the BIS, GSI and DSQ in correctly identifying true positives and true negatives, positive

likelihood ratios (true positive rates/false positive rates=sensitivity/1-specificity) and negative likelihood ratios (false negative rates/true negative rates=1-specificity/specificity).

Results

A correlational matrix (**table 2**) showed significant associations between PD categorical and substance abuse (r = .33, p = .002), psychotic disorder (r = .23, p = .035), BIS (r = .69, p < .001), DSQ (r = .42, p < .001) and GSI (r = .42, p < .001); between PD dimensional and psychotic disorder (r = .29, p = .008), BIS (r = .61, p < .001), DSQ (r = .44, p < .001) and GSI (r = .60, p < .001); between BIS and substance abuse (r = .36, p = .001), BIS and psychotic disorder (r = .30, p = .005).

PD categorical diagnosis

We built a hierarchical logistic regression model with forced entry. The independent variables (BIS, GSI, DSQ, substance abuse and psychotic disorder) were entered into the equation according to the level of significance in the correlational analysis. Since only BIS was found to be a significant predictor in the equation, we repeated the logistic regression after removing the other predictive variables that did not make a significant contribution to the model. The results showed that PD categorical was significantly predicted by BIS scores (β = .13, SE = .03, p < .001). The square value of R (Nagelkerke R^2 = .57), which shows that BIS accounts for 57% of the variance, and the odds ratio (1.14 95% CI 1.09 1.20) indicate that as the value of impulsivity increases, the likelihood of the personality disorder diagnosis occurring also increases significantly.

Table 4 outlines and compares figures with regard to the accuracy rates of the three clinical measures in identifying true positive and true negative PD diagnosis. The BIS was found to have greater sensitivity (.87) and specificity (.78) for presence of PD compared to GSI (sensitivity = .55, specificity = .72) and DSQ (sensitivity = .81, specificity = .60). BIS had a superior overall predictive power of correctly classifying presence/absence of PD (OCC = .82) to both GSI (OCC = .65) and DSQ (OCC = .69). The

value of the BIS Positive Likelihood Ratio (LR+ = 4.08) was twice as high compared to that of the GSI (LR+ = 2.00) and DSQ (LR+ = 2.02), which revealed that BIS had a superior ratio between the probability of a positive result in identifying the presence of a PD and the probability of a positive result in identifying the absence of a PD. Conversely, in the identification of the ratio between false negative and true negative rates (Negative Likelihood Ratio) for PD, BIS (LR- = .17) was found again to be significantly more accurate than GSI (LR- = .62) and DSQ (LR- = .31). Finally, the diagnostic odds ratio values, which is a measure of the overall effectiveness in accurately predicting presence and absence of PD, showed that BIS (OR = 24.42) was far superior compared to the other two measures (GSI OR = 3.23; DSQ OR = 6.53).

PD dimensional

The hierarchical blockwise entry linear regression analysis with PD dimensional as the outcome variable, and BIS as the independent variable was performed. When the other three independent variables (GSI, DSQ and psychotic disorder) were added to the model in stages, it was found that GSI significantly improved the model, while adding DSQ and psychotic disorder did not, and were therefore excluded from the equation (**table 3**). The results of the linear regression model were that both BIS and GSI were significant predictors of the number of positive PD traits (PD dimensional) scored on the SCID-II for the whole sample (β = 0.32, SE = .08, t = 4.05, p < 0.001; and β = 5.04, SE = 1.54, t = 3.28, p = 0.002, respectively).

We further investigated the relationship between severity of impulsivity as measured by the BIS and PD measured as a dimensional construct, controlling for the effect of substance abuse, which was significantly associated with impulsivity (r = .36, p = .001) . After transforming BIS into a binary variable (score > 71 = high impulsivity; score ≥ 71 = moderate/low impulsivity), we run a univariate analysis of variance (ANOVA) with PD dimensional as dependent variable, and BIS binary and substance abuse as fixed factors. The results revealed that BIS binary was a highly significant variable in the equation ($F_{(1)}$ = 20.60, p < .001), while

Table 2. *Correlation matrix of diagnostic and clinical severity variables in the overall sample (N = 85)*

	1	2	3	4	5	6	7	8	9
1 PD categorical									
2 PD dimensional	.65, p < .001								
3 Mood disorder	.18, p = 106	.09, p = .397							
4 Substance abuse	.33, p = .002	.20, p = .067	-.05, p = .669						
5 Eating disorder	.03, p = .773	.07, p = .527	-.25, p = .022	-.26, p = .016					
6 Psychotic disorder	.23, p = .035	.29, p = .008	.18, p = .102	.19, p = .086	-.03, p = .813				
7 BIS intake	.69, p = .692	.61, p < .001	.17, p = .119	.36, p = .001	.04, p = .701	.30, p = .005			
8 GSI intake	.42, p < .001	.57, p < .001	.06, p = 616	.08, p = .452	.24, p = .031	.26, p = .015	.43, p < .001		
9 DSQ intake	.42, p < .001	.44. p < .001	.15, p = .167	.05, p = .657	.14, p = .208	.21, p = .053	.37, p < .001	.51, p < .001	

BIS: Barratt Impulsivity Scale, GSI: Symptom Check-list-90-R General Severity Index, DSQ: Defense Style Questionnaire

Table 3. *Linear regression model summary for PD dimensional*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.610[a]	.372	.364	9.401	.372	49.175	1	83	.000	
2	.698[b]	.488	.475	8.544	.116	18.502	1	82	.000	
3	.706[c]	.499	.474	8.552	.011	.918	2	80	.404	1.242
a. Predictors: (Constant), BIS										
b. Predictors: (Constant), BIS, GSI										
c. Predictors: (Constant), BIS, GSI, Psychotic Disorder, DSQ										
d. Dependent Variable: PD dimensional										

Table 4. *Diagnostic specificity and sensitivity scores for BIS, GSI and DSQ in relation to personality disorder categorical (PD)*

	Sensitivity	Specificity	Odds Ratio	Likelihood Ratio+ (LR+)	Likelihood Ratio- (LR-)	Overall Correct Classification
PD categorical						
BIS	.87	.79	24.42	4.08	.17	.82
GSI	.45	.55	3.23	2.00	.62	.65
DSQ	.82	.60	6.53	2.02	.31	.69

Sensitivity: probability that a test result will be positive when the disorder is present (true positive rate)
Specificity: probability that a test result will be negative when the disorder is not present (true negative rate)
Diagnostic odds ratio is a measure of the effectiveness of a diagnostic test
Positive likelihood ratio: ratio between the probability of a positive test result given the *presence* of the disorder and the probability of a positive test result given the *absence* of the disorder, i.e. = True positive rate / False positive rate = Sensitivity / (1-Specificity)
Negative likelihood ratio: ratio between the probability of a negative test result given the *presence* of the disorder and the probability of a negative test result given the *absence* of the disorder, i.e. = False negative rate / True negative rate = (1-Sensitivity) / Specificity
BIS: Barratt Impulsivity Scale, **GSI**: Symptom Check-list-90-R General Severity Index, **DSQ**: Defense Style Questionnaire

substance abuse and the interaction between BIS binary and substance abuse were not significant ($F_{(1)}$ = .05, p = .828 and $F_{(1)}$ = .01, p = .909, respectively). The mean number positive PD traits met was markedly higher for patients with high impulsivity (mean = 22.54, SD = 10.83) compared with patients with low impulsivity (mean = 9.62, SD = 8.73); in contrast no difference in mean number of positive PD traits was revealed for presence/absence of substance abuse (mean = 15.84, SD = 10.14 and mean = 16.31, SD = 10.26) (**figure 1**).

Discussion

This study confirms that co-morbid PD to a psychiatric diagnosis is associated with a significant increase in the severity of psychiatric disturbance compared to subjects with an Axis-I disorder without PD (McGlashan et al., 2000; Ralevski et al., 2005; Shea, Pilkonis, Beckham, & al., 1990; Skodol, Gunderson, et al., 2005; Tyrer, 2000; Wingenfeld et al., 2011). The degree of psychiatric morbidity, impulsivity and maladaptive defences were markedly higher in the co-morbid sample, which alongside the significant difference in current employment, indicate a greater level of social maladjustment and functional impairment also found in previous studies (Dimaggio et al., 2013; Kool et al., 2005; Skodol, Pagano, et al., 2005).

The severity of impulsivity, as measured by the BIS, was revealed to be the variable most significantly associated with PD, either as a categorical or dimensional construct. The results showed that the likelihood of PD increases significantly with an increase of the level of impulsivity. The BIS was found to yield greater overall accuracy in identifying presence and absence of PD, showing greater specificity and sensitivity compared to the SCL-90-R and the DSQ measures. As DSM-5 outlines, the essential features of PD are impairment in interpersonal relating, negative affectivity, impulsivity, separation anxiety, emptiness, dissociated states and antagonism (Skodol, 2012). In contrast to a recent study that found only a partial association between impulsivity and PD (Barker et al., 2015), several of these core PD features appear to have accurately captured by the BIS in our study.

The lower predictive power revealed by the SCL-90-R may be explained by the fact that it was originally developed to target the severity of a broad range of symptoms and psychopathology that are exhibited across diagnostic categories, belonging to both DSM Axis. Although the DSQ was found to have high sensitivity for detecting presence of PD, it was not as strongly associated with PD compared to BIS. In our study the presence of a dysfunctional defence structure only partially accounted for the variance in the regression models, on account that maladaptive defences are likely shared with Axis-I

Figure 1. *Association between impulsivity scores, substance abuse and positive number of PD traits*

0 = BIS low impulsivity, absence of substance abuse   1 = BIS high impulsivity, presence of substance abuse
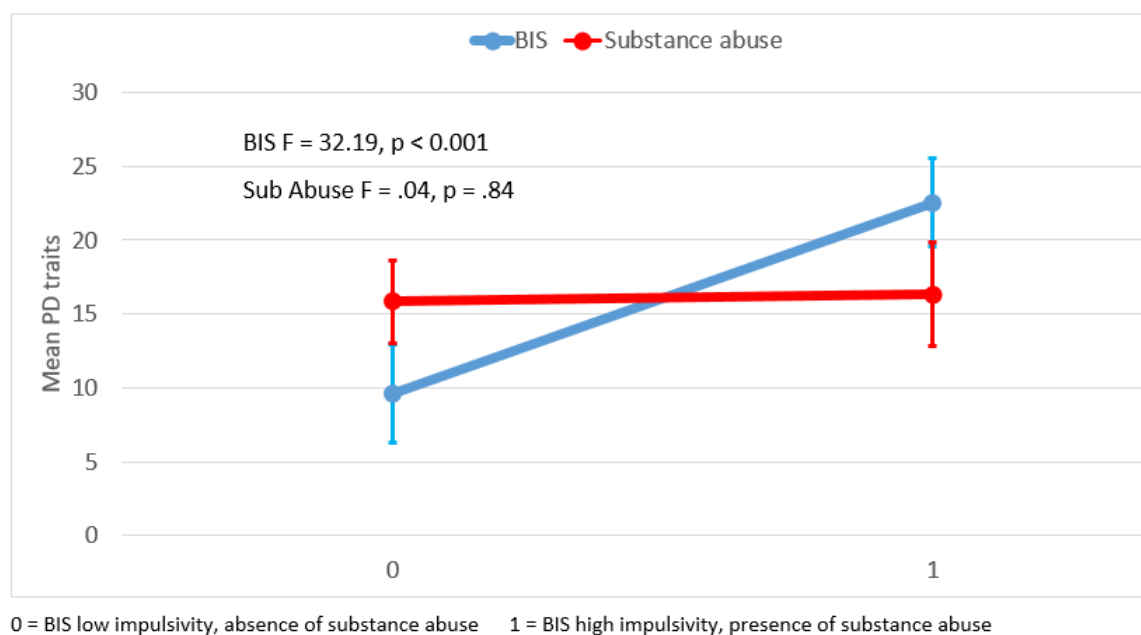
disorders with no PD.

The clinical implications of this study are two-fold. First, the results underscore the importance of correctly identifying subjects with an associated PD diagnosis for treatment planning. Since on average these patients present with more severe psychopathology, they may require specialist interventions in structured programmes that provide greater containment, continuity of treatment, consistency in approach and trained staff to the management of PD symptomatic, interpersonal and psychosocial psychopathology (Bateman et al., 2015; Fonagy, Luyten, & Bateman, 2017; Gunderson, 2001). A number of studies have shown the superiority of treating PD in specifically structured clinical settings compared to routine general psychiatric settings (Bateman & Fonagy, 2009; Bohus et al., 2004; Chiesa, Fonagy, & Holmes, 2006). Second, given the BIS documented accuracy in predicting presence/absence of PD, this study suggests that BIS may be used as a screening instrument to alert clinicians at the assessment stage as to presence of a PD. The integration of the BIS results with the clinical assessment data, may strengthen the likelihood of accuracy of the initial patient's diagnosis and assist with the timely planning for treatment and management. This is a very important aspect, as these patients are often offered inadequate and at times iatrogenic treatment in general psychiatric settings before a proper understanding of the presence of PD complicating the clinical picture is reached (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004; Paris, 2008; Tyrer, 2018). BIS is a more manageable, less time consuming and labour intensive measure in its administration and analysis than structured clinical interviews like the SCID-II, and can be more realistically employed as part of an initial assessment in routine clinical care.

A number of limitations need to be outlined when interpreting the study results. First, although the study was adequately powered, the extent to which the selected study sample is representative of psychiatric outpatient populations needs to be addressed. The Axis-I psychiatric diagnoses, made on purely clinical grounds, were grouped in broad categories to compensate for the relatively small sample size. In addition, there was an excess of eating

disorder and substance abuse diagnoses compared to their average prevalence in psychiatric outpatient populations (Karterud, Arefjord, Andresen, & Pedersen, 2009; Lai, Cleary, Sitharthan, & Hunt, 2015; Toftdahl, Nordentoft, & Hjorthøj, 2016; Zipfel et al., 2014). The possibility of sampling bias is a threat to the external validity of the study. Second, it may be argued that the Axis-I disorders co-occurring with PD are confounding factors that may have partially accounted for the results found. We took this into account by controlling for the Axis-I disorders (psychotic and substance use) which were significantly associated with the dependent variables. In line with previous studies (Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011) we found that psychotic disorder and substance abuse, often found in association with Cluster A and B PD (Trull et al., 2018), did not make a significant contribution to the prediction of PD as categorical and a dimensional constructs. Third, the presence of a non-psychiatric matched control group may have strengthen the internal validity of the findings. Fourth, our operationalisation of PD dimensionality used in the study based on DSM-IV SCID-II number of positive traits may be considered outdated in the light of more recent developments in the field of PD. The DSM-5 AMPD Structured Clinical Interview yields a much more comprehensive and exhaustive outlook of interpersonal functioning and pathological personality traits which scored on a Likert scale. This ensures a more accurate and broader range dimensional assessment of severity of personality pathology than simply adding positive traits on the DSM-IV SCID-II. Unfortunately, when data collection started for our project the Structured Clinical Interview for DSM-5 AMPD was not yet available.

On the whole, these considerations limit the generalisability of the findings to other psychiatric settings and populations. Future research in this area may entail a longitudinal study with a larger sample size in order to increase statistical power and increase generalisability to other settings. To confirm the central role of impulsivity in defining PD, and of BIS as a useful screening measure to be used in routine clinical practice to diagnose PD, it would be desirable to set up a pragmatic randomized controlled trial with the inclusion

of a third arm made up by non-psychiatric controls, and to ensure more stringent inclusion criteria to reduce the chance between Axis-I & -II co-occurrences. This would strengthen the internal validity of the design, and allow for analyses of convergent and discriminant validity between BIS and DSM-5 SCID AMPD.

Despite these limitations, we feel that this study makes a valuable contribution to the understanding of the association between impulsivity and PD, suggesting that the use of the BIS may be a helpful tool in routine clinical practice to aid the identification of the presence/absence of a PD in complex presentations.

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