Temporal stability of personality traits and disorders within substance dependent patients

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ABSTRACT
The current study evaluated the temporal stability of personality disorders (PD) and traits as assessed by the Schedule for Nonadaptive and Adaptive Personality (SNAP) within a sample being treated for substance dependence in a residential TC. Temporal stability coefficients were similar to the few previous studies with clinical samples and comparable retest intervals; however, the current study extended previous work by examining mean-level stability of the PD scales. While most SNAP scales remained stable or decreased over 6 months of active psychotherapy, increases on some scales (e.g. workaholism as well as antisocial, narcissistic and obsessive–compulsive PDs) raised compelling questions. These findings suggest additional research on the stability and validity of the SNAP in treatment samples. Copyright © 2010 John Wiley & Sons, Ltd.

Introduction

The American Psychiatric Association's (APA) *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV-TR*; APA, 2000) currently conceptualizes personality disorders (PDs) as categorical constructs that are distinct from each other and from normal personality functioning. Numerous limitations of this model have been noted (e.g. Clark, 2007; Widiger & Samuel, 2005), and it now appears likely that a dimensional model will be incorporated into DSM-5 (Krueger, Skodol, Livesley, Shrout, & Huang, 2007; Skodol, 2009). There

is general consensus about the domains that would comprise the highest level of a dimensional trait model, as differences between 3-, 4- or 5-factor models appear to be mainly at the level of abstraction (Markon, Krueger, & Watson, 2005). However, there is less concurrence about the specific maladaptive personality traits that should underlie these broad domains and even less agreement about which (if any) of the current diagnostic categories should be retained. Nonetheless, because the DSM-5 proposal includes higher order trait domains and more specific lower order symptoms, as well as PD categories, it is important for research to thoroughly investigate each of these levels.

One particularly important area of investigation is temporal stability. PDs have long been considered to be relatively stable and enduring; however, findings from the Collaborative Longitudinal Personality Disorders Study (Grilo et al.,

2004; Gunderson et al., 2000) have called this into question. Morey and colleagues (2007) found that scores on general personality traits were more stable than the *DSM-IV* PD diagnoses over a period of 48 months. However, these intriguing findings conflate the constructs with the method of assessment as the general traits were self-reported while the PDs were assessed via semi-structured interview. As such, research that examines the relative stability of the broad personality traits and maladaptive symptoms of a dimensional model as well as PD diagnostic scales is important. It would be particularly useful if these were assessed within the same instrument to control for method variance.

The Schedule for Nonadaptive and Adaptive Personality (SNAP; Clark, 1993) is one of only a few instruments that provide an explicit assessment of each of these three personality (traits, symptoms, disorders) levels.[1] The SNAP (Clark, 1993) assesses 3 broad temperaments, 12 primary maladaptive traits and the 10 PDs. An emerging literature supports the reliability and validity of the SNAP temperament and traits scales (e.g. Simms & Clark, 2006), which have correlated well with other measures of personality pathology (e.g. Reynolds & Clark, 2001) and showed predictable relationships with the *DSM-IV* PD categories (Morey et al., 2003). Recent research has also examined the concurrent validity of the PD scale

scores and indicated that they correlate strongly with scores from other self-report inventories (see Widiger & Boyd, 2009) and scores from a structured interview measure (Samuel & Widiger, in press). For the SNAP to gain acceptance as a personality measure with clinical utility, it is important to evaluate the temporal stability of its scales and the extent to which they may change in individuals during an intensive treatment experience.

The short-term test–retest reliability for the SNAP trait and temperament scales in non-clinical samples is excellent (Clark, 1993; Simms & Clark, 2005), and the longer term reliability coefficients in clinical samples also appear to be very good (Clark, Vittengl, Kraft, & Jarrett, 2003; Morey et al., 2007). Melley, Oltmanns, and Turkheimer (2002) have conducted the only study of the stability of the SNAP PD dimensional scores and found a median 9-month interval coefficient of 0.75. However, this study can only be considered a preliminary test as Melley and colleagues (2002) evaluated an undergraduate rather than a clinical sample and, consistent with this focus, limited the examination of temporal stability to Pearson correlations. Although test–retest reliability correlations provide a relatively straightforward index of score pattern similarity, they do not provide information about specific changes in personality symptoms or disorders that emerge across time. Within treatment samples, it is also important to evaluate the degree to which scores decrease (or increase).

Only one study has evaluated changes in SNAP scale scores as a function of treatment and this was confined to the temperament and trait scales. Clark et al. (2003) administered the SNAP to a sample of 108 depressed patients near the beginning and end of a 20-session treatment. Temporal stability coefficients ranged from 0.48 (negative temperament and self-harm) to 0.82 (exhibitionism and disinhibition) with a median of 0.68, over 12–14 weeks. Significant decreases were found for all traits except positive temperament, exhibitionism and entitlement, which increased significantly. These changes were conceptualized as improvements in functioning for the depressed patients

[1]The Minnesota Multiphasic Personality Inventory—2 provides scores for broad traits through scoring the Personality Psychopathology Five (Harkness & McNulty, 1994) as well as separate scales for the *DSM-IV-TR* PD constructs (e.g. Somwaru & Ben-Porath, 1995), although the latter are not part of routine scoring programmes. Additionally, the NEO Personality Inventory–Revised (Costa & McCrae, 1992) provides an assessment of both broad and specific traits and can also be scored for the PDs using a prototype matching approach (Miller, Lynam, Widiger, & Leukefeld, 2001). Other commonly used inventories such as the Millon Clinical Multiaxial Inventory—III (Millon, Millon, & Davis, 1996), Personality Assessment Inventory (Morey, 2007) and the Dimensional Assessment of Personality Pathology (Livesley & Jackson, 2009) provide a thorough assessment of either the traits or the PD constructs, but not both.

(Clark et al., 2003). However, considering that mood fluctuations have been shown to influence self-report personality trait measures (e.g. Trull & Goodwin, 1993), it would be useful to examine the SNAP's stability in treatment samples with primary diagnoses other than mood disorder. It also would be useful to investigate the mean-level change of the PD scales after the completion of a treatment in which behaviours directly related to personality pathology are the primary foci.

A substance-dependent sample is particularly relevant because of the high prevalence of personality pathology (Ball, Rounsaville, Tennen, & Kranzler, 2001; Rounsaville et al., 1998; Verheul, Ball, & van den Brink, 1998). However, a key challenge for evaluating the stability of personality traits and disorders in this clinical group is controlling for the acute and protracted effects of substances. The physiological effects of substances and psychological effects of an addictive lifestyle include marked changes in cognitive, emotional and social functioning that may mimic many of the symptoms of PDs, intensify personality traits and influence self-report personality description (Ball, 2005).

A long-term residential therapeutic community (TC) is an excellent setting for assessment because it controls access to substances and opportunities to engage in addictive behaviours that may influence personality ratings. Another intriguing aspect of assessing the stability of personality in this setting is that a long-term TC approach specifically targets aspects of criminal behaviour and personality pathology. For example, these programmes use behavioural techniques to decrease behavioural impulsivity, affect dysregulation, manipulation, aggression, entitlement, and related traits and symptoms that are highly relevant to the Cluster B PDs (antisocial, borderline, histrionic, and narcissistic). Thus, with effective treatment, one might expect valid changes (i.e. decreases) in scores for these constructs.

In the current study, we evaluate the temporal stability of the SNAP scale scores for substance-dependent patients over 6 months of a residential TC programme that also included weekly individual psychotherapy targeting personality and addiction problems. Because they assess aspects of personality that are consistent over time, we hypothesize that temporal stability coefficients for the SNAP trait and temperament scales will be comparable with previous clinical samples (e.g. Morey et al., 2007), but that scores on the PD scales will be less stable than the trait and temperaments. However, we further predict that intensive TC and psychotherapeutic treatment will result in mean-level decreases in maladaptive personality trait and PD scores. Finally, we will compare these changes with those observed on other psychopathology and PD measures.

Method

Participants and procedure

We recruited adult and adolescent patients from a long-term residential treatment programme for substance abuse in an urban area in the Northeastern United States. As part of the standard admission procedure, all patients were surveyed for potential interest in research. Those who indicated an interest were screened for eligibility in a clinical trial comparing two alternative forms of individual therapy as enhancements to a 6–18-month TC milieu treatment. The goal of TC treatment is a global change in the individual through the development of conduct, feelings, values, and attitudes associated with a pro-social substance-free lifestyle. The rules, structure and self-help process facilitates socialization and character maturation through sequenced stages of learning. The programme teaches honesty, personal responsibility and discipline, and uses behavioural consequences to promote self-control and respect for others. Reactions to the TC rules, techniques, group experiences, or structure are used as opportunities for observation, discussion, understanding, and confrontation of maladaptive patterns of coping and relating to others.

Both adult (19–65 years; $n = 77$) and adolescent (15–18 years; $n = 49$) patients being treated at the

facility were invited to participate and inclusion required a lifetime *DSM-IV* substance abuse or dependence diagnosis. Patients were excluded based on inability to read or understand the consent or assessment forms based on the Slosson Oral Reading Test (Slosson & Nicholson, 1990). Additionally, acute suicidal or homicidal plans/intent requiring hospitalization, current manic episodes or a diagnosis of schizophrenia precluded admission to the TC programme. Individuals who were interested in participating and satisfied the inclusion and exclusion criteria provided written, informed consent. The sample was primarily male (84%) and Caucasian (57%), but included 18 (29%) African-Americans, 5 (8%) Latinos, and 4 (6%) who described themselves as biracial. Participants received a $50 store gift card for completing the baseline, $10 for month 1–5 assessments and $60 for the month 6 assessments. This study was approved by the Institutional Review Board at the authors' institution.

One hundred twenty-six participants enrolled and completed a series of self-report measures at baseline. Sixty-three (50%) completed the 6-month treatment and were re-assessed. One-way analysis of variance (ANOVA) and *t*-tests compared baseline scores between the study sample and those who left treatment prematurely. The two groups did not differ on any demographic variables, but those who left treatment early had significantly higher baseline scores on SNAP negative temperament, $F(1,124) = 5.59$, $p < 0.05$, self-harm, $F(1,124) = 18.73$, $p < 0.001$, borderline PD, $F(1,124) = 6.99$, $p < 0.01$ and avoidant PD, $F(1,124) = 4.01$, $p < 0.05$. They also scored significantly lower on entitlement ($F[1,124] = 3.92$, $p < 0.05$) at baseline.

Materials

SNAP (Clark, 1993). The SNAP is a self-report inventory that includes 375 items rated as true or false. The instrument provides an assessment of three broad temperaments (i.e. positive affect, negative affect, and disinhibition) and 12 maladaptive trait scales that assess aspects of personality pathology (e.g. mistrust, aggression and impulsivity). The SNAP also provides an assessment of the 10 PDs, using some items that overlap with those included in the trait scales. The first two columns of Table 1 present Cronbach's alpha values for the temperament, maladaptive trait and PD scales at both baseline and 6-month follow-up. All values were 0.50 or higher except obsessive–compulsive (OCPD), with an alpha of 0.44 at follow-up. However, this is consistent with studies suggesting OCPD scales are highly heterogeneous (e.g. Ansell, Pinto, Edelen, & Grilo, 2008).

Brief Symptom Inventory (Derogatis, 1992). The BSI is a 53-item self-report inventory of psychiatric symptoms that asks participants to rate items on a 5-point scale of distress. It yields three global severity measures and nine primary symptom dimensions: Anxiety, Depression, Hostility, Interpersonal Sensitivity, Obsessive–Compulsive, Paranoia, Phobic Anxiety, Psychoticism, and Somatization. The alpha values in the current sample ranged from 0.68 (paranoia) to 0.86 (depression) at baseline and from 0.78 (psychotic) to 0.90 (obsessive–compulsive) at follow-up.

Personality Diagnostic Questionnaire—4th Edition, Revised (PDQ-4R; Hyler, 1994). The PDQ-4R is a self-report instrument (with interview follow-up to establish symptom persistence, maladaptivity and independence from Axis I) that provides an assessment of the *DSM-IV* PDs. It contains a single, true/false item corresponding to each diagnostic criterion for each PD. The alpha values at baseline ranged from 0.35 (narcissistic) to 0.76 (avoidant), with a median of 0.55 and were similar at 6 months, when they ranged from 0.48 (histrionic) to 0.69 (dependent), with a median of 0.58.

Results

Table 1 presents the temporal stability coefficients of the SNAP scores using Pearson *r*. The correla-

Table 1: Internal consistency and temporal stability of SNAP scales over 6 months

SNAP scale	Alpha		Temporal stability		Baseline		6 months		*t*	*d*
	Baseline	6 months	R	Disatt.	Mean	SD	Mean	SD		
Temperament scales										
Negative temperament	0.92	0.90	0.76	0.83	16.0	7.5	14.9	7.2	1.77	0.15
Positive temperament	0.84	0.82	0.58	0.69	17.0	5.9	19.1	5.1	−3.32**	−0.38
Disinhibition	0.83	0.81	0.69	0.84	17.1	6.2	16.6	6.1	0.88	0.08
Trait scales										
Mistrust	0.82	0.78	0.67	0.84	10.6	4.4	11.2	4.1	−1.28	−0.14
Manipulativeness	0.83	0.80	0.62	0.77	8.1	4.5	8.7	4.3	−1.21	−0.14
Aggression	0.88	0.84	0.74	0.86	9.2	5.4	8.8	4.8	0.95	0.08
Self-harm	0.78	0.67	0.54	0.71	5.1	3.1	4.7	2.6	1.37	0.14
Low self-esteem	0.73	0.59	0.53	0.82	3.7	2.0	3.3	1.6	2.22*	0.22
Suicide proneness	0.73	0.71	0.56	0.72	1.4	1.8	1.4	1.7	−0.08	0.00
Eccentric perceptions	0.76	0.75	0.72	0.93	5.8	3.6	5.4	3.3	1.30	0.12
Dependency	0.70	0.80	0.62	0.81	5.7	3.2	5.7	3.8	−0.08	0.00
Exhibitionism	0.74	0.74	0.74	1.00	7.4	3.4	8.4	3.4	−3.21**	−0.29
Entitlement	0.74	0.76	0.57	0.76	8.5	3.5	9.6	3.4	−2.66*	−0.32
Detachment	0.80	0.79	0.71	0.88	7.3	4.1	7.6	3.9	−0.62	−0.07
Impulsivity	0.72	0.74	0.64	0.87	8.6	3.6	8.3	3.7	0.69	0.08
Propriety	0.80	0.80	0.69	0.87	11.8	4.2	12.4	4.2	−1.45	−0.14
PD scales										
Workaholism	0.77	0.82	0.65	0.80	8.1	3.7	9.2	4.2	−2.64*	−0.28
Paranoid	0.80	0.73	0.57	0.73	12.8	4.8	13.0	4.3	−0.38	−0.04
Schizoid	0.57	0.50	0.54	0.94	5.5	2.5	5.7	2.4	−0.65	−0.08
Schizotypal	0.82	0.76	0.53	0.68	10.7	4.8	10.0	4.2	1.42	0.16
Antisocial	0.82	0.77	0.72	0.90	16.0	5.8	17.3	5.4	−2.48*	−0.23
Borderline	0.78	0.77	0.60	0.77	13.5	4.7	13.2	4.6	0.60	0.06
Histrionic	0.73	0.67	0.44	0.63	10.3	3.9	11.1	3.5	−1.87	−0.22
Narcissistic	0.71	0.59	0.48	0.74	9.8	3.9	11.4	3.4	−3.72***	−0.44
Avoidant	0.69	0.68	0.58	0.82	8.9	3.5	8.7	3.4	0.67	0.06
Dependent	0.78	0.80	0.61	0.77	8.1	4.4	8.0	4.5	0.17	0.02
OCPD	0.50	0.44	0.37	0.85	9.9	3.2	11.3	3.1	−3.41**	−0.44

Notes: $n = 63$.; Cronbach's alpha coefficient; PD values are calculated using symptom severity scores; negative values indicate an increase. All values are sums of items endorsed on each scale.
SNAP, Schedule for Nonadaptive and Adaptive Personality (Clark, 1993); r = Pearson correlation between mean score at baseline and 6 months; Disatt, disattenuated stability correlations; i.e. the temporal stability correlation multiplied by the average of two alpha values. SD, standard deviation; *d*, Cohen's *d* effect size for mean change. OCPD, obsessive-compulsive personality disorder.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

tions for the temperament and maladaptive trait scales ranged from a low of 0.54 (self-harm) to a high of 0.76 (negative temperament), with a median of 0.67. However, the PD scales obtained somewhat lower values ranging from 0.37 (OCPD) to 0.72 (antisocial), with a median of 0.55. Also presented are the disattenuated temporal stability coefficients. These values were somewhat larger, as expected, with median values of 0.84 for the traits and temperaments and 0.77 for the PD scale scores.

We also conducted a series of paired-sample *t*-tests to assess mean-level changes (see right half of Table 1). The scores on the low self-esteem subscale of self-harm decreased while positive temperament, exhibitionism, entitlement and workaholism trait scores all increased significantly over the course of treatment. Similarly, the scores for obsessive–compulsive, narcissistic and antisocial PDs also increased from baseline to 6 months. In fact, none of the PD scales' scores showed a significant decrease over the course of residential treatment. Table 1 also provides the effect size estimates for these changes in terms of Cohen's *d*, and it is apparent that most significant values were in the small to medium range (Cohen, 1992).

To help clarify further whether these increases corresponded with symptom changes, we also conducted mean comparisons, using paired sample *t*-tests, of scores on the BSI and PDQ-4R from both time points. These analyses indicated a significant decrease for all BSI scales, suggesting that the sample experienced a general reduction in psychiatric symptoms over the 6 months of treatment. Paired sample *t*-tests of the PDQ-4R indicated no significant changes in the mean number of items endorsed for 9 of the 10 PD scales. Interestingly, the one exception was PDQ-4R antisocial, which *decreased* significantly, $t(1,62) = 3.29$, $p < 0.01$, from baseline to 6 months, the opposite of the SNAP finding. Finally, we evaluated whether BSI change scores were correlated with SNAP change scores and found that decreases in psychiatric symptoms did not explain the significant scale increases described above. BSI change was positively related to only schizoid and schizotypal change scores, which did not increase significantly over 6 months.

Post-hoc analyses

We were surprised by our temporal stability findings indicating a mean increase in scores on the SNAP antisocial, narcissistic and OCPD scales, as well as the associated entitlement, exhibitionism and workaholism trait scores. To better understand these counterintuitive results, we conducted an item-level analysis to determine if there were significant changes in particular items that comprised those PD scales. Table 2 presents the 3, 4 and 7 items that showed a significant increase for the antisocial, narcissistic and OCPD scales respectively. It should be noted that one item (#143) is scored for both the narcissistic and OCPD scales. Effect size estimates are also provided in terms of Cohen's *d*. Interestingly, there were no items from these scales that significantly decreased over time. When we examined the content of these items, we noted that two of the three antisocial items with increased endorsement reflect behaviours that could not have occurred during the residential treatment (i.e. incidents of childhood behaviour and drunk driving). The increased narcissistic items concern pride in one's self and one's accomplishments as well as a desire to be the centre of attention. Finally, the OCPD item increases represent most of the diagnostic construct, including workaholism, perfectionism, hoarding and strict morals.

Discussion

The temporal stability coefficients for the temperaments and traits from the current study were comparable with those from previous research that has also utilized longer intervals within clinical samples (Clark et al., 2003; Morey et al., 2007). Not surprisingly though, the mean stability coefficients were lower than those found for very short intervals (e.g. Clark, 1993; Simms & Clark, 2005). The stability coefficients for the PD scale scores were substantially lower than the only other study that has evaluated them (Melley et al., 2002), although it was confined to a non-clinical sample of undergraduate students.

There are several explanations as to why personality trait scores might be less stable in the current sample. One potential explanation is that the changes on scores in the current study could reflect valid personality change. Our sample was actively engaged in a structured treatment designed

Table 2: Items from SNAP antisocial, narcissistic and OCPD scales with significant increases over 6 months

Item #	Baseline		6 month		t	d	Content
	Mean	SD	Mean	SD			
166	0.29	0.5	0.47	0.5	−2.25*	−0.36	I am sometimes careless with other people's things.
209	0.35	0.5	0.49	0.5	−2.18*	−0.28	I've frequently driven when I'm fairly drunk.
258	0.59	0.5	0.73	0.4	−2.41*	−0.31	When I was a kid I stole things a number of times.
57	0.44	0.5	0.63	0.5	−2.56*	−0.38	I like to show off.
108	0.11	0.3	0.24	0.4	−2.40*	−0.37	I perform in public whenever I can.
143	0.25	0.4	0.40	0.5	−2.25*	−0.33	I deserve special recognition.
155	0.50	0.5	0.66	0.5	−2.20*	−0.32	I deserve to be admired.
111	0.32	0.5	0.46	0.5	−2.25*	−0.28	People say that I drive myself hard.
143	0.25	0.4	0.40	0.5	−2.25*	−0.33	I deserve special recognition
160	0.43	0.5	0.57	0.5	−2.01*	−0.28	I greatly dislike it when someone breaks accepted rules of good behaviour.
187	0.24	0.4	0.40	0.5	−2.45*	−0.35	Some people say that I put my work ahead of too many other things.
202	0.62	0.5	0.78	0.4	−2.45*	−0.35	When I'm working on something, I'm not happy until all the details are taken care of.
234	0.38	0.5	0.54	0.5	−2.01*	−0.32	I sometimes have a hard time finishing things because I want them to be perfect.
356	0.48	0.5	0.65	0.5	−2.38*	−0.34	I never throw out anything if there's even a small chance that I might need it sometime.

n = 63
*p < 0.05.
SNAP, Schedule for Nonadaptive and Adaptive Personality (Clark, 1993); SD, standard deviation; OCPD, obsessive-compulsive personality disorder.

to address many of the problematic behaviours that characterize personality pathology. An additional possibility is that the reduced stability could be attributable to shifts in self-report resulting from the more generalized decreases in psychiatric symptoms on the BSI. With regards to the latter possibility, we would note that mean changes in BSI severity were unrelated to the significant mean increases found in several of the SNAP scales. Nonetheless, this is the first study to examine the stability of the SNAP PD scales within a clinical sample and only a few have previously tested the trait and temperament scales. As such, additional investigation of the stability of these scores in treatment samples are needed to better understand whether these effects are specific to residential substance treatment or are applicable to clinical samples, in general.

Perhaps the most surprising findings of the current study were the mean-level increases on several trait (workaholism, entitlement, exhibitionism) and PD (narcissistic, obsessive–compulsive, antisocial) scales from baseline to follow-up. Consistent with the fact that the patients had been living in a drug-free environment and receiving targeted treatment for nearly 6 months, their psychiatric symptoms as assessed by the BSI showed significant improvement. Although Clark and colleagues (2003) did not evaluate the PD scales, they also found increases on entitlement and exhibitionism following treatment for depression, while all other scales (including workaholism) decreased. They suggested that 'all scales showed significant mean changes in the direction of increased psychological health' (p. 159) for the depressed patients.

It is feasible that increases on traits such as exhibitionism and entitlement represent improvements for depressed individuals, but it is more difficult to see how the same could be said for substance-dependent patients with extensive criminality. One possibility is that increases in the endorsement of exhibitionism and entitlement items might reflect healthy self-esteem and pride that accompany an extended period of sobriety in a challenging treatment environment where special privileges and positions are earned. This may also help to explain the increase on narcissistic PD (NPD) as 10 of the 22 items on this scale are drawn from exhibitionism and entitlement, including all items that increased significantly. Perhaps then, in contrast with their labelling as personality pathology constructs, the exhibitionism, entitlement, and NPD scales actually assess adaptive aspects of personality that should increase with treatment. It should be noted that if this is the case, the SNAP NPD scale is not necessarily idiosyncratic, as Samuel and Widiger (2008) reported that it converged reasonably well (mean $r = 0.45$) with other commonly used NPD instruments.

The increases in workaholism and OCPD, though, run counter to the findings from Clark and colleagues (2003) and unlike NPD, do not appear to be accounted for by items assessing an adaptive aspect of these traits (i.e. normal range conscientiousness), which has been shown to increase with treatment (e.g. Wilberg, Karterud, Pedersen, Urnes, & Costa, 2009). In fact, several of the items that did increase appear to be strong indicators of workaholism, perfectionism and hoarding. One could argue that individuals successfully retained in a TC might be those best suited to its rigid, hierarchical standards and performance expectations around performance and that perhaps this environment would enhance those traits.

Other studies have reported that these constructs are often unrelated to, or even positively associated with, indicators of psychosocial functioning (e.g. Cramer, Torgersen, & Kringlen, 2007;

Grant et al., 2004; Ryder, Costa, & Bagby, 2007; Skodol et al., 2005; Ullrich, Farrington, & Coid, 2007). However, the SNAP workaholism and OCPD scales did correlate significantly with some BSI symptom indicators in the current sample. This might suggest that increase on these scores represent an idiosyncrasy in the SNAP's assessment of these constructs. Alternatively, the discrepancy between the current finding and that reported by Clark and colleagues (2003) may reflect fundamental differences in the treatment effects seen for substance-dependent relative to depressed individuals. For example, it might suggest that individuals who are working to maintain their sobriety hold themselves to very high standards (e.g. perfectionism), devote themselves to other pursuits (e.g. workaholism necessary for job functioning within a TC) and become quite rigid about their daily routines in order to manage their disorder. Future research that continues to explore the mean changes in these scores within other clinical samples will be quite useful for resolving this question.

One SNAP scale that needs additional research on its reliability and validity is antisocial PD. The mean-level increase noted for the SNAP antisocial scale, although small in magnitude, is difficult to explain through theory or prior research. An examination of the item-level changes reveals increases on two SNAP antisocial items reflecting behaviours that could not have changed since baseline. For example, the item 'when I was a kid I stole things a number of times' is clearly assessing past behaviours. Additionally, because the individuals in the TC are monitored daily for the presence of alcohol and do not have access to vehicles, any increase in the item 'I've frequently driven when I'm fairly drunk' cannot reflect individuals engaging in drunk driving during the 6 months of treatment. Thus, we reasoned that increases on these items might not reflect an increased level of antisocial pathology, but rather a greater willingness to acknowledge past indiscretions. While validity scales cannot answer this question definitively, a significant decrease in socially desirable

responding or an increase in the endorsement of 'rare virtues' (a SNAP validity scale) might suggest that participants were more honest at the follow-up after successful treatment. However, a repeated measures ANOVA and test of within-subjects contrasts were not significant for the six SNAP validity scales, suggesting that scores on these scales did not change significantly over treatment. In any event, any increased honesty at follow-up also would not explain why the effect for the SNAP scale ran counter to the decrease noted for scores on PDQ-4R antisocial score in the current study. This difference was particularly puzzling since these measures correlated highly both at baseline ($r = 0.69$) and 6 months ($r = 0.72$). Future research that examines the antisocial scale within other clinical samples would be helpful in clarifying this finding.

A limitation of this study was the almost exclusive reliance on self-report inventories.[2] It would be useful for future studies to administer semi-structured clinical interviews as well as to collect descriptions from the patients' therapists or other knowledgeable informants alongside the SNAP during the course of treatment. Previous research has shown that these alternative assessment methods provide unique information regarding personality pathology (Miller, Bagby, & Pilkonis, 2005; Oltmanns, Turkheimer, & Strauss, 1998; Samuel & Widiger, in press), and they would be useful for determining whether the increases reflect shifts in self-perception or are confirmed by other methods. Another limitation was that the temporal stability and mean-level change analyses consider only the half of the baseline sample that remained in treatment for at least 6 months. It would be ideal to obtain follow-up assessments on

all participants regardless of outcome to evaluate the extent that personality changes can be attributed to treatment. Such a goal, though, was quite difficult to obtain with a substance-dependent sample as most patients were in treatment in lieu of jail time. Thus, those who dropped out of treatment were very difficult to locate because they faced re-incarceration.

In conclusion, the current study was the first to examine the mean-level change in the SNAP PD scales over time and, despite engagement in active treatment, the means scores for the narcissistic, obsessive–compulsive and antisocial PD scales unexpectedly increased. These increases occurred despite marked improvement on psychiatric symptoms. However, the current study is unable to determine whether these changes reflect true increases in the constructs or limitations of the instrument. As such, future research that replicates these findings within additional samples and clinical settings is warranted.

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[2]The PDQ-4R contains a follow-up inquiry component that determines whether the positive responses reach the level of clinical significance, have been present for several years and are not better accounted for by an Axis I diagnosis or physical condition. However, this method is neither optimal nor analogous to a semi-structured interview which can inquire on an item-by-item basis.

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