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Development and Validation of Big Four Personality Scales for the Schedule for Nonadaptive and Adaptive Personality-2nd Edition (SNAP-2)

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Abstract

Recently, integrative, hierarchical models of personality and personality disorder (PD)—such as the Big Three, Big Four and Big Five trait models—have gained support as a unifying dimensional framework for describing PD. However, no measures to date can simultaneously represent each of these potentially interesting levels of the personality hierarchy. To unify these measurement models psychometrically, we sought to develop Big Five trait scales within the Schedule for Adaptive and Nonadaptive Personality-2nd Edition (SNAP-2). Through structural and content analyses, we examined relations between the SNAP-2, Big Five Inventory (BFI), and NEO-Five Factor Inventory (NEO-FFI) ratings in a large data set ($N = 8,690$), including clinical, military, college, and community participants. Results yielded scales consistent with the Big Four model of personality (i.e., Neuroticism, Conscientiousness, Introversion, and Antagonism) and not the Big Five as there were insufficient items related to Openness. Resulting scale scores demonstrated strong internal consistency and temporal stability. Structural and external validity was supported by strong convergent and discriminant validity patterns between Big Four scale scores and other personality trait scores and expectable patterns of self-peer agreement. Descriptive statistics and community-based norms are provided. The SNAP-2 Big Four Scales enable researchers and clinicians to assess personality at multiple levels of the trait hierarchy and facilitate comparisons among competing “Big Trait” models.

Keywords

SNAP-2; Personality Pathology; Big Four; Scale Development

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Development and Validation of Big Four Personality Trait Scales for the Schedule for Nonadaptive and Adaptive Personality-2nd Edition (SNAP-2)

Although widely adopted in the mental health community, the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* (American Psychiatric Association [APA], 2000) diagnostic system for personality disorder (PD) has been criticized for leading to high rates of comorbidity, heterogeneity within PDs, diagnostic unreliability, and lack of clinical utility (see Widiger & Samuel, 2005, for a review). These problems have led many to call for a dimensional conceptualization of personality pathology (e.g., Clark, 2007; Tyrer, 2000; Widiger & Frances, 1994). The five broad traits common to the Big Five and Five-Factor models (FFM)¹, both of which emerged from the normal personality literature, have been offered as an organizing framework for PD traits (e.g., McCrae, 1994; Widiger & Simonsen, 2005). These traits typically are labeled Neuroticism (N)/Negative Emotionality, Extraversion (E)/Positive Emotionality/Surgency, Agreeableness (A), Conscientiousness (C) and Openness/Intellect (O). Other trait-dimensional approaches (e.g., the Schedule for Nonadaptive and Adaptive Personality [SNAP/SNAP-2; Clark, 1993; Clark, Simms, Wu, & Casillas, in press] and the Dimensional Assessment of Personality Pathology—Basic Questionnaire [DAPP-BQ; Livesley & Jackson, 2009]) were developed specifically to assess the maladaptive range of traits underlying PD. An important task of recent personality research has been to understand the common and unique aspects of these models and measures and how to integrate across them effectively (Clark, 2007).

The Big Five have been shown to capture the bulk of personality trait variance (Digman, 1990), and reflect a stable trait structure across normal and abnormal personality (e.g., Markon, Krueger, & Watson, 2005; O'Connor, 2005). Widiger and Simonsen (2005) used four of the Big Five as a framework for organizing 18 alternative dimensional models of PD that they identified. Consequently, there has been a push for an integrative, hierarchical model of PD (Widiger, Livesley, & Clark, 2009) and support for the Big Five and closely related trait models (e.g., the Big Four) as a unifying dimensional framework for PD (e.g., Livesley, Jang & Vernon, 1998; Watson, Clark & Harkness, 1994; Mulder & Joyce, 1997; Widiger, Costa & McCrae, 2002). Consensus has focused on a Big Four trait structure (Widiger, 1998; O'Connor & Dyce, 1998), which essentially represents the Big Five traits, minus Openness. The Big Four emerged out of the integration of the Big Five and the Big Three, which grew out of the work of Eysenck (1994), Tellegen and Waller (2008), and others. However, progress integrating the normal- and abnormal-range personality trait models and measures has been impeded because (a) most Big Five measures have been developed from a normal-range perspective, and (b) prominent PD trait measures such as the SNAP-2 do not include scales directly measuring the full range of Big Five traits.

Harkness, McNulty, and Ben-Porath (1995) attempted to address similar limitations in the field by constructing scales assessing the Personality Psychopathology Five (PSY-5) dimensions of personality pathology within the Minnesota Multiphasic Personality Inventory-2 (*MMPI-2*; Butcher et al., 1989) using a replicated rational selection technique. Their work represents a blending of the normal-range perspective of personality embodied by the Big Five and the clinical perspective of the *MMPI-2*, which resulted in scales that resemble pathological variants of the Big Five. The present study aims to take a similar approach to integrating normal- and abnormal-range personality trait models by constructing new scales from the SNAP-2 item pool to correspond to the Big Five model.

¹The phrase "Big Five Model" typically is used when referring to research from the lexical tradition, whereas the competing "Five-Factor Model" (FFM) refers to research involving questionnaires, like the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992). For simplicity and clarity, the Big Five model will be adopted here to refer to the five broad traits common to both models.

Integrating Models of Personality and PD

Structural studies have shown that normal and abnormal personality trait measures share common Big Four or Big Five trait structures. For example, Schroeder, Wormworth, and Livesley (1992) found evidence for a stable five-factor structure—with factors resembling the Big Four (i.e., N, E, A, and C) and a fifth factor containing a mixture of O and low E—in a joint factor analysis of DAPP-BQ and NEO Personality Inventory (NEO PI; Costa & McCrae, 1985). In a similar study, Larstone, Jang, Livesley, Vernon, and Wolf (2002) factor analyzed DAPP-BQ, NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992), and Eysenck Personality Scale (EPQ-R Adult; Eysenck & Eysenck, 1994) ratings from 332 community adults, finding evidence for both four- and five-factor solutions when using DAPP-BQ higher and lower order dimensions, respectively, but described the four-factor structure—N, E, Antagonism (low A), and C—as more “clinically meaningful” due to its convergence with other work (e.g., Mulder & Joyce, 1997).

Reynolds and Clark (2001) performed multiple regression analyses with SNAP and NEO PI-R patient ratings. Results revealed that the facets from the four NEO domains of N, E, A and C each were sole predictors of at least one SNAP scale. Alternatively, O facets only predicted SNAP scales in combination with other NEO facets. Specifically, Openness to Values was a primary predictor of SNAP Propriety, with other O facets being secondary predictors of SNAP Positive Temperament, Eccentric Perceptions, Disinhibition and Manipulativeness. The authors concluded that at least four of the Big Five domains are clearly relevant to personality pathology, and that O may hold some relevance in combination with other traits.

Finally, in a comprehensive structural study of several major normal- and abnormal-range personality measures, Markon, Krueger, and Watson (2005) noted that the structure of personality and PD trait measures was “pervasively hierarchical” (p. 153). Across multiple methods, they found evidence for two- through five-factor solutions, with clear connections to multiple “Big Trait” models. Their two-factor solution closely resembled Digman’s (1997) Alpha and Beta factors, with Alpha containing content from low N, A, and C and Beta including E and O. The three-factor solution of Negative Emotionality, Positive Emotionality, and Disinhibition resembled the Big Three. Their four- and five-factor solutions closely resembled the Big Four and Big Five trait models, respectively, as described above. Markon and colleagues concluded that there are multiple levels of analysis for the description of personality traits and that each level becomes “more or less appropriate depending on the theoretical and empirical context” (p. 153).

Although the above work shows support for the Big Four/Five traits in explaining substantial PD variance, it is important to note that prominent measures of these models, such as the NEO PI-R, are derived from normal-range personality research. Likewise, the use of broad Big Trait models in applied and clinical work has been limited to the extent that common measures of PD typically focus on only a single level of Markon and colleagues (2005) hierarchy. Building Big Five scales using the SNAP-2 item pool could move the personality-PD integration literature forward by (a) permitting simultaneous trait measurement at multiple levels of the trait hierarchy, and (b) offering measures of Big Five traits from scales aimed to measure abnormal-range personality.

Current Study

As different measures have been designed to assess different levels of the trait hierarchy, measures serving as bridges across hierarchical levels would help unify the field in both applied and research settings. To this end, the present study seeks to build scales assessing the Big Five Model using the SNAP and SNAP-2 item pool. Building such scales is a

natural extension of previous work revealing strong associations between the SNAP and Big Four/Five models. Based on these associations, we expected to find sufficient SNAP items to tap each of the broad Big Four and perhaps Big Five traits. Although the SNAP and SNAP-2 were designed to measure the maladaptive range of traits underlying PD, they also include scales tapping the broader Big Three traits. Structural studies of SNAP trait scales tend to support this three-factor structure (Clark, 1993; Clark et al., in press). However, in addition to the Big Three model, there is some evidence that the SNAP-2 item pool can support more differentiated Big Trait models such as the Big Four and Five (Clark & Livesley, 2002; Clark, Vorhies & McEwen, 1994; Reynolds & Clark, 2001). As described above, Clark (1993) presented support for a shared five-factor structure in joint structural analyses between the SNAP and Big Five measures, but with weaker or inconsistent SNAP scale loadings for Openness.

To build these new scales, we used responses from a large and diverse aggregated sample ($N = 8,690$) as the basis for an empirical-rational scale development strategy. We first developed preliminary scales by empirically identifying SNAP/SNAP-2 items that correlated strongly and uniquely with multiple measures of the Big Five. We then honed these scales based on a set of *a priori* assumptions regarding their structural properties. For example, we expected items to cohere strongly with other items from the same scale and to be less or uncorrelated with items from other scales. Likewise, we honed the scales by eliminating redundant items based on a rational examination of their content. As these scales were intended to be analogues of common Big Five scales, we expected to find scale scores of comparable reliability and validity. We also expected scale scores to yield predictable convergent and discriminant relations with scales scores of measures of relevant traits. Descriptive statistics and reliability and validity evidence are presented.

Method

Scale Derivation Participants

Analyses were conducted with responses from a large aggregated data set, which included 8,690 participants who completed the SNAP as well as several other measures in various settings. Data from these participants have been previously published and are described in Table 1. The aggregated sample included 2,172 clinical/psychiatric patients, 3,111 college students, 809 community-based adults, and 2,598 military veterans. Among all 8,690 participants, 52.9% were female, and ages ranged from 17 to 85 years ($M = 26.7$, $SD = 10.5$; 1% missing). Participants for whom race/ethnicity data were available were 78.9% White, 9.9% Black, and 11.2% other; 16.4% were missing this information. Scale development and validation were completed in the full sample as well as subsets of the full sample that completed specific measures, including 751 participants (35% patients; 33% community adults; 32% students) who completed the Big Five Inventory (*BFI*; John & Srivastava, 1999), 1,048 participants (77% patients; 23% community adults) who completed the NEO-Five Factor Inventory (*NEO-FFI*; Costa & McCrae, 1992), and 1,006 participants (56% veterans; 28% patients; 15% students) who completed the MMPI-2.

Scale Validation Participants

Validation analyses were conducted using ratings from additional samples of 358 adolescents, 474 adult outpatients, and 195 college students. The adolescent sample was recruited from the middle- and high-school of a semi-rural community school district in Iowa; it was 56% female, 91.3% white, and 2.5% "minority" (6.1% with no information). Ages ranged from 12 to 18 ($M = 14.6$, $SD = 1.7$; 1 with no age information). All adolescent participants completed the Youth version of the SNAP (SNAP-Y; Linde, Stringer, Simms, & Clark, in preparation) and a subset ($n = 347$) completed the BFI. The patient sample was

recruited primarily in the Iowa City area from University and community mental health clinics; it was 70% female, 63.3% “white” and 13.5% “minority (23.2% with no information). Ages ranged from 18 to 86 ($M = 39.0$, $SD = 13.6$; 3 with no age information). A subset ($n = 137$) of the patients also completed the BFI. The college student sample was 57.4% female, 53.8% Caucasian, 23.6% Asian, 10.3% African American, 6.7% other/multi-racial and 5.6% Hispanic. Ages ranged from 18 to 28 ($M = 19.2$, $SD = 1.9$). All college students completed the BFI, in addition to the SNAP-2.

In the college student sample, participants (targets) were asked to bring a friend (informant) to the lab to facilitate analyses of self-peer agreement for the new SNAP scales. The 195 informants were 61% female, 57.9% Caucasian, 23.1% Asian, 8.7% African American, 5.6% Hispanic, and 4.6% other/multi-racial. Ages ranged from 16 to 33 ($M = 19.4$, $SD = 2.2$). The dyads were 41% female-female, 36% mixed gender, and 23% male-male. Both members of the dyad arrived together and sat out of view of each other’s ratings.

Measures

Schedule for Nonadaptive and Adaptive Personality—The SNAP (Clark, 1993) is a 375-item, true/false self-report questionnaire that assesses 3 broad temperament dimensions (i.e., Negative Affectivity, Positive Affectivity and Disinhibition vs. Constraint) with 15 underlying personality facets (i.e., Negative Temperament, Mistrust, Manipulativeness, Aggression, Self-harm, Eccentric Perceptions, Dependency, Positive Temperament, Exhibitionism, Entitlement, Detachment, Disinhibition, Impulsivity, Propriety, and Workaholism). The revised SNAP-2 (Clark et al., in press) includes an identical set of temperament/trait scales, and all scale development in this study included only items common to both versions. Within the SNAP-2 manual, Clark and colleagues (in press) presented data from multiple samples showing that scores on the SNAP scales yielded generally strong convergent validity with FFM factor scores (convergent r s ranging from $|.40|$ to $|.70|$) as well as scores on state and trait mood measures (e.g., convergent $r = .61$). SNAP scale scores also demonstrated strong internal consistency (median alphas range from $.80$ to $.85$ with college, community, and patient samples) and temporal stability (Median $r = .87$ for intervals ranging from 7 days to 4 months in range. In the present study, alphas ranged from $.78$ (Entitlement) to $.93$ (Negative Temperament).

Big Five Inventory—The BFI (John & Srivastava, 1999) is a measure intended to assess the Big Five personality domains, labeled Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness. It is a 44-item questionnaire based on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). For the present study, domain scales were scored based on completion of the final BFI or its 54-item predecessor (John, Donahue & Kentle, 1991). Research has demonstrated high reliability, strong convergence with other Big Five measures and strong self-peer agreement for BFI scale scores, along with a replicable factor structure of BFI item scores (Benet-Martinez & John, 1998; John, Naumann, & Soto, 2008; Soto, John, Gosling, & Potter, 2008; Soto & John, 2009). In the present study, alpha coefficients ranged from $.78$ (Conscientiousness) to $.90$ (Neuroticism).

NEO-Five Factor Inventory—The NEO-FFI (Costa & McCrae, 1992) is a 60-item version of the 240-item NEO PI-R based on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items are organized into the five broad domain scales (Neuroticism, Extraversion, Conscientiousness, Agreeableness and Openness), with 12 items per scale. Items were selected for their largest structure coefficients for each of the five factors. For the current study, domain scores were calculated based on the completion of the NEO-FFI or the full NEO PI-R. NEO-FFI domain scores have shown adequate to

strong internal consistency and test-retest reliabilities (Costa and McCrae, 1992). In the present study, alpha coefficients ranged from .76 (Agreeableness) to .89 (Neuroticism).

Minnesota Multiphasic Personality Inventory–2—The MMPI–2 (Butcher et al., 1989) is a 567-item, true/false questionnaire to assess personality and psychopathology. For the current study, convergent and discriminant relations were examined between the new SNAP scale scores and the Personality Psychopathology Five (PSY-5; Harkness, McNulty, & Ben-Porath, 1995) and Restructured Clinical (RC; Tellegen et al., 2003) scale scores of the MMPI-2, as they include conceptually matching scales to those considered in the present study (Sellbom & Ben-Porath, 2005). Harkness and colleagues (1995) presented generally strong alpha coefficients (.65 to .88) for PSY-5 scale scores, along with theoretically predicted convergent and discriminant relations between PSY-5 scores and Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008) scale scores. Research (e.g., Simms, Casillas, Clark, Watson, & Doebbeling, 2006; Tellegen et al., 2003) has demonstrated strong internal consistency, test-retest reliability, and convergent and discriminant relations with conceptually relevant criteria for RC scale scores. In the present study, alpha coefficients for the PSY-5 and RC scale scores ranged from .67 (PSY-Constraint) to .88 (PSY-Negative Emotionality) and from .76 (RC6-Ideas of Persecution) to .93 (RC-Demoralization), respectively.

Data Analyses and Results

Scale Development

We adopted a scale development strategy with both empirical and rational-theoretical underpinnings. First, an overinclusive pool of SNAP items was selected empirically by identifying the strongest SNAP item correlates of each Big Five scale. Next, these item pools were honed using an iterative series of factor analyses to ensure adequate structural validity. This stage was guided by Loevinger's (1957) theory of structural validity, which suggests, "structural relations between test items parallel the structural relations of other manifestations of the trait being measured," (p. 661). Thus, weak markers of each factor (i.e., items with lower loadings on a primary factor or high loadings on secondary factors) were considered for removal. Item content then was examined rationally to eliminate redundant items and to ensure that items assessed theoretically relevant aspects of each given construct. Finally, internal consistency, test-retest reliability, self-peer agreement, and convergent and discriminant validity of the scale scores were examined. We expected that the new scale scores would demonstrate reliability and validity patterns comparable to that of the Big Five trait scores analyzed in this study. Details of these steps, along with community-based norms for the scales, are presented below.

Initial Item Selection—SNAP items were selected if their convergent correlations ($r_s > .30$) with BFI and NEO-FFI traits were stronger than their discriminant correlations within the same row or column. Based on preliminary analyses, the convergent correlation threshold was modified to $r_s > .20$ for BFI and NEO-FFI Openness to give it better chance of emerging. In this phase, 122 items were selected for subsequent structural analyses. Using these criteria, 34, 24, 20, 37, and 7 SNAP items were selected for the initial items pools for Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Openness, respectively.

Scale Honing—Prior to any structural analyses, four items that are not in the 390-item version (i.e., SNAP-2; Clark et al., in press) were eliminated to permit scoring of the new scales across both versions of the SNAP. To hone the remaining 118 items and to examine structural validity, exploratory factor analyses (EFAs), alpha coefficients, inter-item and item-total Pearson correlations were calculated. All EFAs were Varimax-rotated and

included squared multiple correlations for the prior communality estimates. Five factors were extracted in order to correspond with the Big Five traits. As theory posits that Big Five traits largely are orthogonal to each other and account for significant variance in items assessing personality, items with loadings $< .30$ on primary factors and cross-loadings $> .20$ on secondary factors were considered for deletion. Also, as Big Five traits are expected to be internally consistent, items that correlated $< .20$ with another item, had item-total correlations $< .30$, and had a high “alpha-if-deleted” values were considered for deletion. This phase was an iterative process in which EFAs were re-conducted after each item was removed from the pool. These iterative analyses reduced the item pool to 82 items total, with 23, 19, 18, and 22 items for Neuroticism, Extraversion, Agreeableness, and Conscientiousness, respectively. Notably, the seven Openness items failed to meet the empirical thresholds of the scale-honing phase.

The scales were honed further by eliminating redundancy based on an empirical and a content analysis of the items. In the service of improving the content validity of scale scores, this process aimed to ensure that a relatively even number of items per relevant content area were represented. Items that correlated $> .50$ with another item, had item-total correlations $> .60$ and had redundant wording were considered for deletion. This process reduced the item pool from 82 to 65 items, with 14, 14, 17, and 20 items remaining for Neuroticism, Extraversion, Agreeableness, and Conscientiousness, respectively. SNAP Neuroticism included the most redundant items as it accounted for 53% of the items eliminated in this phase. Based on rational inspection, no items were judged to be related inappropriately to their primary trait.

Factor loadings for the four-factor, Varimax-rotated solution of the final 65 items are presented in Table 2. Eigenvalues for the first ten factors were 7.68, 4.23, 2.99, 2.56, 1.09, .74, .59, .54, .40 and .32. Thus, there was a clear break after the fourth eigenvalue. A parallel analysis of randomly generated data suggested the extraction of no more than nine factors. Four factors were extracted based on these findings and our *a priori* expectations. Factors were labeled SNAP Neuroticism, SNAP Conscientiousness, SNAP Introversion and SNAP Antagonism. Factor labels were changed from the traditional Big Five labels based on how the majority of the items on a factor were keyed and the construct that the items seemed to reflect based on item content. These labels are consistent with work examining the Big Four traits showing that they correspond to the Big Five traits minus Openness (e.g., Watson, Clark & Harkness, 1994; Widiger & Simonsen, 2005). Factor loadings for the SNAP Big Four items in the three validation samples also are presented in Table 2. The structural validity of the scales was supported through Tucker congruence coefficients of .95, .98, and .93 between the full sample factor structure and the adolescent, patient and college validation sample structure, respectively. SNAP Big Four scales can be scored by summing the items with bolded loadings for the Full Derivation Sample in Table 2. Negative loadings indicate reverse-keyed items.

Items by SNAP Scale—As the SNAP explicitly assesses the core temperament traits of the Big Three model (i.e., Negative Temperament, Positive Temperament, and Disinhibition), an important question is the extent to which the new SNAP Big Four scales are distinct from the existing temperament trait scales. Examination of item overlap revealed that SNAP Big Four scale items had variable degrees of redundancy with the existing temperament trait scales. The item-by-scale breakdown is presented in Table 2 alongside the item numbers. For Neuroticism, 79% of the items came from Negative Temperament, with the rest coming from the Dependent, Narcissistic, and Schizoid PD scales. For Conscientiousness, 40% of the items came from Disinhibition, with the remaining coming from Impulsivity, Workaholism, Positive Temperament, Propriety, and Manipulativeness. For Introversion, 64% of the items came from Detachment, with the rest coming from

Positive Temperament, Exhibitionism, and Histrionic PD. For Antagonism, 65% of the items came from Aggression, with the remainder coming from Manipulativeness, Disinhibition, and Antisocial PD. Thus, although each SNAP Big Four scale was associated primarily with one particular SNAP trait scale, 21–60% of their items derive from a range of other scales, indicating mild to strong overlap but not complete redundancy.

Norms and Descriptive Statistics

Derivation Samples—Raw descriptive statistics for the SNAP-2 normative community sample, along with T-scores for the full sample and each subsample, are presented in Table 3. Unisex norms were calculated using the official SNAP-2 normative sample and with gender weighting procedures identical to those used for all other SNAP-2 scales (see Clark et al., in press, for details of these procedures). Across sex, sample types, and traits, T-scores ranged from 46.4 (SNAP Conscientiousness for female college students) to 62.7 (SNAP Neuroticism for female clinical participants). Two-by-four factorial ANOVAs were calculated to test for sex and sample-type differences for each SNAP scale. Likewise, two-sample *t*-tests were calculated for the Full and SNAP-2 Normative samples. For SNAP Neuroticism, women scored significantly higher than men in every sample type, except the military sample. For SNAP Conscientiousness, women scored significantly higher than men in the normative/community adult and military samples. For SNAP Introversion, men scored significantly higher than women in the full and military samples. For SNAP Antagonism, men scored significantly higher than women in every sample type, except the military sample, in which women scored higher than men. Across the four sample types, the clinical sample scored higher than the others on all SNAP Big Four traits, except SNAP Conscientiousness, on which the military sample scored the highest.

Validation Samples—T-score means for the SNAP Big Four scales in the patient and student validation samples ranged from 47.0 (student SNAP Introversion) to 61.3 (student SNAP Antagonism). Statistics based on raw data are presented for the adolescent sample, as this is the normative adolescent sample for SNAP-Y. These unisex norms were computed using the same procedure as described for the community adult norms, but with the adolescent sample. All descriptive statistics for the validation samples are presented alongside the correlations in Table 6, which will be discussed later.

Reliability

Alpha coefficients and test-retest correlations for the SNAP Big Four scales in the full derivation and validation samples are presented in Table 4. Across all scales and samples, alphas ranged from .73 (SNAP Introversion in the college validation sample) to .88 (SNAP Neuroticism in the full derivation sample). Median alphas across all samples ranged from .79 (college validation sample) to .84 (full derivation sample). SNAP Big Four scale alphas were comparable to the BFI and NEO-FFI scales alphas, which yielded median coefficients of .87 and .84, respectively. Test-retest coefficients were calculated using a subset of the SNAP-2 normative sample who completed the SNAP-2 twice over variable intervals ($n = 270$; mean retest interval = 49.3 days, range = 7–131 days). Retest correlations ranged from .82 (SNAP Antagonism) to .90 (SNAP Conscientiousness) with a median of .85. Test-retest coefficients for the adolescent validation sample ranged from .74 (SNAP Neuroticism) to .87 (SNAP Conscientiousness) with a median of .80 over a 2-week span. These ranges and median coefficients are strong and consistent with the other SNAP scales across all retest intervals (Clark et al., in press).

Validity

Derivation Samples—SNAP Big Four scale intercorrelations along with convergent and discriminant correlations with BFI and NEO-FFI traits are presented in Table 5. All convergent correlations were strong according to Cohen's (1988) standards for correlational effect sizes (i.e., $r_s \geq .50$). Likewise, all convergent correlations were at least .20 larger and significantly ($p < .05$) greater than their respective discriminant correlations (i.e., correlations within the same column or row). Taken together, the SNAP-Big Four scales yielded adequate convergent and discriminant relations with other measures assessing these traits. Regarding the overall pattern, correlations between the SNAP Big Four scales and the BFI and NEO-FFI scales yielded a similar pattern to the correlations between BFI and NEO-FFI scales: Tucker (1951) congruence coefficients of .92 (BFI : NEO-FFI matrix compared with SNAP Big Four : BFI matrix) and .98 (BFI : NEO-FFI matrix compared with SNAP Big Four : NEO-FFI) were calculated².

With respect to the MMPI-2 PSY-5 scales, SNAP Neuroticism and Introversion correlated strongest with PSY-5 Negative Emotionality ($r = .80$) and Positive Emotionality ($r = -.70$), respectively. SNAP Antagonism correlated at least $|.40|$ with all PSY-5 scales, except Positive Emotionality, SNAP Conscientiousness correlated only modestly with the PSY-5 scales, specifically Positive Emotionality ($r = .27$) and Constraint ($r = .18$). Overall, the pattern of correlations between corresponding SNAP Big Four and PSY-5 scales was moderately consistent with findings by Trull, Ueda, Costa, and McCrae (1995), who reported a parallel matrix of correlations between the NEO PI-R and PSY-5 scales. The congruence coefficient between our correlation matrix and the corresponding values in their matrix was .86 (after reversing the signs for all correlations involving SNAP Introversion and Antagonism).

Correlations with the MMPI-2 RC scales revealed strong, conceptually meaningful correlations with three of the SNAP Big Four scales. SNAP Neuroticism and Introversion correlated most strongly with RC7 Dysfunctional Negative Emotions and RC2 Low Positive Emotions ($r_s = .77$ and $.61$, respectively). SNAP Antagonism correlated most strongly with RC9 Hypomanic Activation and RC4 Antisocial Behavior ($r_s = .60$ and $.50$, respectively). The correlation with RC9 makes sense in light of Simms et al.'s (2005) study, which noted that RC9 contained an interpersonal exploitation component. SNAP Conscientiousness did not correlate strongly with any RC scale. Taken together with the similarly low correlations between SNAP Conscientiousness and the PSY-5 scales, but with strong convergent correlations with the conceptually matching BFI and NEO-FFI scales, these results point to a relative lack of variance related to conscientiousness in the MMPI-2 rather than a deficiency in this domain on the SNAP. Conscientiousness scale.

Validation Samples—SNAP Big Four scale intercorrelations and convergent and discriminant correlations with BFI scales for the three validation samples are presented in Table 6. All convergent correlations were strong, except for SNAP Neuroticism ($r = .46$) and Antagonism ($r = -.49$) within the patient sample. Only one discriminant correlation approached the threshold for a strong association (SNAP Antagonism: BFI Conscientiousness $r = -.48$ in the adolescent sample). Taken together, these findings support a generally strong pattern of convergent and discriminant validity for the SNAP Big Four scale scores within the study. The few instances that weaken the validity pattern suggest that SNAP Antagonism may represent a broader trait than FFM Agreeableness, as it seems to include some low Conscientiousness variance as well.

²Given the opposite keying for SNAP Introversion and Antagonism, the congruence coefficients were calculated after reversing the sign for all correlations involving BFI and NEO-FFI Extraversion and Agreeableness.

Finally, self-peer agreement coefficients for each SNAP Big Four and BFI scale are presented in Table 7 in a full Multi-Trait Multi-Method (MTMM; Campbell & Fiske, 1959) matrix of the scales. Self-peer agreement coefficients ranged between .20 for SNAP Neuroticism to .47 for SNAP Antagonism (*Mdn* $r = .41$). Significant differences in r s between SNAP-Big Four and BFI scales were calculated following a Fisher r -to- z transformation. No coefficients were significantly smaller than their respective BFI coefficients within the same sample. Self-peer agreement was significantly higher for SNAP Antagonism than BFI Agreeableness. Overall, SNAP Big Four scale agreement coefficients were comparable to other studies that have assessed these constructs (see McCrae et al., 2005, for a review). In particular, studies have shown that self-other agreement for traits related to Neuroticism typically are among the lowest (e.g., Funder & Dobroth, 1987; Ready & Clark, 2002). This fact has implications for how the MTMM is interpreted. First, the validity correlations for the SNAP Big Four scale scores are sufficiently large, with the exception of Neuroticism. Second, the validity correlations are all larger than the values within their respective row and column within their respective block. This discriminant validity is important given the low self-peer agreement for Neuroticism. Third, the validity correlations generally are stronger than the heterotrait-monomethod values, with the notable exception of Neuroticism. Again, this finding with Neuroticism is expected given its low self-peer agreement.

Discussion

The primary aim of the current study was to build Big Five trait scales for the SNAP-2 to allow for additional levels of assessment within the personality trait hierarchy. An initial empirical item-selection approach, afforded by a large data set, yielded evidence of coverage for the Big Four traits (i.e., Neuroticism, Conscientiousness, Introversion and Antagonism) within the item pool. Substantial evidence within both the derivation and adolescent, patient, and college validation samples demonstrates strong internal consistency and test-retest reliability of the scale scores, consistent with the reliability of conceptually matched constructs (i.e., Big Five scale scores). Validity findings within both the derivation and validation samples suggest strong structural, convergent, and discriminant validity of the scale scores. Again, these findings match expectations, as scale items were selected based on their convergent and discriminant relations with measures of the Big Five. Although some discriminant correlations reached the moderate range, work has shown that this is not uncommon with the Big Five traits (e.g., Digman, 1997; DeYoung, 2006). Also, these moderate discriminant correlations partially may be due to shared method variance. Overall, BFI and NEO-FFI convergent correlations were significantly stronger than discriminant correlations within the derivation sample.

Regarding the PSY-5 correlates, initially one may wonder why PSY-5 Constraint and SNAP Conscientiousness did not share their highest correlation but, in fact, these findings are consistent with Trull et al., (1995), who found that Constraint actually yielded a stronger association with NEO Agreeableness than Conscientiousness. Although it seems logical that the control and harm avoidance components of PSY-5 Constraint would cohere more with Conscientiousness, the present study replicated an earlier finding that the opposite pole of Constraint—resembling Antisocial PD features—actually creates a stronger association with Agreeableness.

Finally, self-peer agreement coefficients also provided support for the construct validity of the scale scores. Notably, SNAP Antagonism yielded significantly higher agreement than BFI Agreeableness. This may be due to the higher “ratability” of aggressive traits (Ready, Clark, Watson, & Westerhouse, 2000). In terms of Funder’s (1995) Realistic Accuracy Model (RAM), this finding may suggest that there is something less “available” or

“detectable” about agreeable behaviors than antagonistic ones. Overall, reliability and validity evidence for the SNAP-Big Four scale scores within this study is promising. Substantial cross-validation evidence supports a strong pattern of reliability and validity of the scale scores across diverse samples.

Openness

With the goal to create Big Five scales, item selection thresholds were lowered to increase the likelihood that Openness would emerge as a scale. Despite this adjustment, the seven identified items failed to meet any of the structural validity thresholds, adding to previous work showing that the broad Openness domain is weakly defined by the SNAP (e.g., Clark, 1993). In further exploration, Reynolds and Clark (2001) showed that lower order facets of Openness were significant predictors of SNAP scales, but only in combination with facets from other Big Five domains. Taken together, it seems Openness at the broad domain-level is not well represented within the SNAP item pool. However, this is not surprising, given that Openness appears to lack relevance to maladaptive personality. Specifically, studies examining relations between normal and maladaptive range traits generally have failed to find a robust relationship between Openness and PD symptomatology (e.g., O'Connor, 2005; Saulsman & Page, 2004).

Moreover, it is not clear whether there is a pathological variant of Openness and, if so, what its nature is. Although some research has revealed connections between normal-range Openness and traits related to oddity and cognitive and perceptual aberrations (e.g., Camisa et al., 2005), other studies have shown that oddity forms a distinct sixth factor in the broad personality trait hierarchy (e.g., Watson, Clark, & Chmielewski, 2008). Notably, the present findings fail to support the suggestion that oddity traits cohere with Openness as measured by the BFI and NEO-FFI, as no items from SNAP Eccentric Perceptions correlated even moderately with those scales. Rather, only items from SNAP Positive Temperament correlated moderately with Openness. Future work would benefit by examining how Openness might interact with other traits in predicting PD and related dysfunction.

Limitations and Future Directions

The primary limitation of this study is that one particular scale construction method was used, and other methods may yield alternative scale compositions. Some researchers (e.g., Harkness et al., 1995) have suggested that methods that capitalize on item obviousness (e.g., replicated rational selection) may be the “royal road to validity” (p. 112). However, there are limitations with purely rational selection methods. For example, the respondent may be more able deliberately to mislead the assessor (Harkness & Hogan, 1995) and problems with discriminant validity may emerge (Simms & Watson, 2007). The method we used sought to maximize convergent, discriminant and structural validity, and to take advantage of the strengths of both empirical and rational methods; thus, we are confident that future work will support the reliability, validity and utility of the SNAP Big Four scale scores.

Regarding utility, it is important to note that the SNAP Big Four scales are not balanced between true and false keying, with the exception of Introversion. Thus, if a test-taker has an acquiescent or denial response style (i.e., “yea-saying” or “nay-saying, respectively), SNAP Neuroticism, Conscientiousness and Antagonism scale scores may be inflated artificially. It is a benefit for future assessors that the new scales can be interpreted in conjunction with the SNAP validity scales. Specifically, SNAP TRIN scores should be analyzed when interpreting the Big Four scales. Significant TRIN elevations would suggest that SNAP Neuroticism, Conscientiousness and Antagonism should be interpreted with caution for that case.

An additional goal of this study was to integrate normal- and abnormal-range personality assessment. Although the DAPP-BQ contains four personality clusters that resemble the Big Four, there are no pathological personality measures, to our knowledge, that explicitly assess the broad Big Four traits as their own scales. In this light, the SNAP Big Four scales may represent an important advance although, as of yet, there are no empirical data that assess the “severity” of these scales. Examination of the item content suggests that SNAP Introversion and Antagonism are more pathological variants of normal-range Extraversion and Agreeableness. Before definite conclusions are made, however, this assumption must be tested directly. For example, Item Response Theory methods could compare item information curves of the SNAP Big Four scales with other measures of the Big Four and Big Five traits to examine the “severity” of the scales and to determine how much information the scales provide at the pathological end of the traits.

Conclusion

The SNAP Big Four scales represent a new level of analysis for the SNAP and SNAP-2 that can be assessed in both future and existing SNAP data and should enable both researchers and clinicians to gather information efficiently at multiple levels of the trait hierarchy within a single measure. Importantly, the SNAP Big Four scales match up with four of the five domains proposed for inclusion in *DSM-5* (i.e., Negative Affectivity, Detachment, Disinhibition vs. Compulsivity and Antagonism; Krueger, Derringer, Markon, Watson, & Skodol, 2011). In addition, SNAP Eccentric Perceptions has been shown to be a measure of the *DSM-5*'s fifth proposed domain, Psychoticism (Watson et al., 2008). Thus, the SNAP Big Four scales plus Eccentric Perceptions will allow clinicians and researchers to map SNAP responses easily onto the proposed *DSM-5* PD trait domains.

As initial construct validity results are promising for the SNAP Big Four scale scores, the methods described in this study for scale construction potentially could be helpful for future researchers wishing to build scales from the item pool of an existing measure. With promising results, future scale-building of this nature may prove useful to help unify the field of personality assessment. In light of work that has shown that multiple theories of personality and PD can be unified through integrative, hierarchical models (e.g., Markon et al., 2005), measures reflecting these models clearly will help the field to move forward.

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Table 1

Description of Derivation Samples Included in the Total Dataset (N = 8,690)

Sample Type	<i>n</i>	Source Description
College	1,888	Undergraduate data collected by L. A. Clark and colleagues at Southern Methodist University and the University of Iowa (Casillas & Clark, 2002; Clark et al., in press; Harlan & Clark, 1999; Ready, Clark, Watson, & Westerhouse, 2000; Ready, Stierman, & Paulsen, 2001; Wu & Clark, 2003).
	1,223	University of Virginia undergraduates collected from 1997–1999. (Oltmanns & Turkheimer, 2006).
Community	561	SNAP-2 normative data collected at multiple sites (Clark et al., in press)
	173	Sample of adoptee data provided by R. J. Cadoret, University of Iowa, Department of Psychiatry.
	75	Non-patient controls of a chronic back pain study (Vittengl, Clark, Owen-Salters, & Gatchel, 1999)
Military	2,026	Air Force cadets in basic training in San Antonio, TX collected from 1997–1999 (Oltmanns & Turkheimer, 2006).
	572	Gulf War deployed and non-deployed veterans followed-up in 2001 and 2002 (Simms, Casillas, Clark, Watson & Doebbeling, 2005.)
Patient	1,333	Mixed patient data collected by L. A. Clark and colleagues in Dallas, TX and Iowa City, IA. (Clark et al., in press; Casillas, Clark, Sarrazin, Huber, & Hall, under review; Clark, Vittengl, Kraft, & Jarrett, 2003; Ready & Clark, 2002; Ready, Clark, & Watson, 2002; Casillas, Clark, & Hall, 2001; Reynolds & Clark, 2001).
	125	Chronic back pain patient data (Vittengl, Clark, Owen-Salters, & Gatchel, 1999)
	714	Data from the Collaborative Longitudinal Personality Disorder Study (CLPS; Morey et al., 2003).

Table 2

SNAP Big Four Item Loadings on Four Varimax-Rotated Factors for the Derivation Sample and Adolescent, Patient and College Validation Samples

			Factor															
			I			II			III			IV						
Item	Scale	Abridged item	FD	AV	PV	CV	FD	AV	PV	CV	FD	AV	PV	CV	FD	AV	PV	CV
320	NT	Worry too much	.61	.57	.62	.64	-.03	.09	-.01	.02	.08	.10	.10	-.02	.03	.04	.07	.18
304	SZD	Feelings hurt	.60	.50	.55	.57	-.07	-.01	-.10	.05	.12	.10	.15	.16	.00	-.02	.02	.06
350	NPD	Too sensitive	.59	.54	.59	.53	-.03	.05	-.05	.00	.11	.09	.09	.04	.01	-.01	.04	.10
311	NT	Troubled by guilt	.58	.56	.55	.54	-.08	.10	.02	-.08	.11	-.04	.14	.03	.07	.04	.03	.18
244	NT	Too upset by setbacks	.57	.46	.65	.56	.00	-.05	.03	.18	.08	.00	.07	-.10	.13	.12	.09	.11
301	NT	Feel "on edge"	.57	.45	.65	.43	-.03	-.10	.00	.05	.12	.05	.16	.04	.17	.14	.14	.25
290	NT	Troubled by thoughts	.56	.53	.61	.64	-.05	.01	-.03	-.06	.04	.03	.09	.02	.11	.10	.14	-.02
316	NT	Worry terrible things	.56	.55	.55	.54	.00	.10	-.07	.12	.05	.07	.09	-.03	.08	-.11	.12	.20
245	NT	Labile mood	.56	.47	.58	.52	-.13	-.08	-.14	-.08	.13	-.03	.09	-.04	.15	.24	.13	.06
340	DPN	Worry when alone	.54	.46	.52	.54	-.04	.08	-.10	.09	.10	.11	.04	.09	.07	.03	.10	.04
294	NT	Worry and insomnia	.54	.45	.52	.45	-.01	.07	.02	.13	.16	.06	.14	.14	.11	.08	.09	.20
260	NT	Scared for no reason	.52	.43	.54	.52	-.09	-.09	-.08	-.03	.13	.09	.15	.00	.11	.18	.16	.13
288	NT	Life is confusing	.47	.46	.56	.49	-.10	-.05	-.04	.03	.07	-.02	.10	-.04	.05	.02	.08	.01
298	NT	Don't easily get upset	-.45	-.27	-.36	-.27	.02	.16	.14	.09	-.06	-.06	-.09	-.08	-.12	-.17	-.10	.07
202	PRO	Perseverate on details	.09	.10	.16	.09	.54	.55	.55	.42	-.02	.00	-.04	-.07	.02	.00	-.01	-.09
29	WRK	Must finish tasks	-.10	-.02	-.21	-.07	.53	.66	.51	.41	-.09	-.05	-.13	-.04	-.03	-.14	-.12	.09
173	IMP, DIS	Use careful reasoning	-.12	.05	-.20	.08	.53	.58	.52	.47	-.02	.01	-.05	.01	-.16	-.27	-.25	-.15
254	DIS	Make careful decisions	-.08	.04	-.14	.11	.52	.53	.55	.42	-.01	.11	-.08	.07	-.17	-.24	-.18	-.13
154	IMP, DIS	Fully prepare for tasks	-.02	-.02	-.02	.02	.52	.60	.61	.56	.00	-.04	-.04	.00	-.05	-.21	-.10	.00
146	IMP	Think before I act	-.06	.01	-.15	-.02	.50	.61	.49	.55	.06	.04	.00	.18	-.19	-.26	-.25	-.16
116	WRK	Don't stop working	.00	.00	.07	-.08	.49	.58	.49	.49	.01	-.07	-.08	.06	.07	.00	.06	.15
54	WRK	Work even while tired	-.03	.12	.04	-.16	.47	.50	.48	.38	-.03	-.04	-.03	-.12	.03	.03	-.01	.19
89	IMP	Value rationality	-.11	.06	-.13	-.08	.43	.56	.48	.38	.01	-.07	.00	-.01	-.20	-.32	-.17	-.12
214	WRK	Enjoy working hard	-.03	.01	-.06	-.05	.43	.54	.38	.47	-.08	-.10	-.05	-.16	-.05	-.16	-.06	.09
307	DIS	Serious-minded	.06	.11	.02	-.01	.41	.44	.32	.40	.17	.17	.07	.08	-.06	-.08	-.01	-.06
236	IMP	Orderly, methodical	.00	.09	.06	.16	.40	.51	.40	.43	.01	-.09	.13	-.15	.01	-.14	-.05	-.03

Item	Scale	Abridged item	Factor											
			I			II			III			IV		
			FD	AV	PV	CV	FD	AV	PV	CV	FD	AV	PV	CV
111	WRK	Drive self hard	.16	.01	.12	-.06	.38	.48	.40	.28	-.05	-.11	-.09	-.01
124	PRO, DIS	Moral decision maker	-.03	.03	-.08	.13	.37	.49	.30	.37	.02	.06	-.03	.04
306	PT	Try to accomplish a lot	-.02	.02	.05	.21	.35	.40	.35	.34	-.16	-.18	-.21	-.14
114	IMP	Lack of detail in plans	.01	.08	.12	-.20	-.33	-.23	-.37	-.16	.06	.10	-.03	.08
198	IMP, DIS	Lose track of money	.16	.10	.21	.35	-.36	-.31	-.29	-.25	.01	-.02	-.04	-.02
261	DIS	Don't overwork	.18	.25	.17	.29	-.42	-.32	-.31	-.21	.04	.05	-.04	-.04
88	MAN, DIS	Joke rather than work	.11	.16	.20	.14	-.43	-.44	-.35	-.32	-.11	.00	-.04	-.05
329	DIS	Not good with details	.10	.16	.13	.03	-.43	-.34	-.41	-.25	.05	-.02	.08	-.09
9	DET	Keep to self	.18	.22	.18	.22	.03	.00	.02	.12	.63	.52	.60	.54
35	DET	Prefer to be alone	.20	.08	.17	.06	-.01	.05	.03	.16	.58	.47	.63	.34
22	DET	Don't like company	.16	.05	.19	-.01	.00	-.01	-.01	.16	.58	.57	.63	.32
140	DET	Loner	.20	.27	.19	.13	-.01	.04	-.02	.10	.57	.43	.55	.52
207	DET	Trouble opening up	.17	.31	.24	.31	-.03	.11	-.05	.18	.50	.34	.53	.37
45	EXH	Prefer to be unnoticed	.11	.21	.20	.16	.03	.04	-.01	.16	.48	.43	.40	.50
82	EXH	Dislike spotlight	.03	.21	.05	.02	.06	.05	.04	.05	.45	.33	.41	.50
363	HIS	Openly express feelings	.08	.07	.10	.05	.05	.03	.03	.06	-.43	-.21	-.47	-.38
182	DET	Try to meet people	-.01	.05	.05	.00	.07	.21	.06	.19	-.47	-.28	-.48	-.34
158	DET	Enjoy collaborating	-.11	.02	-.14	.04	.01	-.01	.06	.11	-.48	-.45	-.53	-.33
319	PT	Playful around others	-.04	.02	-.03	.12	-.02	.16	.03	.23	-.50	-.47	-.59	-.41
256	PT	Enthusiastic	-.11	.02	.13	.02	.15	.21	.16	.19	-.52	-.44	-.53	-.51
101	DET	Like to be with others	-.15	.06	.14	.03	.04	.00	.02	-.09	-.53	-.52	-.51	-.24
218	DET	"People person"	-.06	.05	.10	.01	.05	.14	.06	.04	-.66	-.63	-.65	-.62
56	AGG	Hit deserving others	.03	.08	.04	.07	-.02	-.04	-.07	-.05	.04	-.15	-.04	.09
43	AGG	Like physical aggression	.03	.09	.02	.05	-.05	-.05	-.08	.01	.03	.03	.07	.13
212	AGG	Enjoy brawls	.02	.02	.00	.03	-.02	-.14	-.08	-.02	-.02	.00	.07	-.12
96	AGG	Vengeful	.14	.09	.17	.10	-.08	-.06	-.14	-.12	.02	.02	.08	.10
31	AGG	Want to hit when angry	.16	.16	.08	.14	-.05	-.16	.01	-.12	.06	.01	.04	-.02
70	AGG	Hostile	.19	.21	.14	.23	-.05	-.19	-.06	-.01	.15	.14	.13	.09

Note. Factor loadings [30] are in **bold**. I = SNAP Neuroticism; II = SNAP Conscientiousness; III = SNAP Antagonism; IV = SNAP Introversion; FD = Full Derivation Sample, $N = 8,690$; AV = Adolescent Validation Sample, $N = 358$; PV = Patient Validation Sample, $N = 474$; CV = College Validation Sample, $N = 195$. NT = Negative Temperament; SZD = Schizoid PD Scale; DPN = Dependent PD Scale; NPD = Narcissistic PD Scale; PT = Positive Temperament; WRK = Workaholism; IMP = Impulsivity; DIS = Disinhibition; MAN = Manipulativeness; PRO = Propriety; DET = Detachment; EXH = Exhibitionism; HIS = Histrionic PD Scale; AGG = Aggression; ASP = Antisocial PD Scale

Table 3

Descriptive Statistics for the SNAP-Big Four Scales in the SNAP Normative Sample (Raw Scores) and Four Derivation Samples (T-scores)

Population Group	SNAP Neuroticism		SNAP Conscientiousness		SNAP Introversion		SNAP Antagonism	
	M	SD	M	SD	M	SD	M	SD
SNAP-2 Normative Sample								
Male (<i>n</i> = 233)	4.5	3.7	14.4	4.2	5.2	3.6	2.8	2.8
Female (<i>n</i> = 328)	5.8	3.9	15.1	3.5	4.9	3.6	1.9	2.2
Combined (<i>N</i> = 561)	5.1	3.9	14.7	3.9	5.1	3.6	2.4	2.6
Full Derivation Sample								
Male (<i>n</i> = 4,094)	53.2	10.6	49.2	11.0	50.5	10.5	53.8	13.2
Female (<i>n</i> = 4,593)	55.2	11.0	49.3	10.9	50.0	10.7	52.8	12.6
Combined (<i>N</i> = 8,690)	54.2	10.8	49.2	10.9	50.3	10.6	53.3	12.9
1) Community Adults								
Male (<i>n</i> = 348)	48.7	9.8	48.7	11.1	50.1	9.9	52.1	11.2
Female (<i>n</i> = 461)	51.6	10.2	51.1	9.2	49.4	9.7	48.1	8.4
Combined (<i>N</i> = 809)	50.4	10.1	50.1	10.1	49.7	9.8	49.8	9.9
2) College Students								
Male (<i>n</i> = 4,094)	53.9	9.6	47.2	11.4	47.9	9.1	54.7	13.3
Female (<i>n</i> = 1,623)	55.2	10.0	46.4	11.4	46.9	8.9	53.0	13.1
Combined (<i>N</i> = 3,111)	54.6	9.9	46.7	11.4	47.4	9.0	53.8	13.2
3) Clinical/Psychiatric Patients								
Male (<i>n</i> = 902)	58.7	10.6	46.7	10.9	56.4	10.9	59.2	15.5
Female (<i>n</i> = 1,270)	62.7	9.2	47.3	10.9	56.4	11.1	54.4	13.0
Combined (<i>N</i> = 2,172)	61.0	10.0	47.0	10.9	56.4	11.0	56.4	14.3
4) Military Veterans								
Male (<i>n</i> = 1,359)	49.9	10.0	53.2	9.2	49.6	10.2	49.8	10.3
Female (<i>n</i> = 1,239)	48.8	9.3	54.5	8.7	47.8	9.9	52.7	12.2
Combined (<i>N</i> = 2,598)	49.4	9.7	53.8	9.0	48.7	10.1	51.2	11.4

Note. The "SNAP-2 Normative Sample" is a subset of the larger "Community Adults" subsample. The "Combined" *M* and *SD* for the SNAP normative sample was weighted by proportion of each sex. Three participants from the college sample did not have sex information. Values in **boldface** are significantly greater than the other sex within the subsample (Bonferroni-corrected [$p < .05$]).

Scores with superscripts are significantly greater than the subsamples noted by the superscripts (Bonferroni-corrected [$p < .05$]).

Internal Consistency (Cronbach's Coefficient Alpha) for the SNAP Big Four, BFI and NEO-FFI Scales and Test-Retest Reliability for the SNAP Big Four Scales

Table 4

Scale (# of items)	Alphas			Test-Retest Correlations	
	FD	AV	PV	CV	Derivation Adolescent
SNAP Neuroticism (14)	.87	.81	.88	.84	.84
SNAP Conscientiousness (20)	.85	.87	.82	.75	.90
SNAP Introversion (14)	.83	.75	.85	.73	.85
SNAP Antagonism (17)	.82	.85	.81	.83	.82
Median	.84	.83	.83	.79	.85

Note: All alphas are based on raw item responses. FD = Full Derivation Sample, $N = 8,690$; AV = Adolescent Validation Sample, $N = 358$; PV = Patient Validation Sample, $N = 474$; CV = College Validation Sample, $N = 195$. Mean re-test interval for derivation test-retest reliability was 49.3 days with range from 7 to 131 days; $n = 270$. Validation test-retest reliability was over 2 weeks, $n = 142$.

Table 5

Correlations Between The SNAP-Big Four, BFI, NEO-FFI, MMPI-2 PSY-5 and RC Scales in the Derivation Sample

Scale	1	2	3	4
1. SNAP Neuroticism				
2. SNAP Conscientiousness	-.17			
3. SNAP Introversion	.31	.07		
4. SNAP Antagonism	.29	-.27	.12	
BFI Neuroticism	.78	-.02	.41	.17
BFI Conscientiousness	-.27	.64	-.10	-.22
BFI Extraversion	-.31	.00	-.72	.00
BFI Agreeableness	-.27	.10	-.28	-.52
FFI Neuroticism	.80	-.26	.44	.24
FFI Conscientiousness	-.34	.66	-.22	-.17
FFI Extraversion	-.42	.20	-.76	-.15
FFI Agreeableness	-.35	.13	-.28	-.68
PSY5-Negative Emotionality	.80	-.17	.31	.42
PSY5-Constraint	.02	.18	.09	-.47
PSY5-Positive Emotionality	-.35	.27	-.70	-.07
PSY5-Aggressiveness	-.01	.15	-.19	.52
PSY5-Psychoticism	.52	-.14	.21	.40
RC-Demoralization	.74	-.30	.42	.29
RC1-Somatic Complaints	.47	-.10	.29	.20
RC2-Low Positive Emotions	.46	-.30	.61	.13
RC3-Cynicism	.33	-.02	.21	.40
RC4-Antisocial Behavior	.31	-.23	.15	.50
RC6-Ideas of Persecution	.40	-.07	.19	.37
RC7-Dysfunctional Neg. Emotions	.77	-.16	.35	.37
RC8-Abberant Experiences	.46	-.12	.09	.35
RC9-Hypomanic Activation	.36	-.07	-.15	.60

Note. $N = 8,690$ for the SNAP Big Four scale intercorrelations. $N = 751$ for the SNAP Big Four—BFI scale correlations. $N = 1048$ for the SNAP Big Four—NEO-FFI scale correlations. $N = 1,006$ for the SNAP Big Four—MMPI-2 scale correlations. All $r_s \geq .06$ are significant, $p < .05$ and all $r_s \geq .40$ are in **boldface**.

Table 6
Correlations Between The SNAP-Big Four and BFI in the Validation Samples

Scale	<i>M</i>	<i>SD</i>	1	2	3	4
Adolescents						
1. SNAP Neuroticism <i>a</i>	6.75	3.6				
2. SNAP Conscientiousness <i>a</i>	4.38	3.0	-.05			
3. SNAP Introversion <i>a</i>	5.30	4.1	.26	-.11		
4. SNAP Antagonism <i>a</i>	11.88	5.2	.23	-.47	.13	
BFI Neuroticism <i>b</i>			.58	-.10	.21	.17
BFI Conscientiousness <i>b</i>			-.08	.75	-.16	-.48
BFI Extraversion <i>b</i>			-.11	-.03	-.62	.12
BFI Agreeableness <i>b</i>			-.21	.39	-.18	-.62
Patients						
SNAP Neuroticism <i>c</i>	57.8	10.9				
SNAP Conscientiousness <i>c</i>	54.4	11.2	-.23			
SNAP Introversion <i>c</i>	47.4	11.1	.35	-.14		
SNAP Antagonism <i>c</i>	52.2	12.0	.33	-.33	.13	
BFI Neuroticism <i>d</i>			.46	-.04	.36	.06
BFI Conscientiousness <i>d</i>			-.30	.50	-.15	-.29
BFI Extraversion <i>d</i>			-.22	.15	-.62	-.01
BFI Agreeableness <i>d</i>			-.38	.22	-.28	-.49
College Students						
SNAP Neuroticism <i>e</i>	56.5	10.1				
SNAP Conscientiousness <i>e</i>	47.6	9.5	-.02			
SNAP Introversion <i>e</i>	47.0	8.2	.16	.00		
SNAP Antagonism <i>e</i>	61.3	15.5	.29	-.16	.15	
BFI Neuroticism <i>e</i>			.61	-.15	.22	.08

Scale	<i>M</i>	<i>SD</i>	1	2	3	4
BFI Conscientiousness ^e			-.22	.56	-.03	-.24
BFI Extraversion ^e			-.23	-.04	-.61	-.06
BFI Agreeableness ^e			-.23	.30	-.20	-.52

Note. All *rs* |.40| are presented in in **boldface**.

^a *N* = 358; all *rs* |.10| are significant, *p* < .05.

^b *N* = 347; all *rs* |.11| are significant, *p* < .05.

^c *N* = 474; all *rs* |.09| are significant, *p* < .05.

^d *N* = 137; all *rs* |.17| are significant, *p* < .05.

^e *N* = 195; all *rs* |.14| are significant, *p* < .05.

Adolescent descriptive statistics are presented as raw z-scores as this is the normative sample for the youth version of the SNAP.

Table 7

Multitrait-Multimethod Matrix With Self-Peer Agreement Correlations for SNAP Big Four and BFI Scales.

Scale	Target Ratings								Informant Ratings							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Target Ratings																
1. SNAP Neuroticism																
2. SNAP Conscientiousness	-.02															
3. SNAP Introversion	.16	.00														
4. SNAP Antagonism	.29	-.16	.15													
5. BFI Neuroticism	.61	-.15	.22	.08												
6. BFI Conscientiousness	-.22	.56	-.03	-.24	-.25											
7. BFI Extraversion	-.23	-.04	-. 61	-.06	-.34	.13										
8. BFI Agreeableness	-.23	.30	-.20	-. 52	-.30	.42	.18									
Informant Ratings																
9. SNAP Neuroticism	<u>.20</u>	-.08	-.05	.11	.14	-.02	.03	-.08								
10. SNAP Conscientiousness	.10	.39	.23	-.14	.16	.28	-.22	.17	-.03							
11. SNAP Introversion	.09	.05	.42	.07	.03	-.01	-. 47	-.09	.07	.04						
12. SNAP Antagonism	.05	-.18	-.09	.47 *	-.18	-.11	.20	-.25	.31	-.30	.01					
13. BFI Neuroticism	.30	-.04	-.05	.13	<u>.22</u>	.17	-.10	.07	.71	-.09	.21	.32				
14. BFI Conscientiousness	.01	.36	.14	-.26	-.05	.35	.08	.14	-.17	.75	.07	-. 40	-.19			
15. BFI Extraversion	-.17	-.02	-. 35	-.08	-.04	-.13	.48	-.08	-.18	.00	-. 77	.01	-.30	.06		
16. BFI Agreeableness	-.14	.14	.03	-. 39	-.15	.13	.05	<u>.29</u>	-.34	.30	-.17	-. 69	-. 51	.44	.20	

Note: $N = 195$ dyads. All r_s $|.14|$ are significant, $p < .05$. Validity diagonals are *italicized* and self-peer agreement coefficients are also underlined.

* Significantly higher self-peer agreement than respective coefficient, $p < .05$. All r_s $|.35|$ are in **boldface**.