

Factorial Structure of Pathological Personality as Evaluated by Peers

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This study explored how individuals apply features of personality disorders (PDs) to peers. Members of groups nominated peers who exhibited symptoms for each of the 10 PDs in the *DSM-IV*. Data were gathered in 2 samples: 1st-year college students ($n = 1,440$) and Air Force recruits ($n = 2,075$). The peer method reliably identified group members exhibiting specific PD features. Factor analyses identified a clearly interpretable structure relevant to the pathological personality constructs being assessed. The structure replicated well across samples and showed expected relationships to broader models of normal personality. However, cross-method correlations of factor scores were only moderate, suggesting that peer reports are reliably different from self-reports regarding the presence of pathological personality traits.

Personality disorders (PDs), defined as persistent, inflexible, maladaptive ways of relating to oneself and one's environment (American Psychiatric Association, 1994), are generally considered to be one of the most common forms of psychopathology. Of the general adult population, it is estimated that 10%–14% have PD features present to a sufficient degree to warrant diagnosis (Pilkonis, Blehar, & Prien, 1997; Weissman, 1993; Widiger & Rogers, 1989). People with PDs may be unable to view themselves realistically or be unaware of the effect their behavior has on other people. Indeed, many personality disorder criteria explicitly involve distortions of self-perception and an inability to assess realistically one's effect on others (Westen, 1997; Westen & Shedler, 1999). These facts have clear implications for the usual practice of assessing personality disorders through self-report and have led a number of reviewers to recognize the importance of gathering information from external sources (e.g., Clark, Livesley, & Morey, 1997; Grove & Tellegen, 1991; Widiger & Frances, 1987; Zimmerman, 1994).

Little research has been performed in this area to date. The studies that do exist have typically relied on a single informant, generally someone with a specific relational bond (family member or personal friend) to the individual (Klonsky, Oltmanns, & Turkheimer, 2002). The project on which the current study is based has gathered information about maladaptive personality traits from a large group of unselected informants. Because such data represent more completely the perceptions of the interper-

sonal domain within which the individual functions, they may be useful in determining the degree to which external sources can provide meaningful information about an individual's maladaptive personality characteristics (Oltmanns, Turkheimer, & Strauss, 1998; South, Oltmanns, & Turkheimer, in press).

The Peer Nomination Project and the Current Study

Samples were identified in which relatively large groups (a) had interacted with each other in a range of situations over an extended period of time and (b) had not specifically selected each other as peers. The two samples that were used were Air Force recruits who had lived and worked together in "flights" of approximately 40 individuals through 6 weeks of basic training, and university students, who had lived together in dormitory halls or suites of between 12 and 22 residents for at least one semester. A "round robin" design was used in which every individual in the group had the opportunity to judge every other individual. The judgments were made on the basis of lay translations of the individual symptoms of the 10 PDs from the *Diagnostic and Statistical Manual of Mental Disorders* (4th edition; *DSM-IV*; American Psychiatric Association, 1994). For each PD feature, the judge nominated, from a list of all of the members of his or her group, those who exhibited that feature, specifying the degree (on a scale where 1 = *sometimes like this*, and 3 = *always like this*) to which that feature was present for each person they nominated. The round robin design used here is particularly powerful because the individuals within a group are all judged by the same set of group members (excepting themselves). Consequently, individual differences in the degree to which a feature is judged to be present cannot be attributed to idiosyncratic characteristics of the judges.

On any given PD feature, the sum of nomination scores constituted a score representing the degree to which that PD feature was viewed to be present by the peer group as a whole. Of course, for such a score to be meaningful, there must be agreement between group members about which individuals exhibit more or less of that feature. If adequate reliability is demonstrated, the score can be taken as reflecting a consensus by the group. Such consensus is clearly necessary to show that the score is not simply a conglomerate of idiosyncratic opinions of individual raters. Demonstrating

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the reliability of PD features was thus an important step in this study.

However, the fact that there is a high level of consensus regarding the specific PD features would not in itself show that this consensus results from agreement by the group about which members exhibit pathological personality traits. To demonstrate agreement across the group at this level, it would be necessary to show that the relationships between the PD feature scores are largely explainable in terms of common dimensions that bear some systematic relation to the basic traits to be expected in any other evaluation of pathological personality. Factor analysis is a particularly useful and well-accepted means of identifying such basic dimensions. Previous studies of normal (e.g., McCrae & Costa, 1987; Norman, 1963; Watson & Clark, 1991) and maladaptive (Ready, Clark, Watson, & Westerhouse, 2000) personality have shown that very similar factor structures emerge when factor analyses are performed independently on self-ratings and peer ratings. However, these studies have generally been based on a small number of peers, most often one selected peer. One cannot assume that the same result would occur when aggregate scores from large groups of unselected peers are used. Even if the same basic traits underlie each individual's evaluation of his or her peers, the factor structure would not obtain unless there were some agreement across judges about which members of the group exhibited each of these basic traits. The presence of the expected structure would make evident that there is consensus not only at the level of isolated features but at the more relevant level of the general organization of pathological personality in group members.

Factor Analysis in PD Assessment

There has been little consensus based on prior research about a set of traits expected to emerge from a factor analysis of these features. There have been relatively few studies in this area, and somewhat different approaches to the number of factors extracted have been used. In addition, the PD feature set is relatively restricted psychometrically, with some dimensions that may underlie variance in a few symptoms but not adequately represented for separate factors to emerge. Approaches that have used more extensive sets of features related to pathological personality have, in fact, produced some consensus regarding underlying traits that would be expected to emerge (Clark, Livesley, Schroeder, & Irish, 1996). The factor patterns that emerge have never conformed fully to the *DSM* PD diagnostic categories, although they do reflect some of the combinations of features underlying these diagnoses (e.g., Austin & Deary, 2000; Ekselius, Lindström, von Knorring, Bodlund, & Kullgren, 1994; Hyler et al., 1990; Nestadt et al., 1994). For instance, the study that has taken the approach to factor extraction most similar to our own has found eight factors, with some of these factors combining common features across more than one diagnosis and others reflecting clusters of specific symptoms within a diagnosis (Austin & Deary, 2000).

In addition, strong relationships with normal personality dimensions have been demonstrated when more general (i.e., fewer) factors are extracted. These dimensions can provide a framework for understanding the PD features within the broader context of personality, with much of the variance in pathological personality being seen as extreme variants on the dimensions of normal

personality (McCrae & Costa, 1986; Widiger, Trull, Clarkin, Sanderson, & Costa, 1994; Wiggins & Pincus, 1994). Most studies have focused on the five-factor model (FFM) of personality, consistently showing strong relationships between PD diagnoses and four of five of the FFM factors, excluding Openness to Experience (see Austin & Deary, 2000; Watson, Clark, & Harkness, 1994; and Widiger et al., 1994, for reviews). Fewer studies have examined other representations of the multidimensional personality space, but results have typically also indicated strong relationships with Eysenck's (1992) personality scales (Austin & Deary, 2000; Deary, Peter, Austin, & Gibson, 1998; O'Boyle, 1995) and with the four temperament dimensions included in Cloninger and Svrakic's (1994) extension of his biosocial theory of personality (Mulder & Joyce, 1997; O'Connor & Dyce, 1998). It is important to note that these latter models appear to represent variant interpretations of a very similar multidimensional personality space rather than independent models.

When four factors are extracted and rotated independently, previous research has suggested that a specific pattern should arise that does not exactly map onto any of the normal personality factors but has strong and consistent relationships with them (see Austin & Deary, 2000; Mulder & Joyce, 1997). The factors, deemed the "Four As" have been labeled aesthetic (related to high neuroticism), asocial (related to low extraversion), antisocial (related to low agreeableness/conscientiousness), and anankastic (i.e., obsessive-compulsive). The expectation based on this research was that results of factor analyses with our data would also reflect these basic dimensions.

A more hypothesis-driven approach to assessing similarity between our data and expectations based on models of normal personality involves rotating the factor pattern derived from our data to maximum similarity with theoretical models. O'Connor and Dyce (1998) have collected and organized a range of models into targets for Procrustes rotations, which they validated against existing data. The models that were most strongly confirmed were those based on four factors of the FFM (again excluding Openness to Experience) and the Cloninger and Svrakic (1994) model noted earlier. In this study, our data were compared directly with the models that were used by O'Connor and Dyce to establish whether similar levels of conformity were present.

Comparison of Self-Report and Peer Report

The degree to which the factor structure of data gathered from peer groups is similar to expectations from previous literature would provide information about the meaningfulness of the structure that emerges. Is the pattern consistent with our understanding of basic traits underlying the evaluation of pathological personality? Does the structure relate to the broader framework of normal personality in the expected way? The most effective way to assess the degree to which the structure conforms to the factor structure underlying self-report data, however, is to assess the issue directly. For this purpose, we used self-report data gathered from a subgroup of the Air Force sample. These individuals were asked to evaluate themselves on the same PD features that were used to evaluate other members of their peer group. The resulting data were factor analyzed and the structure compared directly with that which emerged from the peer data.

These data would also be useful in evaluating the degree to which individuals' opinions overlap with their peer group regarding their personality features. Cross-method correlations provide useful means of validating the traits themselves. If the underlying traits are the same across methods, one would expect correlations between corresponding factors to exceed correlations between factors that do not correspond. Such a principle is the basis of the concepts of convergent and discriminant validity (Campbell & Fiske, 1959). Previous research both on normal (McCrae & Costa, 1987; Watson & Clark, 1991) and maladaptive (Ready et al., 2000) personality has shown moderate correlations between self- and peer report. In addition, John and Robins (1993) provided evidence that self-peer agreement is lower for highly evaluative traits, such as those involved in the assessment of pathological personality. Consequently, there is reason to expect a substantial portion of the information provided by peer report to be unique.

Method

Participants

The Peer Inventory for Personality Disorders (PIPD) was administered to two samples:

Sample 1. This sample consisted of 2,111 Air Force recruits (1,307 men, 804 women) completing their basic training at Lackland Air Force Base in San Antonio, Texas. Recruits were enlisted personnel being prepared for jobs ranging from janitor to airplane mechanic. They had trained and lived together for 6 weeks prior to assessment. There was a median of 42 recruits (range = 27–53) in each group or "flight." Fifty of these flights were assessed; 17 of the flights (13 male; 4 female) were single sex. In the mixed-sex flights, a mean of 54% were men (range = 43%–62%). There was 99% participation on the part of recruits, and there were no missing data on the part of the recruits that participated. Participants' ages ranged from 18 to 35 years, with a median age of 19 years. Ninety percent of participants were between 18 and 25.

Prevalence of PDs was assessed in a subsample of 432 individuals from this group, who were interviewed by clinicians using the *Structured Interview for DSM-IV Personality (SIDP-IV)*; Pfohl, Blum, & Zimmerman, 1997). Fifteen percent of the individuals interviewed were diagnosed with at least one PD.

A self-report (SR) measure was administered to a subgroup of this sample (i.e., all participants who were tested after the first 6 months of the study). The subsample consisted of 1,559 Air Force recruits (936 men, 623 women).

Sample 2. This sample consisted of 1,536 freshman students (605 men, 931 women) at the University of Virginia who had lived together in dormitory suites or on dormitory halls (approximately 12–22 individuals). The range participating in the study was 4 to 25. Participants' ages ranged from 17 to 27 years, with 98% either 18 or 19.

A subsample of 166 participants from this group were also interviewed with the *SIDP-IV*. Nine percent of that subsample were diagnosed with at least one PD. The numbers both from this sample and from the Air Force sample were generally consistent with prevalence rates found in epidemiological research for community samples (Lyons, 1995; Weissman, 1993).

Procedure

Peer Inventory of Personality Disorders (PIPD). The PIPD is composed of 103 items, including 79 items based on the features of 10 personality disorders listed in *DSM-IV* as well as 24 supplementary items based on additional personality traits (mostly positive characteristics, such as "trustworthy and reliable," "agreeable and cooperative," and "articulate and persuasive"). The items are presented to participants in a quasi-random

order. For each item, the participant is asked to nominate members of his or her group who exhibit the characteristic in question.

Items for the PIPD were constructed by translating the *DSM-IV* criterion sets for PDs into lay language. Each of the 78 *DSM-IV* PD features was rewritten into words that avoided the use of technical psychopathological terms and psychiatric jargon. One of the diagnostic criteria (narcissistic PD criterion 8) was split into two separate items ("is often envious of others or believes that others are envious of him or her" became "is jealous of other people" and "thinks other people are jealous of him/her"). One item ("Has little, if any, interest in having sexual experiences with another person") was excluded from the PIPD presented to recruits because of military regulations. Only the remaining 78 items were included in analyses used in this article.

The PIPD was presented on a computer screen. For each item, the personality trait or feature was listed at the top of the screen. The names of all other members of the group (excluding the name of the participant completing the PIPD) appeared below the trait description. The following numbers were listed to the right of each person's name, with the default selection being zero: 0 = *never like this*, 1 = *sometimes like this*, 2 = *usually like this*, and 3 = *always like this*. Instructions to the participants were as follows:

We are interested in your perceptions of other people in your group. You will be presented with descriptions of various personal characteristics. For each characteristic, you will be asked to click the mouse button when the cursor is pointing to the names of the people in your group who best fit that description. You may click as many names as you want, but you must select at least one person for each characteristic. If you have an especially difficult time identifying even one person who fits the description, select the person who comes closest to the description and then indicate that your choice was difficult or problematic by clicking the mouse on the word "yes" next to the box that says, "It was difficult to select anyone for this item."

Participants used the full range of the scale, with approximately 50% of the nominations being rated as 1, 25% rated as 2, and 25% rated as 3. Correlations between difficult-to-rate and nondifficult items were calculated within diagnoses, with results ranging from .63 for schizoid PD to .80 for avoidant PD.

Self-report (SR) measure. This measure, intended to be a cross-method analogue to the PIPD, was administered to a portion of both samples. After they completed the PIPD, individuals were once again presented with each item from the inventory. They were asked, "Knowing everything that you do about yourself, what are you really like with regard to this particular trait?" and were required to select a response from four options: 0 (*never like this*), 1 (*sometimes like this*), 2 (*usually like this*), or 3 (*always like this*).

Results

Reliabilities

For all of the analyses described here, scores for a given PD feature were summed across all judges rating the target and divided by the number of members in the group. We calculated reliabilities using the median (across groups) coefficient alpha for each PD feature (calculated across each of the judges rating the targets within a group).

The median peer reliability across all PD features was .74 in the Air Force sample. Values ranged from .90 to .19. However, only three items had values below .50. These were as follows: "Can't throw out old things even if they are of no use to him/her" (.19), "Does not want to tell personal information to anyone because they might use it against him/her" (.29), and "Is very stingy with

Table 1
Principal-Components Factor Analysis of Personality Disorder Symptoms: Varimax Rotation of the Consensus Matrix Across College and Air Force Samples

Personality disorder symptoms	Factor loadings						
	HN	DA	DET	AM	ANT	OC	STY
Antisocial							
Lies to people; cons people	.65	.17	.14	.24	.45	-.05	.05
Does things without thinking; doesn't plan ahead	.33	.43	.03	.09	.63	.00	.19
Is irresponsible; can't be counted on to do his/her work	.29	.39	.13	.07	.64	-.08	.11
Gets mad easily and often gets in fights	.44	-.02	.12	.65	.33	.12	-.03
Doesn't feel guilt after hurting someone or stealing	.60	-.01	.23	.39	.47	.08	-.11
Repeatedly gets in trouble with the police	.35	.01	.13	.14	.65	-.13	.09
Has a reckless lack of concern for safety of self or others	.42	.14	.12	.23	.71	-.12	.08
Avoidant							
Is reserved or shy when meeting new people because feels inadequate	-.21	.58	.57	-.09	-.08	.03	-.03
Worries that others will criticize or reject him/her	.25	.76	.17	.22	-.02	.06	.15
Thinks that s/he is clumsy, unattractive, or inferior to others	-.14	.70	.38	.11	.01	.04	.14
Is unwilling to do new things because they might be embarrassing	.06	.64	.33	.05	-.01	.22	-.13
Is very inhibited with close friends for fear of being teased	-.01	.65	.43	.12	-.02	.11	.02
Avoids working in teams for fear of criticism or rejection	-.01	.56	.60	.10	.08	.06	.01
Is unwilling to get involved with other people unless certain of being liked	.34	.57	.35	.19	.01	.06	.01
Borderline							
Seems to feel empty inside	.02	.58	.55	.22	-.01	-.04	.19
Lacks a fundamental sense of who s/he is	.22	.72	.32	.18	.12	.00	.19
Has strong mood swings in response to events	.36	.34	.13	.62	.06	.22	.21
Has unstable, intense relationships; switches between loving and hating	.61	.22	.08	.41	.16	-.03	.15
Repeatedly attempts (or threatens) suicide or serious self-harm	.04	.42	.34	.34	.05	-.12	.37
Has sudden, even violent outbursts of anger	.39	.03	.15	.65	.23	.17	.03
Will do almost anything to keep from being left alone	.43	.66	.01	.13	.10	-.02	.15
Gets paranoid or acts strange in response to stress	.18	.42	.17	.46	.10	.21	.41
Lives a reckless lifestyle; does dangerous things without planning	.44	.04	.07	.11	.69	-.16	.15
Dependent							
Needs to have others take care of him/her	.23	.74	.09	.08	.22	.04	.13
Is unrealistically afraid of being left alone to care for him/herself	.22	.77	.11	.16	.05	.00	.10
After romantic breakup, quickly finds someone else to take care of him/her	.70	.19	-.03	.00	.13	-.16	.15
Feels helpless when left alone; fears not being able to take care of self	.17	.79	.13	.12	.00	.01	.10
Doesn't like to disagree with others because fears rejection	-.02	.75	.18	-.06	.01	.09	.00
Can't make a simple decision without lots of advice	.18	.76	-.03	.10	.09	.14	.12
Is afraid to do things by him/herself	.20	.80	.07	.09	.08	.03	.00
Will do almost anything to get other people to take care of him/her	.40	.64	.03	.13	.22	.00	.11
Histrionic							
Has shallow emotions that change rapidly	.66	.26	.14	.42	.13	.11	.08
Talks in a vague way that lacks detail and is hard to understand	.00	.49	.40	.00	.18	.16	.30
Behaves as if "on stage"; exaggerates expressions of emotion	.66	.16	-.06	.18	.22	.15	.29
Is easily influenced by other people (suggestible)	.20	.79	.04	-.02	.12	.04	.04
Considers his/her relationships to be closer than they actually are	.61	.36	.04	.13	.05	.03	.26
Is unhappy when s/he is not the center of attention	.83	.15	-.05	.16	.17	.16	.12
Is inappropriately sexually seductive in interacting with others	.73	.15	-.04	-.01	.17	-.18	.18
Uses physical appearance to draw attention to his/herself	.81	.16	-.04	-.05	.07	-.01	.10
Narcissistic							
Preoccupied with gaining unlimited success, power, or beauty	.71	.17	.03	.21	.09	.27	.08
Needs other people to admire him/her	.86	.22	-.04	.11	.08	.17	.07
Is stuck up or "high and mighty"	.79	-.01	.12	.19	.07	.30	-.18
Is not concerned about the feelings or needs of others	.64	.05	.30	.35	.34	.18	-.11
Thinks other people are jealous of him/her	.86	.07	.06	.11	.08	.18	-.08
Feels s/he deserves special favors or treatment	.79	.17	.09	.27	.11	.26	-.04
Thinks s/he is much better than others (without good reason)	.81	.02	.12	.25	.12	.27	-.14
Thinks that s/he is special and should only hang out with special people	.80	.02	.10	.15	.12	.19	-.16
Takes advantage of others with no intention of paying them back	.66	.13	.14	.27	.44	.03	-.09
Is jealous of other people	.51	.43	.16	.40	.07	.08	.02
Obsessive-compulsive							
Needs to do such a perfect job that nothing ever gets finished	.17	.17	.08	.18	-.02	.60	.11
Is very rigid and stubborn	.48	.00	.19	.50	.22	.45	-.02
Is very stingy with money	.22	.11	.22	.24	.15	.28	.02
Needs to do everything him/herself because no one else will do it right	.34	-.03	.19	.26	.01	.60	-.02
Can't throw out old things even if they are of no use to him/her	.11	.28	.06	.06	.22	.18	.20
Is much too concerned about details, rules, lists, and schedules	.15	.12	.06	.17	-.09	.75	.04
Works so much that s/he never has fun and has no friends	-.03	.13	.43	.02	-.07	.51	.08
Has very strict and rigid ideas about morals and ethics	.06	.08	.07	.01	-.08	.60	.06

Table 1 (continued)

Personality disorder symptoms	Factor loadings						
	HN	DA	DET	AM	ANT	OC	STY
Paranoid							
Has frequent doubts about the loyalty of friends; doesn't trust anyone	.25	.25	.47	.50	.11	.08	.08
Doesn't want to tell personal info because it might be used against him/her	.27	.20	.45	.24	.08	.21	.05
Incorrectly believes people are threatening him/her or putting him/her down	.35	.43	.17	.60	.07	.15	.19
Incorrectly believes others are attacking his/her reputation and reacts with anger	.50	.17	.16	.62	.17	.17	.02
Thinks that people are taking advantage of or harming him/her	.26	.42	.25	.57	.06	.16	.21
Is suspicious that his/her sexual partner might be cheating	.42	.14	.01	.13	.10	-.06	.13
Holds grudges for a long time if insulted or injured	.51	.08	.19	.61	.17	.20	-.06
Schizotypal							
Incorrectly thinks other people are looking at or talking about him/her	.46	.50	.15	.46	.07	.11	.13
Is superstitious or believes in mind reading	.08	.17	.09	.06	.19	.11	.36
Is odd or peculiar in behavior or appearance	-.01	.41	.57	.04	.18	.09	.42
Shows emotional responses that seem strange or "out of sync"	.19	.44	.37	.39	.06	.10	.49
Has an odd way of thinking; speech sometimes does not make sense	.04	.42	.35	.06	.20	.18	.50
Is nervous around others because s/he doesn't trust them	.03	.47	.59	.25	.02	.10	.09
Seems to see, hear, or experience things differently than others	.12	.42	.42	.19	.18	.17	.49
Is overly suspicious or paranoid	.22	.49	.22	.52	-.02	.18	.24
Schizoid							
Has no close friends (other than family) ^a	-.02	.44	.69	.05	.01	.05	.18
Prefers to do things alone	.04	.11	.73	.02	.09	.20	.05
Doesn't enjoy doing anything	.02	.39	.62	.24	.14	.01	.01
Is cold; doesn't show any feelings	.25	.00	.66	.19	.15	.20	-.12
Doesn't care whether other people praise or criticize him/her	.20	-.10	.22	.09	.39	.31	.09
Doesn't want to be physically or emotionally close to others, even family	.09	.16	.63	.23	.18	.04	.18

Note. Factor loadings greater than or equal to .45 are in boldface. Longer items have been abbreviated slightly for convenience of tabular presentation. HN = Histrionic/Narcissistic; DA = Dependent/Avoidant; DET = Detachment; AM = Aggression/Mistrust; ANT = Antisocial; OC = Obsessive-Compulsive; STY = Schizotypal.

^a Also included on Schizotypal PD.

money" (.32). In the college sample, values ranged from .73 to .26, with a median of .54. The fact that alphas were generally somewhat lower in this sample is not surprising because the groups were smaller in size. Items with the lowest alphas in this sample were as follows: "Works so much that s/he never has fun and has no friends" (.26), "Does not want to tell personal information" (.27), and "Shows emotional responses that are strange/out of sync" (.30). Although alphas, in many cases, are low relative to standards for test construction, it is important to note that they are quite high for assessments of individual PD features. Based on scoring coefficients derived from the factor analyses presented here (see Table 1) and the PD feature reliabilities, the linear combinations for factors are reliable at the .95-.97 level for the college sample and the .97-.99 level for the Air Force sample. Even for a four-item scale based on the items with loadings of greater than .40 on the Schizotypal PD factor (see Table 1), coefficient alpha is .89.

Factor Analysis of PD Features: Simple Structure

Our first goal was to establish, with exploratory methods, the factor pattern that best represented basic dimensions underlying the data in both samples. In this and in all subsequent factor analyses, principal-components factor analysis was performed with squared multiple correlations on the diagonal. To establish an estimate of the appropriate number of factors to retain for rotation, we performed Horn's (1967) method of parallel analysis, the most often recommended method of identifying the appropriate number

of factors for rotation (Matthews & Oddy, 1993). The method estimated seven factors in the Air Force sample and eight factors in the college sample as the most appropriate number for extraction. In addition, seven was the maximum number of factors for which the relationship between salient loadings had a clear, common theme after simple structure rotation in either sample, an important criterion in determining the appropriate number of factors for extraction (Gorsuch, 1983). Moreover, it was only at the level of seven factors that the factors could be interpreted in a similar manner in both samples (with rotation of two to eight factors assessed). Consequently, there was good evidence to support the extraction of seven factors for subsequent rotations and comparisons between samples.

The rotation of factors was first performed with independent varimax rotations. Similarity of factor loadings between the target and the rotated matrix was assessed with Tucker-Burt-Wrigley-Neuhaus coefficients of congruence (see Guadagnoli & Velicer, 1991). These coefficients are measures of proportional similarity between vectors of factor loadings, interpretable in a manner similar to correlation coefficients. They are, in fact, essentially Pearson correlations, except that the factor loadings are in raw form, without rescaling as deviations from the mean. The resulting congruences for the independently rotated factor pattern ranged from .78 to .93, with an average coefficient of .85 across all factors. The congruences reflect very close similarity between each pair of corresponding factors. Given this high degree of similarity, it seemed useful to summarize the information provided by the two

samples into a single structure. The varimax rotation of the consensus matrix (VCM) method, recommended by Kiers (1998) for optimizing simple structure and similarity across samples, was used for this purpose. The method rotates the two factor patterns to maximum similarity using a Procrustes rotation, takes the average of the factor loadings across the two factor patterns, then uses a varimax rotation to rotate the resulting matrix to a simple structure. The results of this rotation are presented in Table 1.

As can be seen in Table 1, the seven factors that emerge are loosely consistent with models of normal personality, with the addition of more specific variance consistent with the structure of some of the PD diagnoses. Associations with FFM factors excluding openness (or, alternatively, the Aesthetic, Antisocial, Asocial, and Anankastic factors identified in previous research with the PD feature set; Austin & Deary, 2000) are clearly evident. Our Dependent–Avoidant factor is primarily identified by anxiety-related items and thus is centrally related with neuroticism (McCrae & Costa, 1987; Watson & Clark, 1984) or aesthenia. Our Detachment factor could just as easily have been labeled Asocial and is defined by items that are clearly at the low extreme of the Extraversion factor, a factor which McCrae and Costa have shown is identified by terms like sociable, fun-loving, friendly, and affectionate. McCrae and Costa (1987) have defined the low end of their Agreeableness factor as antagonism, and mistrust represents one of the most core traits on this end of the dimension. The mapping onto our Anger–Mistrust factor is evident, as is its similarity to the Antisocial factor of previous research. Finally, McCrae and Costa's Conscientiousness factor, representing a high degree of scrupulousness, shows a clear relation with our Obsessive–Compulsive (or Anankastic) factor. The remaining three factors do not have such a clear mapping onto the FFM factors, although associations with these factors do appear to be evident. As noted previously, research has shown that the FFM structure, although central to the domain of maladaptive personality, does not entirely subsume it (Clark, 1993). The additional factors do bear some similarity to the *DSM* PD diagnoses, with all seven factors being associated centrally with either one or two of the diagnoses.

Factor Analysis: Self-Report

Because self-report data were available for a substantial portion of the Air Force sample, it was possible for us to assess directly the degree to which peers were evaluated, along dimensions similar to those used by participants in evaluating themselves. For this purpose, factor analyses were performed independently on the self-report data then rotated to maximum similarity with the peer structure.

The median response frequencies across all of the PD features were 73%, 22%, 4%, and 2% for responses of 0, 1, 2, and 3, respectively, for the self-report data gathered in this study, with no substantial differences in distribution across samples. Because of the positive skew and the limited number of response categories available, polychoric correlation matrices were estimated using PRELIS 2 and used as input for the factor analysis presented here. Principal-components analyses were then performed on the polychoric correlation matrices, and seven factors were extracted for rotation to conform to the number of factors that had emerged in the PIPD analysis. These factors were rotated with an independent

varimax rotation as well as with orthogonal (Schönemann, 1966) and oblique Procrustes rotations to maximum similarity with the PIPD consensus matrix (see Table 1). Coefficients of congruence were calculated following each of these rotations, comparing the rotated factors with corresponding factors in the consensus matrix. Results are presented in Table 2.

As can be seen, correspondence across methods is quite high. Because the Procrustes rotations capitalize on random aspects of the data to increase agreement between factors (Horn, 1967), a bootstrapping method was developed that assesses the probability that given coefficients of congruence exceed the levels that would be expected on the basis of chance alone (McCrae, Zonderman, Costa, Bond, & Paunonen, 1996; see O'Connor & Dyce, 1998). This procedure compares the coefficient of congruence for natural data with a distribution of 1,000 congruences calculated after rotating pseudorandom matrices to the same specified target. The details of the procedure followed those used in the previous studies. Results exceeded levels that could be accounted for by chance at the .99 level in all cases. In fact, it appears that even the independent varimax rotation was adequate in capturing the similarity of the PIPD pattern with the SR patterns, despite the fact that similarity across patterns is not a goal of that rotation. When the independently rotated patterns were examined for interpretability, they were conceptually quite similar, a result that is perhaps inevitable with congruences at this level. It does not, in fact, appear that much is gained from the Procrustes rotations beyond what would be expected on the basis of the slight inflation of congruences inherent in that method. The only possible exception is that the Antisocial and Schizotypal PD factors were more clearly represented after the Procrustes rotation.

Comparing Factor Structure With Previously Established Models

In addition to a factor analysis performed using entirely exploratory methods, some more specific expectations based on prior research can be defined quantitatively and the factor patterns rotated and compared directly with these models. When correlations between PD features are used as input for the factor analysis, the 10 *DSM-IV* diagnoses represent such a model. As noted previously, the expectation based on prior research is that some similarity with the *DSM* system would be present but that the

Table 2
Coefficients of Congruence for Self-Report Data With Peer Report Consensus Matrix for the Air Force Sample

Rotation method	Factor							Average
	HN	DA	DET	AM	ANT	OC	STY	
IV	.93	.95	.78	.74	.66	.70	.83	.80
Orthogonal	.92*	.95*	.90*	.86*	.76*	.74*	.88*	.86*
Oblique	.95*	.97*	.94*	.88*	.86*	.85*	.90*	.91*

Note. HN = Histrionic/Narcissistic; DA = Dependent/Avoidant; DET = Detachment; AM = Anger/Mistrust; ANT = Antisocial; OC = Obsessive–Compulsive; STY = Schizotypal; IV = independent varimax rotation; Orthogonal = orthogonal Procrustes to peer report consensus matrix; Oblique = oblique Procrustes to peer report consensus matrix.

* $p < .001$ (p values for Procrustes rotations only).

system as a whole could not adequately represent the dimensions underlying the data. The degree to which the PD feature domain is organized into the diagnostic categories was assessed by extracting 10 factors (to conform to the number of PD diagnoses) and rotating them to optimal similarity with a target matrix defined by the *DSM* diagnoses. The PD features included in a given disorder were represented by 1 on the corresponding factor, with all other features represented by 0 on that factor. Orthogonal and oblique Procrustes rotations were then performed. Results for the oblique rotation had average coefficients of congruence of .69 and .72 for Air Force and college samples, respectively. Congruences for individual factors ranged between .62 and .82 for the Air Force and between .57 and .85 for college samples. In both samples, the rank order of congruences across factors was the same, with Dependent and Obsessive–Compulsive PDs having the highest, and Histrionic and Paranoid PDs the lowest. For the orthogonal rotation, the average coefficients were .61 and .67 for the Air Force and college samples, respectively.

Coefficients did exceed levels expected on the basis of chance alone at the 99% threshold, on average, as well as for each of the individual factors. Better than chance, however, clearly does not mean that the similarity is perfect; coefficients of around .70 suggest that the matrices are related but not congruent. The result thus can be taken to suggest that the actual factor structure is related to but not adequately explained by the *DSM–IV* PD model.

As noted earlier, theoretical models of factor patterns based on relationships between PD diagnoses have been put forward by O'Connor and Dyce (1998). Analogous data were produced for this study by summing the PD feature scores across all features included in a specific diagnosis. Such a summary of the 78 features into 10 diagnoses results in a less fine-grained analysis but permits direct comparison with other models at the level of diagnoses rather than individual criteria. We selected models from O'Connor and Dyce's (1998) study for which there was clear evidence of validity. These models included four- and five-factor versions of the FFM model (including and excluding the Openness factor; NEO; Costa & McCrae, 1992) as well as four- (Novelty Seeking, Harm Avoidance, Reward Dependence, and Self-Directedness) and five-factor models (four-factor model plus Cooperativeness) based on Cloninger and Svrakic's (1994) seven-factor model. The target matrices were identical to those included in the O'Connor

and Dyce study, with the exception that loadings for Passive–Aggressive PD, not included in *DSM–IV*, were deleted. Our procedure for testing models otherwise closely followed that used by O'Connor and Dyce (1998).

Both the self-report and PIPD data were submitted to these factor analyses, with the number of factors to be extracted dictated by the target matrix to be used for the rotation. The resulting factor pattern was then rotated to maximum similarity with the target, using both orthogonal and oblique Procrustes rotations for the FFM models and the oblique Procrustes rotation only for the Cloninger and Svrakic (1994) models (because the Cloninger and Svrakic target is not orthogonal). We calculated coefficients of congruence for corresponding factors following rotation and performed bootstrapping to determine the likelihood that observed congruences occurred because of chance characteristics of the data. Results are presented in Table 3.

All congruences exceeded levels that could be accounted for by chance at a .99 level of confidence. The congruences themselves are consistent with those reported by O'Connor and Dyce (1998) for the 12 input matrices that they tested. Coefficients in their study ranged from .79 to .95 and from .75 to .97 for the four- and five-factor versions of the FFM, respectively. Coefficients for the four- and five-factor versions of the Cloninger and Svrakic models ranged from .90 to .96 and from .92 to .96, respectively. Consequently, it can be concluded that similar dimensions account for the diagnostic level PD configurations assessed with the peer method as with more traditional methods of assessment. The five-factor models were not fit to the SR data because five factors clearly represented overextraction in these cases (eigenvalues < 0).

Comparing Self-Ratings and Peer Ratings

Having established that very similar dimensions underlie the PIPD and SR methods, we felt it appropriate to compare the degree to which these dimensions agree across methods. For this purpose, factor scores representing the seven basic dimensions were calculated for self- and peer-report data. Scoring coefficients were based on the PIPD factor pattern in the Air Force sample because it was necessary that the same scoring coefficients be used across methods, and the PIPD pattern has been the primary focus of this

Table 3
Congruences With Target Factor Loading Matrices

Sample and rotation method	FFM		Cloninger & Svrakic (1994)	
	4 factors	5 factors	4 factors	5 factors
Peer report, Air Force sample				
Orthogonal	.88**	.82*		
Oblique	.92**	.87*	.96**	.97*
Peer report, college sample				
Orthogonal	.85**	.84**		
Oblique	.89**	.89**	.96**	.97**
Self-report, Air Force sample				
Orthogonal	.81**			
Oblique	.91**		.93**	

Note. FFM = Five-Factor Model of Personality (NEO Personality Inventory; Costa & McCrae; 1992).
* $p < .001$. ** $p < .0001$.

investigation. Prior to correlational analyses, factor scores (which exhibited severe positive skew) were transformed to conform to normal distributions.

The cross-method correlations between factor scores for the PIPD and SR data in the Air Force sample are reported in Table 4. Convergent correlations exceeded discriminant correlations for each factor assessed. Such a pattern is consistent with previous research comparing the perspectives of self and peers (McCrae & Costa, 1987; Ready et al., 2000; Watson & Clark, 1991), although correlations between .21 and .30 are mild and generally lower than those reported in previous studies.

Discussion

The results of this investigation provide evidence that peers develop meaningful perspectives on the pathological personality of group members, with a relatively high degree of consensus across the peer group regarding which members exhibit these traits. The reliabilities of individual PD features across the peer group demonstrate a high degree of consensus present for specific features. In addition, the emergence of a meaningful factor pattern indicates that a common understanding of which individuals exhibit basic traits underlies the consensus on the PD features. Otherwise, individuals' differing opinions would have obscured the factor pattern because of the summing of scores across group members.

In this study, factor analysis demonstrated an organization that is clearly meaningful in terms of general traits shown to be relevant to pathological personality in previous research. In the central factor analysis (Table 1), which replicates well across two samples, each factor represents either an aggregate of two PD diagnoses or a trait relevant to a particular diagnosis. As expected, the structure does not conform to the *DSM-IV* classification system (e.g., Hyler et al., 1990; Livesley, Jackson, & Schroeder, 1989) but does reflect a substantial relationship with it. Subjective evaluation of the emerging structure is consistent with the pattern expected on the basis of previous research. (Compare Austin and Deary's, 2000, eight-factor solution, which conforms very closely to the present structure, except in the presence of a factor dominated by passive-aggressive PD features, which were not included here.) Direct comparison with a factor analysis of self-report data

gathered on an overlapping group of individuals makes particularly evident the very high degree of similarity in basic dimensions underlying both approaches. In addition, the expected relationships with the broader framework of normal personality were apparent in content overlap between normal personality factors and factors that emerged here (Watson et al., 1994; Widiger et al., 1994). The relationship was also specifically demonstrated through a theoretical, higher order rotation with expected conformity to FFM and Cloninger and Svrakic (1994) models (O'Connor & Dyce, 1998).

Because the factor structure is largely shared in common across self and peer methods, we were able to compare correlations between the methods across factor scores. The results of these analyses met Campbell and Fiske's (1959) criteria for convergent and discriminant validity: In every case, the correlation with the corresponding factor in the opposing method exceeded the correlations with all noncorresponding factors in the opposing method. This evidence is consistent with much previous research on normal personality traits (e.g., Borgatta, 1964; McCrae & Costa, 1987; Watson & Clark, 1991). The finding provides important evidence of the external validity of the personality dimensions being assessed, with both methods of assessment providing meaningful information related to the general constructs.

Convergent correlations across self and peer report were relatively mild, in the .20 to .30 range, particularly relative to the very high consensus scores across the peer group in assessing its members, with coefficient alphas for factor scores equaling or exceeding .95. This finding makes evident that self-report does not capture a common view developed within the group as a whole regarding basic maladaptive traits of personality in its members. A number of factors would be expected to affect self-peer correlations. These include number of raters included in the peer composite (e.g., Watson & Clark, 1991), observability (or rateability) of the features being assessed (John & Robins, 1993; Kenrick & Funder, 1988; Ready et al., 2000), and level of acquaintanceship between the target and the judge (Funder & Colvin, 1988; Funder, Kolar, & Blackman, 1995; John & Robins, 1993; Ready et al., 2000). These factors would probably affect our data in conflicting ways. For example, although agreement across the group as a whole was quite good, individual peer-peer agreement was low, suggesting that acquaintanceship may be relatively low in our groups, whereas number of raters was clearly high. Consequently, although our results are at least consistent with the expectation of low correlations on the basis of the highly evaluative nature of the traits being assessed (John & Robins, 1993), it would not be appropriate to conclude that it was that factor that explained the relatively low correlations.

Table 4
Factor Score Correlations Between Peer and Self-Report Data in the Air Force Sample

Self	Peer						
	HN	DA	DET	AM	ANT	OC	STY
HN	.22**	-.09	.02	-.07	.01	-.07	.07
DA	-.18**	.30**	-.07	-.08	-.01	-.07	.05
DET	-.08	-.03	.21**	.03	.19**	.03	-.07
AM	-.07	.10**	-.04	.29**	.10**	.08	-.08
ANT	-.17**	.08	.03	.07	.30**	.12**	-.04
OC	-.08	.00	.03	.08	.05	.27**	-.02
STY	.07	-.01	-.01	-.07	.03	-.02	.24**

Note. HN = Histrionic/Narcissistic; DA = Dependent/Avoidant; DET = Detachment; AM = Aggression/Mistrust; ANT = Antisocial; OC = Obsessive-Compulsive; STY = Schizotypal.
** $p < .0001$.

Accuracy and the Peer Method

The fact that high levels of information are unique to the peer method, and yet capture core traits of pathological personality in a manner that is consistent across judges, is worth examining in some depth. Consensus between judges is a well-established criterion of accuracy in the field of interpersonal perception. Some researchers have concluded that there is no other basis for determining accuracy than consensus among perceivers of behavior (Kruglanski, 1989). Kenny (1991), for instance, has defined accuracy as a sort of ideal consensus: "the average judgment made by all possible judges of all possible target behaviors" (p. 159). In the

practical case, of course, the agreement of a specific set of judges assessing a finite number of behaviors falls short of this standard; however, peers who have interacted with the target person day in and day out have been exposed to a wider range of behaviors than other real-world judges.

The fact that the relatively high consensus was not reflected in high levels of self-peer agreement is also of interest. Some evidence suggests that peers are better perceivers of behavior than the self (John & Robins, 1994; Levesque & Kenny, 1993). For instance, John and Robins (1994) demonstrated that individuals are more accurate, relative to evaluation based on behavioral criteria, when judging others than when judging themselves. They furthermore showed that the lack of correspondence was, in large part, due to systematic bias, rather than error, in self-judgments and that this bias was strongly related to narcissism. In addition, the same authors (John & Robins, 1993) have elsewhere showed that the level of agreement between self and others is much lower for traits that are viewed as negative than for neutral traits, presumably because the self is more likely to present a biased (self-enhancing) perspective on more negative traits.

Potential Limitations of Accuracy

There are some factors, however, that may limit the relationship between consistency and accuracy. The first potential factor is communication between members of the group about the personality traits of other group members. This effect has been proposed in the interpersonal perception literature as a potential basis of artificially inflated consensus because judges would no longer be independent in their judgments (see Kenrick & Funder, 1988). However, evidence to date has indicated that communication has very little effect on overall judgments. For instance, Funder et al. (1995) had a pair of judges from each target's hometown and a pair from his or her college complete a "third person" version of the NEO Personality Inventory (McCrae & Costa, 1987). Pairs of judges from the same context (home, college) agreed equally well, whether or not they were acquainted.

A more serious concern, and one that gets to the heart of the strengths and limitations of the current method, is the possibility that judges tend to agree because they have generally observed the same set of behaviors. If the target has behaved in an unusual manner on a few occasions in front of a large portion of the peer group, it is likely that peers would agree about the target because of those few behaviors. Previous studies have shown greater agreement when observed behaviors overlap. Again, Funder et al. (1995) may have provided the most relevant study for our purposes, showing somewhat higher correlations for pairs of judges that had known the target in the same context (hometown acquaintances, parents, or college acquaintances) relative to individuals who had known the target in different contexts. However, there was still substantial interjudge agreement across all contexts. In addition, self-other agreement was as high with college acquaintances as with parents, who had known their child their entire lives. The latter finding suggests that the behavioral context within which the individual first establishes independence from family is as relevant to these young people's view of their own personality as the full range of earlier behaviors exhibited at home.

In determining the degree to which behavioral overlap might have resulted in a spurious level of consensus across the peer

group, it is important to consider the strengths of the two groups used in our study. The Air Force sample was limited in that behavior was observed in a highly controlled environment that was, in many ways, distinct from the less structured environment most people are likely to operate within for much of their lives. At the same time, it is important to note that someone in this peer group had observed virtually every interpersonal behavior that every member of the peer group had exhibited in the last 6 weeks. There are a few exceptions (e.g., letters to girlfriends, brief phone calls to parents), but very few. The group had listened to the participants' homesick complaints, heard their every lewd comment, laughed at their jokes, watched them react to the stress of grueling training, and so forth. The college sample may have been less exhaustive in having witnessed the total set of behaviors exhibited by the individual, and the amount of time shared between members of this group probably varied widely; there was also likely to be a wider range of behaviors exhibited by this group in the less structured college setting. However, the level of consensus across groups on the factor analytically defined dimensions was quite good. For both of these samples, peer groups had a large body of information that, practically speaking, could never be available to clinicians or to researchers. Much of this information is not available to self (Bem, 1967), and some is likely to be interpreted in a biased manner by the self (John & Robins, 1994). If these peer groups, with their daily experience, agree about personality features exhibited by individuals, it is difficult to imagine who would be in a position to say that they were incorrect in their assessments. Clearly, peers do not have the same intimate knowledge available to the self and probably would not provide information as central to diagnostic decisions. Nevertheless, the presence of this consistency of perspective across the group as a whole indicates a source of information to be reckoned with, apparently offering something unique and certainly calling for more thorough understanding.

Further Research

The idea of exploring dimensions relating to the PD symptoms in a normal population presupposes that certain items will be related to each other throughout the entire population rather than only in a subgroup of individuals who can be categorized as having a certain PD. The distinction is important because the *DSM-IV* defines categories of disorder, implying that the trait of interest is, to some degree, simply present or absent. Contrary to the categorical model proposed by the *DSM*, evidence so far indicates that PD symptoms can be more usefully understood as extreme ends of continuous dimensions of normal personality (cf. Wiggins & Pincus, 1994). The high rate of comorbidity among PD diagnoses provides a basic challenge to the idea of discrete diagnostic categories (Clark, Watson, & Reynolds, 1995). Moreover, to date there is no evidence that distributions of scaled scores for PD diagnoses are characterized by the discontinuities or points of rarity that would be present if individuals who did have or did not have the diagnosis were in some way categorically distinct (Kendell, 1975; Zimmerman & Coryell, 1989). Further research is necessary on these issues; some theorists and researchers do believe that a few PD classifications are categorical (Grove & Tellegen, 1991; Lenzenweger, 1999). However, direct comparisons across clinical and nonclinical samples have shown no substantial structural differ-

ences in the organization of PD traits (Clark, 1993; Livesley, Jackson, & Schroeder, 1992). Future research is clearly necessary to examine the degree to which current findings generalize to populations in which pathological personality is more prevalent. Nevertheless, the existing evidence does appear to provide some basis to expect similar structural findings regardless of the specific population assessed.

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