Personality Traits in Late Adolescence Predict Mental Disorders in Early Adulthood: A Prospective-Epidemiological Study

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ABSTRACT   Prospective relations between personality traits and mental disorders were assessed in a longitudinal study of a representative birth cohort of young men and women from Dunedin, New Zealand. Personality traits were assessed via self-report questionnaire at age 18, and mental disorders were assessed via diagnostic interview at both ages 18 and 21. High "negative emotionality" (a propensity to experience aversive affective states) at age 18 was linked with affective, anxiety, substance dependence, and antisocial personality disorders at age 21 when corresponding mental disorders at age 18 were controlled. Low "constraint" (difficulty inhibiting the expression of affect and impulse) at age 18 was linked with substance dependence and antisocial per-

sonality disorders at age 21 when corresponding mental disorders at age 18 were controlled. The findings are discussed in terms of their implications for the development and treatment of mental disorders in young adulthood.

Adolescence is a pivotal period in the life-course, marking the transition from childhood to the responsibilities of adult life. Classic accounts of adolescence describe it as a period of psychological "storm and stress" for the vast majority of persons (Blos, 1962; Freud, 1958; Hall, 1904). Nevertheless, there are individual differences in the "storm and stress" of adolescence; only a portion of adolescents exhibit serious difficulties in adjustment (Offer & Schonert-Reichl, 1992; Petersen, 1988). What separates more severely disturbed adolescents from those who arrive at young adulthood unscathed? The current research examined the hypothesis that personality traits are useful in predicting which persons will experience diagnosable mental disorders as they pass from late adolescence into early adulthood.

The transition from late adolescence to early adulthood is a key period for studying relations between personality and mental disorders for a number of reasons. First, prevalence rates for mental disorder are higher in this age cohort (i.e., 15-to-24-years-old) than in any other age cohort (Kessler et al., 1994). That is, this age cohort has sufficient variance in diagnostic status to allow for robust tests of associations between diagnostic status and other psychosocial variables, such as personality. Second, these high prevalence rates—approximately 37% in a national probability sample of noninstitutionalized civilians across the 48 continental United States (Kessler et al., 1994)—are a cause for serious concern from a public health standpoint. Accordingly, the Committee on Prevention of Mental Disorders of the Institute of Medicine (1994) issued a call for epidemiological research focusing on the transition from adolescence to adulthood. The current report is one response to this call.

Third, the period from late adolescence to early adulthood is a significant time of transition in the life-course, when people are making major choices in multiple life spheres (e.g., employment and education). Individual differences are accentuated during such life transitions (Caspi & Moffitt, 1993), making the transition from adolescence to young adulthood an optimal "window" for studying relations between individual–difference variables (e.g., personality traits) and significant life

outcomes, such as mental disorders. Fourth, the solidification of personality by age 30 (James, 1890/1983; McCrae & Costa, 1990) suggests that early adulthood may be the last stage of the life-course during which significant personality change may occur. Young adulthood may provide opportunities to induce change in personality traits that are robust predictors of mental disorders before these personality-disorder relations are (to use William James's phrase) "set like plaster."

Evidence that personality is prospectively linked to mental disorder during the transition from late adolescence to young adulthood also has other implications for treatment and prevention efforts (cf. Ben-Porath & Waller, 1992; Costa & McCrae, 1992). Specifically, robust relations between personality and mental disorder suggest that treatment and prevention programs that focus on manifest symptomatology without addressing underlying character structures may be limited in their ultimate influence. Personality may thus be useful both in predicting which persons are likely to experience mental disorder as they enter young adulthood, and in conceptualizing effective treatments for these persons.

Personality and Mental Disorder: A Rapprochement

The existence of stable dispositions is no longer a matter of great dispute among personality psychologists (Goldberg, 1993; Kenrick & Funder, 1988; Tellegen, 1991). Such consensus has led to renewed enthusiasm regarding the possibility that personality traits may be helpful in determining who is likely to experience mental disorder (Watson & Clark, 1994). The current study focused on the roles of four broad factors that appear to be useful in summarizing a wide range of personality variants potentially related to mental disorder: *Agency*, defined by traits such as dominant and gregarious; *Communion*, defined by traits such as trusting and empathic; *Negative Emotionality*, defined by traits such as worrying and nervous; and *Constraint*, defined by traits such as disciplined and responsible (Tellegen & Waller, in press). We focused on these four broad traits because, together, they provide an "integrative structural model" for personality assessment, bridging the "Big Three" (e.g., Eysenck & Eysenck, 1975; Gough, 1987; Tellegen, 1985) and "Big Five" (e.g., Digman, 1990; Goldberg, 1993; John, 1990; McCrae & Costa, 1987) traditions in personality assessment (see Watson, Clark, & Harkness, 1994). In addition, we focused on the four most prevalent types of

disorder in the population: anxiety, depressive, substance abuse, and antisocial disorders (Kessler et al., 1994).

Personality traits related to disorders of anxiety and depression. Persons who experience anxiety and depressive disorders have similar personality characteristics. Specifically, both anxious and depressive disorders and symptoms are consistently associated with personality traits subsumed by negative emotionality (Clark, Watson, & Mineka, 1994; Gjerde, Block, & Block, 1988; Watson, Clark, & Carey, 1988). Such a pattern may, however, reflect the influence of a depressed or anxious state on the measurement of the negative emotionality trait (Hirschfeld et al., 1983; Reich, Noyes, Coryell, & O'Gorman, 1986). To discover if personality *predisposes* to anxiety or depression, prospective longitudinal studies are needed.

Few prospective longitudinal studies of personality and anxiety and depressive disorders have been conducted; for example, *no* studies have been conducted for anxiety disorders assessed by standardized interview methods (Clark et al., 1994).[1] Nevertheless, prospective studies of personality and the anxiety disorders are likely to be fruitful because many putative anxious "states" are relatively enduring, blurring the distinction between "states" of disorder and traits of personality. For instance, in various samples of anxiety-disordered patients surveyed by Barlow, Blanchard, Vermilyea, Vermilyea, and DiNardo (1986) mean durations of retrospectively recalled generalized anxiety ranged from 5 to 22 years in length.

With regard to depression, some evidence suggests that earlier personality characteristics (specifically, negative emotionality) can predict later depression (e.g., Angst & Clayton, 1986; Block, Gjerde, & Block, 1991; Boyce, Parker, Barnett, Cooney, & Smith, 1991; Hirschfeld et al., 1989; Kendler, Neale, Kessler, Heath, & Eaves, 1993). However, these studies have certain limitations, such as the use of self-report depression scales at follow-up (vs. diagnostic interviews; see Block et al., 1991; Boyce et al., 1991), incomplete follow-up of all initial participants (see Angst

1. A literature search for articles appearing after the review conducted by Clark et al. (1994) also yielded no prospective studies of personality and anxiety disorders. One study (Nyström & Lindegård, 1975) measured various personality variables prior to the assessment of "neurasthenic syndrome" and "anxiety syndrome." However, these authors' criteria for these syndromes were not provided in their report, and their diagnostic procedures were not detailed.

& Clayton, 1986), and assessment of a limited range of personality traits (see Kendler et al., 1993). In addition, some studies used nonrepresentative sampling strategies, employing high-risk samples (see Hirschfeld et al., 1989), or samples of very specific populations (e.g., primiparous women; see Boyce et al., 1991). Such sampling strategies can produce findings that are distorted relative to the general population (Mednick, 1978).

Personality traits related to substance abuse and antisocial behavior. Persons who abuse substances and engage in persistent antisocial behavior share personological features. Specifically, both types of disorder have been associated, at least cross-sectionally, with high levels of negative emotionality, as well as with low levels of constraint (Caspi et al., 1994; Krueger et al., 1994; Sher & Trull, 1994; Trull & Sher, 1994). As with anxiety and mood disorders, questions have been raised regarding the extent to which such personality differences represent more than the influence of clinical state (e.g., alcoholism) on responses to personality inventories (e.g., Nathan, 1988; Schuckit, Klein, Twitchell, & Smith, 1994; Vaillant & Milofsky, 1982). However, some studies have succeeded in linking various earlier personality or temperament characteristics to later alcohol abuse (e.g., Cloninger, Sigvardsson, & Bohman, 1988; Jones, 1968, 1971; Loper, Kammeier, & Hoffmann, 1973; McCord & McCord, 1962) and antisocial behavior (e.g., Caspi, Henry, McGee, Moffitt, & Silva, 1995; Farrington, Biron, & LeBlanc, 1982; Sigvardsson, Bohman, & Cloninger, 1987; Tremblay, Pihl, Vitaro, & Dobkin, 1994). As in the depression literature, some of these studies have limitations, such as a very small yield of diagnosable participants at follow-up (see Jones, 1968, 1971), the use of nontraditional and less-well-validated approaches to personality assessment (i.e., telephone interviews with subjects' teachers; see Cloninger et al., 1988; Sigvardsson et al., 1987), and the use of referral to courts/official agencies or treatment seeking as criteria for later disorder (vs. complete assessment of all initial research participants at follow-up; see Cloninger et al., 1988; Loper et al., 1973; McCord & McCord, 1962; Sigvardsson et al., 1987). In addition, some studies (e.g., Schuckit et al., 1994; Vaillant, 1980) have found mostly *nonsignificant* relations between earlier personality and later alcohol abuse. Substantial inconsistencies in patterns of significant versus nonsignificant personality associations have also been reported for antisocial

behavior (e.g., comparing the London and Montreal samples studied by Farrington et al., 1982).

Extending Knowledge of Prospective Links Between Personality and Mental Disorder

In addition to the specific limitations and inconsistencies reviewed above, extant longitudinal studies of the link between personality and common mental disorders have a number of shortcomings as a group. First, investigators have typically focused on single disorders as outcomes. Thus, it has not been possible to compare results *across* disorders within the same sample of persons—an endeavor that may yield novel insights about similarities and differences in the personological risk factors for different diagnoses. Along these same lines, different studies have used different diagnostic schemes and different personality instruments and assessment methods. Thus, apparent differences in the personality profiles of various disorders could be artifactual, that is, attributable to different assessment approaches, not to reliable personality differences between diagnoses.

To our knowledge, no prospective study of a representative, population-based sample included a systematic assessment of anxiety, depressive, substance abuse, and antisocial disorders—the four most prevalent varieties of mental disorder in the population (Kessler et al., 1994). The current investigation was designed to fill this gap. Personality and mental disorder were assessed in an unselected birth cohort of men and women who were enrolled in the Dunedin Multidisciplinary Health and Development Study (Silva, 1990). Personality was assessed in late adolescence (at age 18) using the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982). This instrument was designed to produce low correlations among its 10 primary scales, thereby promoting "fidelity" in measuring a lower level of the personality trait hierarchy (Tellegen & Waller, in press). Nevertheless, the MPQ also has substantial "bandwidth," as its primary scales cohere into the higher-order, integrative four-factor structure defined by Agency, Communion, Negative Emotionality, and Constraint (Tellegen & Waller, in press; Watson et al., 1994). In addition, the MPQ scales show substantial stability from late adolescence through early adulthood (McGue, Bacon, & Lykken, 1993), justifying the use of the MPQ in the current study as a measure of consistent individual differences in personality.

Mental disorder was assessed using the Diagnostic Interview Schedule III-R (DIS-III-R; Robins, Helzer, Cottler, & Goldring, 1989), a psychiatric interview used to diagnose discrete mental disorders as defined in the official psychiatric nomenclature (DSM-III-R; American Psychiatric Association, 1987). The DIS-III-R was administered both in late adolescence (when the cohort members were 18-years-old), and again in early adulthood (when they were 21-years-old). This design made it possible to control for current mental disorder (at the time of personality assessment) in predicting future mental disorder—a prospective research strategy. In addition, items from the DIS-III-R were used to create scales to measure psychiatric symptomatology continuously. Both discrete mental disorder diagnoses and symptom scales were analyzed in an effort to bridge the more categorical approach to assessment preferred in psychiatry (Klerman, 1978) and the more continuous approach to assessment preferred by most personality psychologists (Gangestad & Snyder, 1985).

This report extends our earlier research on links between personality and mental disorder. A previous report (Krueger, Caspi, Moffitt, Silva, & McGee, 1996) also documented relations between personality (MPQ) and mental disorder (DIS-III-R) data in the Dunedin Multidisciplinary Health and Development Study. However, the analyses in that report did not address the question of whether personality traits have predictive validity above and beyond that provided by an assessment of current disorder in the prediction of future disorder. Answering this question is essential in ensuring that relations between personality and mental disorder are not simply a function of mental disorder status when completing personality inventories.

METHOD

Research Participants

The research participants belonged to an unselected birth cohort that has been studied extensively since birth as part of the Dunedin Multidisciplinary Health and Development Study. The base sample for the longitudinal study consisted of 1,037 3-year-olds; the history of the study has been described in detail by Silva (1990). With regard to social origins, the children's fathers were representative of the social class distribution in the general population of similar age in New Zealand. With regard to racial distribution, the sample members are of predominantly European ancestry. Fewer than 7% identify themselves as Maori

or Polynesian, which matches the ethnic distribution of New Zealand's South Island.

The Dunedin sample has been reassessed with a diverse battery of psychological, medical, and sociological measures at ages 3, 5, 7, 9, 11, 13, 15, 18, and—most recently—21. The basic research procedure involves bringing each sample member into the research unit within 60 days of his or her birthday for a full day of individual data collection. The various research topics are presented in different private interview rooms as standardized modules by different trained examiners in counterbalanced order throughout the day (e.g., personality assessment, physical examination, diagnostic interview). Printed brochures about how to get help for mental disorders were made available in the waiting area and referral was available for sample members reporting suicidal intent.

Attrition. At age 21, mental health interviews (the source of the dependent variables in this study) were missing for 76 members (7.3%) of the original sample of 1,037; 17 persons had died since age 3 years, 9 persons were not located, 19 refused to participate, and 31 were interviewed by telephone, but were not asked questions about mental health. The 76 nonrespondents did not differ from the 961 respondents on family social class ($t[939] = 1.35$, $p = .18$), race ($\chi^2 [1] = .41$, $p = .52$), or sex ($\chi^2 [1] = 1.26$, $p = .26$). In addition, the age-18 MPQ scales (the predictor variables in this study) were not correlated with status as a respondent versus nonrespondent at age 21; the relevant point-biserial correlations ranged from $-.06$ to $+.05$, with only 1 of 10 correlations approaching significance at $p = .06$ (the number expected by chance alone). These results suggest that our findings are not compromised by attrition bias.

Measurement of Mental Disorder

The Diagnostic Interview Schedule (DIS; version III-R; Robins et al., 1989) was used to obtain diagnoses of mental disorder in the last 12 months at both ages 18 and 21. The DIS was developed by the National Institute of Mental Health for the Epidemiologic Catchment Area program (ECA; Regier et al., 1984). We modified the DIS to use only those items that were criteria for DSM-III-R (American Psychiatric Association, 1987) classifications, to omit lifetime prevalence questions, and to score items as $0 = no$, $1 = sometimes$, and $2 = yes,$ *definitely*. In identifying disorder, only scores of "2" were used to indicate a positive response (commensurate with a "5" in the original DIS).

Forty-four percent of the sample met the requisite DSM-III-R criteria for a 12-month disorder at age 18; at age 21, the corresponding figure was 40.4%. Although these estimates may seem high, they are consistent with prevalence data for this age group from the ECA studies (Robins & Regier, 1991), and from the National Comorbidity Survey (Kessler et al., 1994). An extensive report on

the mental health of the New Zealand sample at age 18 may be found in Feehan, McGee, Nada Raja, and Williams (1994); for a corresponding report at age 21, see Newman et al. (1996).

Mental disorder groups. For the current study, four groups of disordered study members were created at both age 18 and age 21: an *Affective Disorder* group, comprising study members meeting the criteria for Major Depressive Episode, Dysthymia, or both (at age 18, $n = 163$; at age 21, $n = 167$); an *Anxiety Disorder* group, comprising study members meeting the criteria for Generalized Anxiety Disorder, Panic Disorder, Agoraphobia, Social Phobia, Simple Phobia, Obsessive-Compulsive Disorder, or any combination of these disorders (at age 18, $n = 214$; at age 21, $n = 188$); a *Substance Dependence Disorder* group, consisting of study members meeting the criteria for Alcohol Dependence, Marijuana Dependence, or both (at age 18, $n = 166$; at age 21, $n = 149$). At age 18, a *Conduct Disorder* group was created, consisting of study members meeting the criteria for Conduct Disorder ($n = 68$). At age 21, an *Antisocial Personality Disorder* group was created to parallel the age 18 Conduct Disorder group ($n = 30$).[2]

Mental disorder scales. At both ages 18 and 21, scales were created to measure the four most prevalent forms of disturbance in the sample (affective, anxiety, substance dependence, and antisocial symptomatology) continuously. Each of these scales was created by summing the study member's scores on interview symptom items relevant to each domain; 2-month test–retest reliabilities for the scales at age 18 ranged from .78 to .85, and Cronbach alphas for the scales at age 21 ranged from .57 to .93.

Measurement of Personality

As part of the age-18 assessment, study members completed a modified version (Form NZ) of the Multidimensional Personality Questionnaire (Tellegen, 1982). The MPQ is a self-report personality instrument designed to assess a broad range of individual differences in affective and behavioral style. Form NZ is a 177-item version of the MPQ that yields 10 different scales (Tellegen, 1982, pp. 7–8; Tellegen's Absorption scale was not included in MPQ Form NZ). The 10 scales constituting the MPQ can be combined to measure four higher-order superfactors: Constraint, Negative Emotionality, Communion, and Agency (Tellegen & Waller, in press). The Constraint factor is associated with scales labeled

2. In the DSM-III-R, Antisocial Personality Disorder is conceived of as the correct diagnosis for persons showing severe antisocial behavior as adults (i.e., after age 18; American Psychiatric Association, 1987, p. 344), whereas Conduct Disorder is conceived of as the diagnosis corresponding to severe antisocial behavior in children and adolescents (i.e., before age 18; American Psychiatric Association, 1987, p. 55).

Traditionalism, Harm Avoidance, and Control. Individuals high on this factor tend to endorse social norms, act in a cautious and restrained manner, and avoid thrills. The Negative Emotionality factor is associated with scales labeled Aggression, Alienation, and Stress Reaction. Individuals high on this dimension have a low general threshold for the experience of negative emotions such as fear, anxiety, and anger, and tend to break down under stress (Tellegen et al., 1988). The Agency factor is associated with scales labeled Well Being, Social Potency, and Achievement and summarizes a *mastery orientation* in an individual, that is, a general tendency to seek pleasurable experiences by *engaging* the environment and conquering the challenges it may present. Communion is associated with scales labeled Well Being, Social Potency, and Social Closeness and summarizes an *interpersonal orientation* in an individual, that is, a general tendency to seek pleasurable experiences by *integrating* into relationships. Further information about these higher-order factors and their relations to other theorists' superfactors can be found in Tellegen (1985).

Data Analysis

As indicated earlier under "Measurement of Mental Disorder," both continuous mental disorder scales and discrete mental disorder diagnoses were analyzed, that is, a "dual analytic" approach was taken to these data. We reasoned that, whereas personality psychologists are more accustomed to continuous individual–difference variables, discrete mental disorders constitute the basic assessment paradigm in modern psychiatry (Klerman, 1978). Taking both analytic approaches to the same data provides a "sensitivity check" on the analyses. The personality predictors that are significant across the two different approaches to measuring mental disorders represent the most *robust* predictors of mental disorder. However, findings that differ across the two approaches are "sensitive" to the form of measurement, and are associated with less reliable predictors of mental disorder.

RESULTS

The analyses addressed two related questions about the link between personality in late adolescence and mental disorder in young adulthood. First, did 21-year-olds in each disorder group (affective, anxiety, substance dependence, and antisocial) have age-18 MPQ profiles that were different from those of their nondisordered peers, when the corresponding disorder at age 18 was controlled? Second, were similar results obtained when continuous mental disorder scales were used in place of discrete mental disorder groups?

Logistic Regression Analyses of Discrete Mental Disorder Groups

For each of the four disorder groups, separate logistic regression models were estimated to analyze the relationship between the continuous personality predictor variables at age 18, the dichotomous diagnostic group membership control variable at age 18, and the corresponding dichotomous diagnostic group membership outcome variable at age 21. In addition, to examine personality–disorder relationships at different levels of the personality trait hierarchy, separate models were estimated for the MPQ scales and the MPQ superfactors, within each type of disorder.

Affective disorder. Did young adults who met the DSM-III-R criteria for affective disorder at age 21 differ from young adults who did not meet these criteria in terms of their MPQ profiles at age 18, when affective disorder at age 18 was controlled? To answer this question, a logistic regression model was estimated in two steps. In the first step, affective disorder group membership at age 18 was entered as a predictor of affective disorder group membership at age 21. This model represented a significant improvement over a model containing only a constant, χ^2 (1) = 45.86, p = .001; affective disorder at age 18 was a significant predictor of affective disorder at age 21, B = 1.36, SE = .20, Odds Ratio (OR) = 3.89, p = .001.

Do the MPQ scales add any predictive validity to this equation? To answer this question, all 10 z-scored MPQ scales were added as predictors in step 2. This resulted in a model that represented a significant improvement over the model in step 1, χ^2 (10) = 41.89, p = .001; that is, the addition of the MPQ scales increased the predictive validity of the equation.

The parameter estimates for the MPQ scales can be seen in the top half of the left side of Table 1. Because the MPQ scales were entered in z-score form, the odds ratios for the MPQ scales can be interpreted as how much the odds of being in the affective disorder group at age 21 increased or decreased with each 1 SD increase in the MPQ scale score at age 18. The relevant coefficients in Table 1 show that less Well Being, less Aggression, and greater Stress Reactivity significantly increased the odds of being diagnosed with an affective disorder at age 21 (at $p < .05$).

This procedure was repeated, using the four MPQ superfactors in place of the 10 MPQ scales. As was the case for the 10 scales, the four

Table 1

Parameter Estimates from Logistic and OLS Regression Analyses Predicting Affective Disorder

MPQ Scale/Superfactor	Logistic Regression Estimates				OLS Regression Estimates		
	B	*SE*	*OR*	*p*	β	*t*	*p*
Well being	**−.23**	**.10**	**.80**	**.02**	**−.08**	**−2.31**	**.02**
Social potency	.01	.10	1.01	.91	−.06	−1.75	.08
Achievement	.14	.10	1.15	.16	.03	.86	.39
Social closeness	.06	.11	1.06	.61	.07	1.76	.08
Stress reaction	**.42**	**.11**	**1.52**	**.00**	**.11**	**2.85**	**.00**
Alienation	.15	.11	1.17	.15	**.09**	**2.50**	**.01**
Aggression	**−.39**	**.12**	**.68**	**.00**	−.04	−1.00	.32
Control	−.13	.11	.88	.25	−.01	−.14	.89
Harm avoidance	−.20	.11	.82	.07	**−.09**	**−2.35**	**.02**
Traditionalism	.02	.11	1.02	.87	−.01	−.26	.80
Agency	.00	.11	1.00	.98	−.03	−.90	.37
Communion	−.14	.11	.87	.21	−.03	−.86	.39
Negative emotionality	**.24**	**.10**	**1.27**	**.02**	**.12**	**3.17**	**.00**
Constraint	.02	.10	1.02	.81	.00	−.04	.96

Note. *B* = logistic regression coefficient. *SE* = standard error of the logistic regression coefficient. *OR* = odds ratio. OLS = ordinary least squares. Significant coefficients (at *p* < .05) are listed in bold type.

superfactors increased the predictive validity of the logistic regression equation at step 2 (i.e., after controlling for affective disorder at age 18 in step 1), χ^2 (4) = 10.26, p = .036. The parameter estimates for the MPQ superfactors can be seen in the bottom half of the left side of Table 1. These coefficients show that greater Negative Emotionality increased the odds of being diagnosed with an affective disorder at age 21.

Anxiety disorder.   The analytic procedures for anxiety disorder, substance dependence, and antisocial disorder followed the same steps as for affective disorder. In predicting anxiety disorder group membership at age 21, the addition of anxiety disorder group membership at age 18 represented a significant improvement over a model containing only a constant, χ^2 (1) = 102.45, p = .001; anxiety disorder at age 18 was a significant predictor of anxiety disorder at age 21, B = 1.85, SE = .18, OR = 6.33, p = .001.

The addition of all 10 z-scored MPQ scales in step 2 represented a significant improvement over the model in step 1, χ^2 (10) = 39.65, p = .001. The parameter estimates for the MPQ scales can be seen on the left side of the top half of Table 2. These coefficients show that greater Stress Reactivity and greater Alienation increased the odds of being diagnosed with an anxiety disorder at age 21.

As was the case for the 10 scales, the four superfactors increased the predictive validity of the logistic regression equation at step 2, χ^2 (4) = 28.38, p = .001. The parameter estimates for the MPQ superfactors can be seen on the left side of the bottom half of Table 2. These coefficients show that greater Negative Emotionality and greater Constraint increased the odds of being diagnosed with an anxiety disorder at age 21.

Substance dependence disorder.   The substance dependence model at step 1 represented a significant improvement over a model containing only a constant, χ^2 (1) = 113.88, p = .001; substance dependence at age 18 was a significant predictor of substance dependence at age 21, B = 2.20, SE = .21, OR = 9.00, p = .001. The addition of the 10 z-scored MPQ scales at step 2 resulted in a model that represented a significant improvement over the model in step 1, χ^2 (10) = 57.00, p = .001. The parameter estimates for the MPQ scales can be seen on the left side of the top half of Table 3. These coefficients show that greater Aggression and less Traditionalism increased the odds of being diagnosed with substance dependence at age 21.

Table 2
Parameter Estimates from Logistic and OLS Regression Analyses Predicting Anxiety Disorder

MPQ Scale/Superfactor	Logistic Regression Estimates				OLS Regression Estimates		
	B	*SE*	*OR*	*p*	β	*t*	*p*
Well being	−.07	.10	.93	.48	−.07	−1.81	.07
Social potency	.08	.10	1.09	.42	.06	1.59	.11
Achievement	−.08	.10	.92	.44	.04	1.21	.23
Social closeness	−.09	.11	.92	.41	.01	.31	.75
Stress reaction	**.36**	**.11**	**1.43**	**.00**	**.21**	**5.10**	**.00**
Alienation	**.32**	**.11**	**1.38**	**.00**	.05	1.22	.22
Aggression	−.14	.12	.87	.25	−.02	−.52	.60
Control	.14	.11	1.15	.22	.02	.62	.53
Harm avoidance	.04	.11	1.04	.71	**−.08**	**−2.00**	**.05**
Traditionalism	.07	.11	1.07	.52	.01	.40	.69
Agency	−.07	.11	.93	.54	.04	1.08	.28
Communion	−.07	.11	.93	.50	−.03	−.68	.50
Negative emotionality	**.49**	**.10**	**1.63**	**.00**	**.18**	**4.53**	**.00**
Constraint	**.27**	**.10**	**1.31**	**.01**	.02	.51	.61

Note. B = logistic regression coefficient. SE = standard error of the logistic regression coefficient. OR = odds ratio. OLS = ordinary least squares. Significant coefficients (at $p < .05$) are listed in bold type.

As was the case for the 10 scales, the four superfactors increased the predictive validity of the logistic regression equation at step 2, χ^2 (4) = 38.08, p = .001. The parameter estimates for the MPQ superfactors can be seen on the left side of the bottom half of Table 3. These coefficients show that greater Negative Emotionality and less Constraint increased the odds of being diagnosed with substance dependence at age 21.

Antisocial disorders.   The antisocial disorders model at step 1 represented a significant improvement over a model containing only a constant, χ^2 (1) = 38.41, p = .001; conduct disorder at age 18 was a significant predictor of antisocial personality disorder at age 21, B = 2.73, SE = .40, OR = 15.37, p = .001. The addition of the 10 z-scored MPQ scales at step 2 resulted in a model that represented a significant improvement over the model in step 1, χ^2 (10) = 45.89, p = .001. The parameter estimates for the MPQ scales can be seen on the left side of the top half of Table 4. These coefficients show that greater Alienation and greater Aggression increased the odds of being diagnosed with antisocial personality disorder at age 21.

As was the case for the 10 scales, the four superfactors increased the predictive validity of the logistic regression equation at step 2, χ^2 (4) = 27.55, p = .001. The parameter estimates for the MPQ superfactors can be seen on the left side of the bottom half of Table 4. These coefficients show that greater Negative Emotionality and less Constraint increased the odds of being diagnosed with antisocial personality disorder at age 21.

Ordinary-Least-Squares (OLS) Regression
Analyses of Continuous Mental Disorder Scales

The logistic regression analyses showed that the MPQ scales and superfactors were significantly predictive of membership in each disorder group at age 21, controlling for membership in the corresponding disorder group at age 18. Were similar results obtained when disorder *scales* were used in the place of disorder *groups*? To answer this question, for each of the four disorder scales, separate OLS regression models were estimated to analyze the relationship between the continuous MPQ predictor variables at age 18, the continuous disorder scale control variable at age 18, and the corresponding continuous disorder scale outcome variable at age 21. Personality–disorder relationships at different

Table 3
Parameter Estimates from Logistic and OLS Regression Analyses Predicting Substance Dependence

MPQ Scale/Superfactor	Logistic Regression Estimates				OLS Regression Estimates		
	B	*SE*	*OR*	*p*	β	*t*	*p*
Well being	.16	.12	1.17	.19	.00	.13	.90
Social potency	−.20	.12	.82	.10	−.03	−1.17	.24
Achievement	−.13	.12	.88	.28	.01	.31	.75
Social closeness	.00	.12	1.00	.99	.03	.84	.40
Stress reaction	.10	.12	1.10	.42	−.01	−.30	.76
Alienation	.15	.12	1.16	.22	.03	1.08	.28
Aggression	**.60**	**.12**	**1.82**	**.00**	**.16**	**4.87**	**.00**
Control	−.05	.13	.95	.72	−.03	−.94	.35
Harm avoidance	−.11	.12	.90	.40	−.05	−1.47	.14
Traditionalism	**−.24**	**.12**	**.79**	**.04**	−.05	−1.52	.13
Agency	−.06	.12	.94	.62	.01	.35	.73
Communion	.04	.12	1.04	.73	.01	.33	.74
Negative emotionality	**.46**	**.12**	**1.58**	**.00**	**.09**	**3.02**	**.00**
Constraint	**−.42**	**.11**	**.66**	**.00**	**−.12**	**−4.18**	**.00**

Note. B = logistic regression coefficient. SE = standard error of the logistic regression coefficient. OR = odds ratio. OLS = ordinary least squares. Significant coefficients (at $p < .05$) are listed in bold type.

Table 4

Parameter Estimates from Logistic and OLS Regression Analyses Predicting Antisocial Personality Disorder

MPQ Scale/Superfactor	Logistic Regression Estimates				OLS Regression Estimates		
	B	*SE*	*OR*	*p*	β	*t*	*p*
Well being	−.27	.23	.76	.24	−.04	−1.24	.22
Social potency	−.16	.25	.85	.52	.00	−.03	.98
Achievement	.27	.25	1.31	.28	.01	.26	.79
Social closeness	−.03	.23	.97	.91	−.02	−.65	.52
Stress reaction	−.33	.28	.72	.24	.01	.39	.69
Alienation	**.76**	**.23**	**2.14**	**.00**	**.14**	**4.27**	**.00**
Aggression	**.91**	**.27**	**2.48**	**.00**	**.20**	**5.58**	**.00**
Control	.09	.26	1.10	.73	−.04	−1.22	.22
Harm avoidance	−.26	.27	.77	.33	−.02	−.75	.45
Traditionalism	−.42	.25	.66	.09	**−.12**	**−3.93**	**.00**
Agency	.31	.26	1.36	.23	.02	.54	.59
Communion	−.34	.23	.72	.15	−.04	−1.31	.19
Negative emotionality	**.78**	**.24**	**2.19**	**.00**	**.21**	**6.58**	**.00**
Constraint	**−.54**	**.22**	**.58**	**.02**	**−.18**	**−5.72**	**.00**

Note. B = logistic regression coefficient. *SE* = standard error of the logistic regression coefficient. *OR* = odds ratio. OLS = ordinary least squares. Significant coefficients (at *p* < .05) are listed in bold type.

levels of the personality trait hierarchy were again examined by estimating separate models for the MPQ scales and MPQ superfactors, within each type of disorder.

Affective disorder. Were scores on the affective disorder scale at age 21 predictable from the age-18 MPQ scales, when affective disorder scale scores at age 18 were controlled? To answer this question, an OLS regression model was estimated in two steps. In the first step, the affective disorder scale scores at age 18 were entered as a predictor of affective disorder scale scores at age 21. Affective disorder scale scores at age 18 significantly predicted affective disorder scale scores at age 21, $R^2 = .12$, $p = .001$.

Do the MPQ scales add any predictive validity to this equation? To answer this question, all 10 z-scored MPQ scales were added as predictors in step 2. This resulted in a model that represented a significant improvement over the model in step 1, change in $R^2 = .04$, $p = .001$; that is, the addition of the MPQ scales increased the predictive validity of the equation. The parameter estimates for the MPQ scales can be seen on the right side of the top half of Table 1. These coefficients show that less Well Being, less Harm Avoidance, greater Stress Reactivity, and greater Alienation were predictive of higher affective disorder scale scores at age 21.

This procedure was repeated, using the four MPQ superfactors in place of the 10 MPQ scales. As was the case for the 10 scales, the four superfactors increased the predictive validity of the regression equation at step 2 (i.e., after controlling for affective disorder scale scores at age 18 in step 1), change in $R^2 = .02$, $p = .003$. The parameter estimates for the MPQ superfactors can be seen on the right side of the bottom half of Table 1. These coefficients show that greater Negative Emotionality was predictive of higher affective disorder scale scores at age 21.

Anxiety disorder. The analytic procedures for anxiety disorder, substance dependence, and antisocial disorder followed the same steps as for affective disorder. Anxiety disorder scale scores at age 18 significantly predicted anxiety disorder scale scores at age 21, $R^2 = .07$, $p = .001$. The addition of the 10 z-scored MPQ scales in step 2 improved the model, change in $R^2 = .05$, $p = .001$. The parameter estimates for the MPQ scales can be seen on the right side of the top half of Table 2. These coefficients

show that less Harm Avoidance and greater Stress Reactivity were predictive of higher anxiety disorder scale scores at age 21.

The four superfactors also increased the predictive validity of the regression equation at step 2 , change in $R^2 = .03$, $p = .001$. The parameter estimates for the MPQ superfactors can be seen on the right side of the bottom half of Table 2. These coefficients show that greater Negative Emotionality was predictive of higher anxiety disorder scale scores at age 21.

Substance dependence disorder.   Substance dependence scale scores at age 18 significantly predicted substance dependence scale scores at age 21, $R^2 = .37$, $p = .001$. The addition of the 10 z-scored MPQ scales in step 2 improved the model, change in $R^2 = .04$, $p = .001$. The parameter estimates for the MPQ scales can be seen on the right side of the top half of Table 3. These coefficients show that greater Aggression was predictive of higher substance dependence scale scores at age 21.

The four superfactors also increased the predictive validity of the regression equation at step 2, change in $R^2 = .02$, $p = .001$. The parameter estimates for the MPQ superfactors can be seen on the right side of the bottom half of Table 3. These coefficients show that greater Negative Emotionality and less Constraint were predictive of higher substance dependence scale scores at age 21.

Antisocial disorders.   Conduct disorder scale scores at age 18 significantly predicted antisocial personality disorder scale scores at age 21, $R^2 = .24$, $p = .001$. The addition of the 10 z-scored MPQ scales in step 2 improved the model, change in $R^2 = .10$, $p = .001$. The parameter estimates for the MPQ scales can be seen on the right side of the top half of Table 4. These coefficients show that greater Alienation, greater Aggression, and less Traditionalism were predictive of higher antisocial personality disorder scale scores at age 21.

The four superfactors also increased the predictive validity of the regression equation at step 2, change in $R^2 = .08$, $p = .001$. The parameter estimates for the MPQ superfactors can be seen on the right side of the bottom half of Table 4. These coefficients show that greater Negative Emotionality and less Constraint were predictive of higher antisocial personality disorder scale scores at age 21.

DISCUSSION

The current study examined relations between personality traits in late adolescence and mental disorders in young adulthood in a birth cohort. Personality scales and superfactors consistently added predictive validity above and beyond an assessment of current mental disorder in the prediction of future mental disorder. Stated differently, *personality traits were able to predict which adolescents would experience mental disorder as they entered young adulthood, regardless of their level of mental disorder in late adolescence.* These findings underscore the key role individual differences in personality play in determining adjustment during a life transition (cf. Klohnen, Vandewater, & Young, 1996). Although the personality effect sizes were not large, it should be borne in mind that these results correspond to the predictive utility of personality after taking into account the substantial stability of mental disorder across time (Krueger, Caspi, Moffitt, & Silva, 1998).

A number of consistent findings emerged from the analyses. First, high negative emotionality was predictive of each of the four disorders, regardless of whether these disorders were modeled as discrete (in the logistic regression analyses) or as continuous (in the OLS regression analyses). Second, low constraint was uniquely predictive of substance dependence and antisocial personality disorder, regardless of whether these disorders were modeled as discrete or continuous. These findings thus replicate and extend the existing cross-sectional literature on personality and common mental disorders (reviewed most recently by Clark et al., 1994; Sher & Trull, 1994). That is, as has been found in the cross-sectional literature, high negative emotionality was predictive of affective, anxiety, substance dependence, and antisocial disorders, and low constraint was predictive of substance dependence and antisocial disorders. To our knowledge, ours was the first prospective longitudinal study of all four common varieties of mental disorder in the same sample, as well as the first prospective study of personality and the anxiety disorders.

Although the findings were generally robust across discrete versus continuous conceptualizations of mental disorder at the superfactor level, the findings were less consistent at the personality scale level. Across the four disorders, there were 13 instances in which a specific personality scale was predictive of a specific mental disorder group or scale variable (at $p < .05$). In 6 of these 13 cases, this predictive validity was seen for

both the group variable and the scale variable; in the remaining 7 cases, a relationship present for the group or scale variable was not present for the other variable.

These inconsistencies represent findings that were "sensitive" to the way mental disorder was measured, that is, as a discrete versus as a continuous variable. Because these more inconsistent, scale-level findings were not robust across different measurement paradigms, the remainder of the discussion will focus on the superfactor findings, which were more robust across measurement paradigms. These more robust superfactor findings may be further understood by considering their implications for the development and treatment of mental disorders in young adulthood.

Origins of Stable Personality Traits: Implications for the Development of Mental Disorders

Childhood temperament may provide the foundation for the development of adult personality (Rothbart & Ahadi, 1994). Nevertheless, the paths leading from childhood temperament to adult personality are likely to be multiple and varied. For example, temperamental differences both modulate other people's responses to the child and also influence the child's preferences for certain situations over others (Rutter & Rutter, 1993).

Although developmental paths may vary, these observations suggest a general framework for understanding links between personality and mental disorder: early emerging temperamental differences may influence personality development, and personality acts as a persistent, relatively stable risk factor for mental disorder during life transitions. Deflection of personality development may, therefore, be a necessary component of interventions aspiring to promote lasting improvements in adjustment.

Structural Models of Personality Traits: Implications for the Treatment of Mental Disorders

Many putatively separate constructs that have been linked to mental disorder may be usefully united under the rubrics provided by broad personality factors, such as those studied here (cf. Watson et al., 1994). For example, depression has been linked to a dysfunctional attributional style, a hostile attributional style, hopelessness, negative

self-perceptions, and maladaptive coping patterns (Compas, Hinden, & Gerhardt, 1995; Quiggle, Garber, Panak, & Dodge, 1992). Each of these variables may be conceived of as a facet of negative emotionality (Watson et al., 1994), suggesting that treatments that focus on any single "cognitive style variable" or "self-perceptual bias" may obscure the breadth of the personological factors that increase the risk of developing a number of common mental disorders. In addition, the inconsistencies observed in the current study at the personality scale level suggest that a focus on a higher level of the personality trait hierarchy may be useful in resolving controversies about the role of personality in specific mental disorders. For example, some of the controversy surrounding the role of personality in substance abuse (cf. Nathan, 1988; Sutker & Allain, 1988; Tarter, 1988) may be due to different investigators assessing personality traits at different levels of the personality trait hierarchy.

Summary and Future Directions

The prospective links between broad personality factors and common mental disorders observed in the current study suggest the possibility that common mental disorders in young adulthood may be usefully understood in personological terms. The current official diagnostic system, DSM-IV (American Psychiatric Association, 1994) assigns personality functioning to an axis independent of the axis on which clinical disorders are to be recorded. The research reported here suggests that personality in late adolescence and the probability of experiencing a mental disorder in young adulthood are not distinct. Although a comprehensive diagnostic system for mental disorders organized by personality variation remains well in the future, the current research suggests that the potential of such a system deserves careful consideration and research attention.

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