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# Health Status and the Five-factor Personality Traits in a Nationally Representative Sample

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## Abstract

The authors' objective was to determine the association between the 'big-five' personality traits and mental and physical disorders among adults in the United States. The Midlife Development in the United States Survey, a nationally representative sample of 3032 adults ages 25–74, was used to determine the association between the five-factor traits of personality and common mental and physical disorders. Findings are consistent with and extend previous results showing that conscientiousness is associated with significantly reduced likelihood of a wide range of mental and physical disorders among adults in the general population, and inversely that neuroticism is associated with increased rates. Among adults with physical illnesses, associations were found between personality and likelihood of physical limitations, especially conscientiousness. These findings provide a framework upon which research on complex causal processes may proceed. Thus future research attention might profitably be directed to conscientiousness-relevant processes, such as adherence to health and treatment recommendations and internalization of healthy societal norms for sensible health-related behavior.

## Keywords

- *conscientiousness*
- *epidemiology*
- *health status*
- *personality*
- *physical illness*

RESEARCHERS in health psychology have traditionally used a wide but unsystematic range of personality concepts in efforts to link individual differences and health. These include nervousness, anger, hostility, aggression, Type A, repression, sensation-seeking, anxiety, cynicism, locus of control, hardiness, vital exhaustion, ambition, delinquency, trust and many others. Recent research in personality theory, however, has shown the value of a five-factor model, which involves neuroticism, extraversion, conscientiousness, agreeableness and openness to experience. Although there is some disagreement about the details, there is substantial agreement that it would be useful to use some variant of the five-factor model in studying individual differences and health (Smith & Williams, 1992). For example, conscientiousness has been previously studied under a variety of classifications and rubrics that now might be united (Costa & McCrae, 1998; Goldberg, 1999).

One of the most surprising findings to emerge from health psychology research in the past decade is the apparent importance of the personality dimension of conscientiousness to health. At the beginning of the 1990s, most attention in the area of personality and health was still focused around anger and hostility (Smith & Pope, 1990), which was an outgrowth of pioneering research on Type A behavior. In the decade that followed, however, conscientiousness emerged as a key factor. Friedman and colleagues showed that conscientiousness in childhood was a good predictor of life-span mortality risk (Friedman et al., 1993). Others then confirmed that conscientiousness may be a key personality predictor of health (Christensen et al., 2002; Roberts & Bogg, in press).

Research on personality and health is ultimately important because of the information it provides about likely causal mechanisms linking psychology and health. Although many causal and reciprocal relations have been documented, some associations draw attention to certain temperamental mechanisms, coping mechanisms or behavioral mechanisms.

Research in personality and health has also now begun turning away from an artificial separation of mental and physical illness. It is increasingly clear that traditionally 'mental' disorders such as depression, anxiety and substance abuse should often be conceptually

linked to traditionally 'physical' disorders such as diabetes, skin disorders and hypertension, as the complex ties among physiology, psychology, behavior, environment and health are better appreciated. For example, multifaceted ties have been demonstrated among personality, stress, hormones, body fat and eating (Bradley, Pierce, Hendrieckx, Riazi, & Barendse, 2001; Epel, Spanakos, Kasl-Godley, & Brownell, 1996; Goldston, Kovacs, Obrosky, & Iyengar, 1995). The present study therefore includes both types of illness.

Once illness occurs, personality is often associated with limitations on physical functioning, although here too there is limited information on national samples. There are various potential pathways affecting adaptation over time (Graziano & Ward, 1992). These adaptations may shed light on the broader causal links among personality and disease, and so we examined limits on physical functioning.

In sum, the present study employed a nationally representative sample to determine the association between the big-five personality traits, including conscientiousness, extraversion, openness to experience, agreeableness and neuroticism, and common mental and physical disorders.

## Materials and methods

### Sample

The Midlife Development in the United States (MIDUS) survey is a nationally representative survey of 3032 persons aged 25–74 years in the non-institutionalized civilian population of the 48 coterminous United States (Brim et al., 1996; Kessler, DuPont, Berglund, & Wittchen, 1999). The survey was carried out by the John D. and Catherine T. MacArthur Foundation Network on Successful Midlife Development between January 1995 and January 1996. All respondents completed a 30-minute telephone interview (70.0 percent response rate) and filled out 2 mailed questionnaires estimated to take a total of about 90 minutes to complete (86.8 percent conditional response rate in the subsample of telephone respondents). The overall response rate was 60.8 percent. The participants were grouped by those who were and were not married, white and minority racial status, and educational attainment (dichotomized into

those who had and had not completed high school). More details on the MIDUS survey design, field procedures and representativeness are available elsewhere (Brim et al., 1996; Kessler et al., 1999).

### *Diagnostic assessment*

All measures were independently validated in previous research. The MIDUS survey diagnoses were based on the Composite International Diagnostic Interview (CIDI) Short Form scales, a series of diagnostic-specific scales that were developed from item-level analyses of the CIDI questions in the National Comorbidity Survey (Kessler et al., 1994). The CIDI Short Form scales were designed to reproduce the full Composite International Diagnoses as exactly as possible with only a small subset of the original questions. Comparison of the CIDI Short Form classifications of major depression with the full CIDI (Wittchen, 1994) classifications in the National Comorbidity Survey yielded a sensitivity of 89.6 percent, a specificity of 93.9 percent and an overall agreement of 93.2 percent (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). Major depression, panic attacks, generalized anxiety disorder (GAD) and alcohol and drug abuse and dependence were included in the current study.

Physical illnesses were assessed by self-report of past 12-month prevalence including the following disorders: asthma/chronic bronchitis/emphysema, tuberculosis, other lung disease, persistent skin problems, sciatica/lumbago (lower back pain), urinary/bladder problems, high blood pressure, diabetes/high blood sugar, stroke, ulcer, bone/joint problems and hernia/rupture. While the data are limited in that there were no objective physician diagnoses or accompanying physical exams, previous epidemiologic studies have documented adequate reliability and validity for the self-report physical illnesses included above (Idler, Hudson, & Leventhal, 1999). Nevertheless, some of the conditions are likely subject to self-report biases, and so overall patterns were the focus of the present study.

### *Personality factors*

Assessment of personality traits in the Midlife Development Inventory Personality Scales (MIDI), based on the 'big-five' factor model, was

developed based on the results of a pilot study, which was conducted in 1994 with a probability sample of 1000 men and women, age 30–70 (574 valid cases were usable for item analysis). Items with the highest item to total correlations and factor loadings were selected for MIDI (Goldberg, 1992; John, 1990; Lachman & Weaver, 1997; Trapnell & Wiggins, 1990). Forward regressions were also run to determine the smallest number of items needed to account for over 90 percent of the total scale variance. Scales included extraversion ( $\alpha = 0.78$ ), openness to experience ( $\alpha = 0.77$ ), conscientiousness ( $\alpha = 0.57$ ), agreeableness ( $\alpha = 0.80$ ) and neuroticism ( $\alpha = 0.74$ ). Responses were on a Likert-type scale from one to four, asking respondents to describe how much of the time the word described them. Items of the measure of conscientiousness included, 'organized', 'responsible', 'careless (not)' and 'hardworking'. The scale asked 'all', 'most', 'some' and 'a little'. For each trait, the score for each case was computed by finding the mean of the relevant personality items for cases that had valid values for at least half of the items for that trait. The alphas are based on the MIDUS national sample.

### *Limitations on physical functioning*

Within the MIDUS survey, a series of questions was asked of each participant about the amount that the individual was limited in specific physical activities. Respondents were asked separate questions about whether respondents had experienced limitations in the following areas of functioning within the past 12 months: lifting or carrying groceries; bathing or dressing yourself; climbing stairs; bending, kneeling, stooping; walking more than one mile; walking several blocks; and walking one block. Respondents were also asked whether they experienced limitations in moderate and/or vigorous physical activity. Respondents could reply by indicating one out of four items on a Likert scale for 1 = never; 2 = occasionally; 3 = sometimes; 4 = often. These items have been collapsed into one measure of limitation of physical functioning for use in these analyses.

### *Analytic strategy*

Because illnesses were classified either as present or absent, one-way ANOVA was deemed a

simple yet powerful strategy used to determine the difference in conscientiousness between those with and without each mental and physical illness. These analyses were then run for each of the four remaining big-five personality factors (i.e. extraversion, agreeableness, openness to experience and neuroticism). Because overall patterns rather than individual disease comparisons were of primary interest, the  $p$ -values were not adjusted for multiple tests; instead, a rational examination of patterns was undertaken—with a focus on personality dimensions where more than three-fourths of the comparisons were reliably different in the expected direction.

Next, linear regression analyses were used to determine the association between conscientiousness and level of limitations on physical activity among adults who reported at least one physical illness (current/past 12-months) (Table 6), adjusted for differences in age, gender, race, marital status, education and mental disorders. Again, these analyses were then repeated for each of the big-five personality factors.

## Results

### *Personality and socio-demographic characteristics*

Females had significantly higher levels of conscientiousness than males (3.43 (0.46) vs 3.36 (0.46),  $F = 14.8$ , d.f. (1, 2619),  $p < 0.0001$ ). There was a significant association between conscientiousness and level of education, with higher education being associated with higher level of conscientiousness (3.41 (0.46) vs 3.31 (0.48),  $F = 12.2$ , d.f. (1, 2619),  $p < 0.0001$ ). There was no significant association between conscientiousness and age, race or marital status (data not shown).

Females had significantly higher levels of extraversion (3.6 (0.4) vs 3.4 (0.5),  $F = 2.1$ , d.f. (1, 2619),  $p = 0.01$ ), but there were no other sociodemographic differences associated with extraversion. Openness to experience was significantly higher among married adults, compared with those who are not married (3.1 (0.5) vs 3.0 (0.5),  $F = 16.2$ , d.f. (1, 2619),  $p < 0.0001$ ), males (3.1 (0.5) vs 3.0 (0.5),  $F = 22.7$ , d.f. (1, 2619),  $p < 0.0001$ ) and those who had more formal education (3.1 (0.5) vs 2.8 (0.5),  $F = 44.4$ ,

d.f. (1, 2619),  $p < 0.0001$ ). Females had significantly higher levels of agreeableness (3.36 (0.5) vs 3.6 (0.4),  $F = 175.5$ , d.f. (1, 2619),  $p < 0.0001$ ) as did those with higher education (3.48 (0.48) vs 3.54 (0.46),  $F = 4.5$ , d.f. (1, 2619),  $p = 0.034$ ).

Females also had significantly higher levels of neuroticism (2.35 (0.7) vs 2.15 (0.6),  $F = 59.8$ , d.f. (1, 2619),  $p < 0.0001$ ), and neuroticism was associated with being younger ( $p < 0.0001$ ), but there were no other sociodemographic characteristics associated with neuroticism.

### *Personality and illness among adults in the community*

**Mental disorders** The level of conscientiousness among those with each mental disorder was significantly lower, compared to those without mental disorders (Table 1). Specifically, those with major depression, panic attacks, GAD and alcohol/substance use disorders had reliably lower levels of conscientiousness compared to those without these disorders. A similar pattern was evident for extraversion and mental health (Table 2), with lower means among those with major depression, panic attacks and GAD compared to those without each of these disorders. There was no significant association between openness to experience and mental disorders (Table 3), and agreeableness had a lower mean among those with alcohol/substance use disorders but was unrelated to other mental disorders (Table 4). Neuroticism (Table 5) was significantly higher among those with each mental disorder, compared to those without.

**Physical illness** With the exception of asthma/bronchitis, and other lung problems, each physical illness queried was associated with a significantly lower level of conscientiousness, compared to those without each physical disorder. Extraversion showed no clear pattern, although there was evidence for significantly lower extraversion among respondents with high blood pressure, sciatica, stroke and tuberculosis, compared to those without. Similarly, openness to experience showed no clear pattern, although mean scores on openness to experience were lower among those with stroke, hernia, tuberculosis and bone/joint problems compared to those without. Agreeableness likewise showed no clear pattern, although it was higher among those with diabetes and high

Table 1. Level of conscientiousness among adults with and without common mental and physical disorders in the community

Past 12 months	No disorder	Disorder present	r	p-value
Major depression	3.41 (0.45) (n = 2592)	3.31 (0.48) (n = 440)	0.080	p < 0.0001
Panic attack	3.41 (0.46) (n = 2844)	3.31 (0.47) (n = 188)	0.049	p = 0.012
Generalized anxiety disorder	3.40 (0.46) (n = 2952)	3.27 (0.49) (n = 80)	0.047	p = 0.015
Alcohol/substance use disorder	3.41 (0.45) (n = 2564)	3.03 (0.65) (n = 74)	0.137	p < 0.0001
Regular cigarette smoking	3.33 (0.50) (n = 2345)	3.38 (0.50) (n = 685)	0.089	p < 0.0001
Diabetes	3.41 (0.46) (n = 2492)	3.25 (0.43) (n = 145)	0.078	p < 0.001
High blood pressure	3.41 (0.46) (n = 2150)	3.35 (0.45) (n = 484)	0.048	p = 0.015
Persistent skin problems	3.41 (0.45) (n = 2353)	3.32 (0.52) (n = 278)	0.063	p = 0.001
Sciatica/lumbago	3.41 (0.45) (n = 2042)	3.36 (0.48) (n = 534)	0.041	p = 0.036
Urinary/bladder problems	3.41 (0.45) (n = 2286)	3.35 (0.48) (n = 339)	0.042	p = 0.03
Stroke	3.40 (0.45) (n = 2610)	3.19 (0.54) (n = 24)	0.043	p = 0.028
Ulcer	3.40 (0.45) (n = 2521)	3.32 (0.55) (n = 114)	0.037	p = 0.057
Hernia	3.41 (0.46) (n = 2541)	3.22 (0.47) (n = 92)	0.074	p < 0.0001
Tuberculosis	3.40 (0.45) (n = 2625)	2.66 (0.13) (n = 7)	0.084	p < 0.0001
Bone/joint problems	3.41 (0.46) (n = 2139)	3.35 (0.47) (n = 491)	0.050	p = 0.011
Asthma/bronchitis	3.40 (0.46) (n = 2287)	3.40 (0.42) (n = 343)	0.000	NS
Other lung problems	3.40 (0.46) (n = 2534)	3.33 (0.44) (n = 93)	0.028	NS

blood pressure (and marginally with bone/joint problems and asthma/respiratory disease) but lower among those with tuberculosis. Neuroticism, like conscientiousness, showed a clear pattern. Neuroticism was higher among respondents with skin problems, sciatica, urinary problems, asthma/respiratory disease, ulcer and other lung problems, compared to those without.

### *Personality and physical limitations among adults with physical illness*

As predicted, among adults with a physical illness, higher conscientiousness was associated

with a decreased frequency of physical limitations (Table 6, columns 17–19). Among those with self-reported physical illnesses, limitations in physical exertion were fewer among those with high conscientiousness compared to those with low conscientiousness. This held true even after adjusting for age, gender, race, marital status, education and mental disorders.

In terms of the other personality traits, effects were much weaker. Higher agreeableness was associated with a decreased frequency of limitations on bathing, dressing and walking short distances (among those with self-reported physical illnesses). Higher openness and extraversion

Table 2. Level of extraversion among adults with and without common mental and physical disorders in the community

<i>Past 12 months</i>	<i>No disorder</i>	<i>Disorder present</i>	<i>r</i>	<i>p-value</i>
Major depression	3.21 (0.56) ( <i>n</i> = 2592)	3.08 (0.57)	0.082	<i>p</i> < 0.0001
Panic attack	3.20 (0.56) ( <i>n</i> = 2844)	3.10 (0.57)	0.042	<i>p</i> = 0.03
Generalized anxiety disorder	3.20 (0.56) ( <i>n</i> = 2952)	3.02 (0.61)	0.051	<i>p</i> = 0.009
Alcohol/substance use disorder	3.20 (0.56) ( <i>n</i> = 2564)	3.10 (0.67)	0.029	<i>p</i> = 0.1
Regular cigarette smoking	3.19 (0.6) ( <i>n</i> = 2345)	3.20 (0.60)	0.005	NS
Diabetes	3.20 (0.57) ( <i>n</i> = 2492)	3.16 (0.55)	0.014	NS
High blood pressure	3.21 (0.57) ( <i>n</i> = 2150)	3.13 (0.53)	0.056	<i>p</i> = 0.004
Persistent skin problems	3.20 (0.56) ( <i>n</i> = 2353)	3.12 (0.60)	0.048	<i>p</i> = 0.015
Sciatica/lumbago	3.21 (0.56) ( <i>n</i> = 2042)	3.13 (0.57)	0.055	<i>p</i> = 0.005
Urinary/bladder problems	3.20 (0.56) ( <i>n</i> = 2286)	3.14 (0.59)	0.034	<i>p</i> = 0.087
Stroke	3.20 (0.56) ( <i>n</i> = 2610)	2.87 (0.58)	0.055	<i>p</i> = 0.005
Ulcer	3.20 (0.56) ( <i>n</i> = 2521)	3.17 (0.64) ( <i>n</i> = 114)	0.011	NS
Hernia	3.20 (0.56) ( <i>n</i> = 2541)	3.22 (0.49) ( <i>n</i> = 92)	0.006	NS
Tuberculosis	3.20 (0.56) ( <i>n</i> = 2625)	2.42 (1.16) ( <i>n</i> = 7)	0.072	<i>p</i> < 0.0001
Bone/joint problems	3.20 (0.56) ( <i>n</i> = 2139)	3.17 (0.57) ( <i>n</i> = 491)	0.025	NS
Asthma/bronchitis	3.20 (0.56) ( <i>n</i> = 2287)	3.20 (0.58) ( <i>n</i> = 343)	0.002	NS
Other lung problems	3.20 (0.56) ( <i>n</i> = 2534)	3.12 (0.60) ( <i>n</i> = 93)	0.027	NS

were also both associated with decreased likelihood of physical limitations in each area. In contrast, higher neuroticism was associated with an increased likelihood of limitations in physical functioning in each category among adults with self-reported physical illnesses. These associations persisted after adjusting for differences in sociodemographic characteristics and comorbid mental disorders.

## Discussion

A key step in understanding the public health implications of the associations between person-

ality and illness is the careful measurement of the associations between a variety of personality measures and a variety of illnesses. The present study focused on the comprehensive five-factor model of personality and a range of both mental and physical illnesses, in a nationally representative sample. This study then also analyzed the relationship between personality factors and physical limitations among individuals with physical illnesses.

This investigation complements studies that have focused on causal mechanisms in restricted samples, such as those that relate childhood personality, health behaviors, longevity and

Table 3. Level of openness to experience among adults with and without common mental and physical disorders in the community

<i>Past 12 months</i>	<i>No disorder</i>	<i>Disorder present</i>	<i>r</i>	<i>p-value</i>
Major depression	3.04 (0.52) ( <i>n</i> = 2592)	3.03 (0.52) ( <i>n</i> = 440)	0.007	NS
Panic attack	3.04 (0.52) ( <i>n</i> = 2844)	3.00 (0.54) ( <i>n</i> = 188)	0.017	NS
Generalized anxiety disorder	3.04 (0.51) ( <i>n</i> = 2952)	2.96 (0.65) ( <i>n</i> = 80)	0.024	NS
Alcohol/substance use disorder	3.04 (0.52) ( <i>n</i> = 2564)	3.10 (0.51) ( <i>n</i> = 74)	0.019	NS
Regular cigarette smoking	3.00 (0.50) ( <i>n</i> = 2345)	3.10 (0.50) ( <i>n</i> = 685)	0.028	NS
Diabetes	3.04 (0.52) ( <i>n</i> = 2492)	2.94 (0.54) ( <i>n</i> = 145)	0.046	<i>p</i> = 0.018
High blood pressure	3.06 (0.52) ( <i>n</i> = 2150)	2.95 (0.51) ( <i>n</i> = 484)	0.080	<i>p</i> < 0.0001
Persistent skin problems	3.04 (0.52) ( <i>n</i> = 2353)	3.00 (0.52) ( <i>n</i> = 278)	0.020	NS
Sciatica/lumbago	3.05 (0.52) ( <i>n</i> = 2042)	3.00 (0.51) ( <i>n</i> = 534)	0.033	<i>p</i> = 0.053
Urinary/bladder problems	3.04 (0.52) ( <i>n</i> = 2286)	3.05 (0.51) ( <i>n</i> = 339)	0.012	NS
Stroke	3.04 (0.52) ( <i>n</i> = 2610)	2.76 (0.51) ( <i>n</i> = 24)	0.050	<i>p</i> = 0.01
Ulcer	3.04 (0.51) ( <i>n</i> = 2521)	2.96 (0.63) ( <i>n</i> = 114)	0.033	<i>p</i> = 0.095
Hernia	3.04 (0.52) ( <i>n</i> = 2541)	2.88 (0.53) ( <i>n</i> = 92)	0.057	<i>p</i> = 0.003
Tuberculosis	3.04 (0.52) ( <i>n</i> = 2625)	2.44 (0.76) ( <i>n</i> = 7)	0.060	<i>p</i> = 0.002
Bone/joint problems	3.06 (0.51) ( <i>n</i> = 2139)	2.96 (0.55) ( <i>n</i> = 491)	0.071	<i>p</i> < 0.0001
Asthma/bronchitis	3.04 (0.52) ( <i>n</i> = 2287)	3.06 (0.53) ( <i>n</i> = 343)	0.015	NS
Other lung problems	3.04 (0.52) ( <i>n</i> = 2534)	3.09 (0.52) ( <i>n</i> = 93)	0.018	NS

cause of death (Friedman, Tucker, Schwartz, Wingard, & Criqui, 1995b), or those that relate mental health status and longevity (Martin et al., 1995). The current study cannot and does not attempt to establish direct causal links but rather provides important clues for process research. Specifically, the data are consistent with but extend previous findings by documenting an association between conscientiousness and decreased likelihood of mental and physical disorders among adults in the general population, as well as decreased physical limitations among those with physical illnesses. Consistent with recent research, the findings confirm that

conscientiousness must be a key consideration in understanding personality and health (Friedman, Tucker, Schwartz, & Tomlinson, 1995a; Roberts & Bogg, in press).

Our findings regarding the association between neuroticism and mental disorders and physical health problems are in line with previous work. Study results have consistently indicated links between neuroticism and poor physical health (Charles, Gatz, Pedersen, & Dahlberg, 1999; Goodwin & Stein, 2003), poorer treatment outcomes among those treated for cardiac and other health conditions (Glazer, Emery, Frid, & Banyasz, 2002; Pedersen, Middel,

Table 4. Agreeableness among adults with and without common mental and physical disorders in the community

<i>Past 12 months</i>	<i>No disorder</i>	<i>Disorder present</i>	<i>r</i>	<i>p-value</i>
Major depression	3.48 (0.48) ( <i>n</i> = 2592)	3.51 (0.46) ( <i>n</i> = 440)	0.021	NS
Panic attack	3.48 (0.48) ( <i>n</i> = 2844)	3.51 (0.60) ( <i>n</i> = 188)	0.015	NS
Generalized anxiety disorder	3.48 (0.48) ( <i>n</i> = 2952)	3.56 (0.41) ( <i>n</i> = 80)	0.025	NS
Alcohol/substance use disorder	3.49 (0.47) ( <i>n</i> = 2564)	3.30 (0.66) ( <i>n</i> = 74)	0.067	<i>p</i> = 0.001
Regular cigarette smoking	3.47 (0.50) ( <i>n</i> = 2345)	3.49 (0.50) ( <i>n</i> = 685)	0.014	NS
Diabetes	3.49 (0.48) ( <i>n</i> = 2492)	3.56 (0.49) ( <i>n</i> = 145)	0.040	<i>p</i> = 0.039
High blood pressure	3.47 (0.49) ( <i>n</i> = 2150)	3.53 (0.46) ( <i>n</i> = 484)	0.050	<i>p</i> = 0.01
Persistent skin problems	3.49 (0.47) ( <i>n</i> = 2353)	3.47 (0.54) ( <i>n</i> = 278)	0.019	NS
Sciatica/lumbago	3.48 (0.48) ( <i>n</i> = 2042)	3.49 (0.47) ( <i>n</i> = 534)	0.008	NS
Urinary/bladder problems	3.48 (0.49) ( <i>n</i> = 2286)	3.52 (0.43) ( <i>n</i> = 339)	0.031	NS
Stroke	3.48 (0.48) ( <i>n</i> = 2610)	3.53 (0.43) ( <i>n</i> = 24)	0.009	NS
Ulcer	3.48 (0.48) ( <i>n</i> = 2521)	3.52 (0.58) ( <i>n</i> = 114)	0.018	NS
Hernia	3.48 (0.48) ( <i>n</i> = 2541)	3.46 (0.43) ( <i>n</i> = 92)	0.008	NS
Tuberculosis	3.49 (0.44) ( <i>n</i> = 2625)	2.63 (1.30) ( <i>n</i> = 7)	0.092	<i>p</i> < 0.0001
Bone/joint problems	3.47 (0.49) ( <i>n</i> = 2139)	3.52 (0.45) ( <i>n</i> = 491)	0.039	<i>p</i> = 0.048
Asthma/bronchitis	3.48 (0.48) ( <i>n</i> = 2287)	3.53 (0.46) ( <i>n</i> = 343)	0.041	<i>p</i> = 0.038
Other lung problems	3.48 (0.48) ( <i>n</i> = 2534)	3.49 (0.46) ( <i>n</i> = 93)	0.005	NS

& Larsen, 2002) and increased risk of mental disorders (Bienvenu et al., 2001; Goodwin, Fergusson, & Horwood, 2003; van Os & Jones, 2001), such as depression and schizophrenia. Our findings add to this literature by providing evidence of a link between neuroticism and increased impairment and limitations in functioning among those with self-reported physical illnesses. Although it is known that some associations between neuroticism and health result from reporting artifacts (Watson & Pennebaker, 1989), it is increasingly clear that causal links are also relevant. Overall, the consistency of these findings supports the validity and generalizability

of our findings regarding both conscientiousness and neuroticism, and they should encourage public health attention to the complex, life-long processes that produce associations between individual differences and health.

Higher levels of extraversion and openness to experience were somewhat associated with decreased levels of impairment among those with physical illness as well. Agreeableness was not associated with level of impairment among those with physical illnesses. These other basic dimensions of personality may be more relevant to specific people in specific circumstances but not generally very predictive of health.

Table 5. Neuroticism among adults with and without common mental and physical disorders in the community

Past 12 months	No disorder	Disorder present	<i>r</i>	<i>p</i> -value
Major depression	2.18 (0.63) ( <i>n</i> = 2592)	2.69 (0.66) ( <i>n</i> = 440)	0.267	<i>p</i> < 0.0001
Panic attack	2.20 (0.65) ( <i>n</i> = 2844)	2.79 (0.6) ( <i>n</i> = 188)	0.210	<i>p</i> < 0.0001
Generalized anxiety disorder	2.20 (0.64) ( <i>n</i> = 2952)	3.17 (0.59) ( <i>n</i> = 80)	0.232	<i>p</i> < 0.0001
Alcohol/substance use disorder	2.30 (0.66) ( <i>n</i> = 2564)	2.47 (0.74) ( <i>n</i> = 74)	0.055	<i>p</i> = 0.005
Regular cigarette smoking	2.32 (0.60) ( <i>n</i> = 2345)	2.30 (0.70) ( <i>n</i> = 685)	0.058	NS
Diabetes	2.26 (0.66) ( <i>n</i> = 2492)	2.24 (0.70) ( <i>n</i> = 145)	0.004	NS
High blood pressure	2.25 (0.66) ( <i>n</i> = 2150)	2.27 (0.67) ( <i>n</i> = 484)	0.014	NS
Persistent skin problems	2.24 (0.66) ( <i>n</i> = 2353)	2.40 (0.68) ( <i>n</i> = 278)	0.053	<i>p</i> = 0.006
Sciatica/lumbago	2.22 (0.65) ( <i>n</i> = 2042)	2.41 (0.68) ( <i>n</i> = 534)	0.114	<i>p</i> < 0.0001
Urinary/bladder problems	2.20 (0.66) ( <i>n</i> = 2286)	2.40 (0.68) ( <i>n</i> = 339)	0.087	<i>p</i> < 0.0001
Stroke	2.30 (0.66) ( <i>n</i> = 2610)	2.53 (0.68) ( <i>n</i> = 24)	0.040	<i>p</i> = 0.04
Ulcer	2.24 (0.66) ( <i>n</i> = 2521)	2.58 (0.68) ( <i>n</i> = 114)	0.100	<i>p</i> < 0.0001
Hernia	2.30 (0.66) ( <i>n</i> = 2541)	2.40 (0.73) ( <i>n</i> = 92)	0.036	<i>p</i> = 0.065
Tuberculosis	2.24 (0.66) ( <i>n</i> = 2625)	2.74 (0.55) ( <i>n</i> = 7)	0.038	<i>p</i> = 0.05
Bone/joint problems	2.25 (0.66) ( <i>n</i> = 2139)	2.27 (0.67) ( <i>n</i> = 491)	0.010	NS
Asthma/bronchitis	2.24 (0.66) ( <i>n</i> = 2287)	2.32 (0.65) ( <i>n</i> = 343)	0.041	<i>p</i> = 0.034
Other lung problems	2.25 (0.66) ( <i>n</i> = 2534)	2.44 (0.76) ( <i>n</i> = 93)	0.054	<i>p</i> = 0.006

The observed association between decreased likelihood of physical limitations and conscientiousness among adults with physical illnesses is consistent with piecemeal previous results but has not been documented previously. For instance, conscientiousness has been found to be the only personality modifier of cardiovascular response to occupational stress reflected by systolic blood pressure (Merecz, Makowska, & Makowiec-Dabrowska, 1999). This link appears conceptually distinct from the associations between conscientiousness and mental and physical disorders. Specifically, the association between conscientiousness and improved physical functioning may be related to an association

between conscientiousness and health-promoting physical health behaviors. For example, conscientiousness is associated with participation in exercise programs after breast cancer diagnosis, compared to those with lower conscientiousness (Rhodes, Courneya, & Bobick, 2001). Together, these data are not inconsistent with findings by Friedman et al. (35, 36) that the association between conscientiousness and improved health may result from avoidance of health risk behaviors (e.g. smoking, alcohol consumption, substance abuse) and could conceivably relate to participation in health promotion behaviors.

It is also likely that this relationship is sometimes influenced by the extent of the respondents'

Table 6. Association between limitations in physical functioning among adults with physical illnesses in the community

Limitations on the following activities	A			N			O			E			C		
	Adj <sup>a</sup> B	p	r	Adj <sup>a</sup> B	p	r	Adj <sup>a</sup> B	p	r	Adj <sup>a</sup> B	p	r	Adj <sup>a</sup> B	p	r
Bathing and dressing	0.061 (0.028)	0.009	0.231	-0.044 (0.021)	0.073	0.229	0.066 (0.025)	0.004	0.235	0.068 (0.023)	0.003	0.235	0.167 (0.035)	<0.0001	0.248
Climbing stairs	0.027 (0.047)	0.230	0.321	-0.104 (0.036)	0.004	0.326	0.141 (0.043)	0.001	0.328	0.176 (0.038)	<0.0001	0.335	0.305 (0.038)	<0.0001	0.361
Walking several blocks	0.040 (0.043)	0.072	0.331	-0.129 (0.033)	<0.0001	0.341	0.119 (0.039)	0.002	0.338	0.152 (0.035)	<0.0001	0.344	0.237 (0.034)	<0.0001	0.358
Moderate physical activity	0.021 (0.044)	0.300	0.339	-0.136 (0.034)	<0.0001	0.347	0.051 (0.339)	0.021	0.339	0.106 (0.036)	0.003	0.341	0.205 (0.035)	<0.0001	0.351

<sup>a</sup>Adjusted for differences in age, gender, race, marital status, education and mental disorders

adherence to treatment for illnesses, which could also be influenced by such aspects of personality. For instance, the extent to which an individual adheres to a physical therapy treatment schedule may have a profound impact on limitations in physical functioning. The lack of a strong and consistent association between agreeableness, openness to experience and extraversion and health outcomes further supports the specificity of the association between conscientiousness and health outcomes. The association between higher levels of neuroticism and increased impairment is also consistent with previous findings in terms of the pervasiveness of the influence of neuroticism on daily living.

Methodological limitations of this study should be noted while interpreting results. First, there is obviously an increased risk of Type I error due to a large number of comparisons, and so small effects should not be over-interpreted. One of the main objectives of the article was to identify associations between conscientiousness and specific illnesses; therefore we thought the inclusion of each was important and that revealing patterns, rather than proving statistical significance in each case, was the main goal. In other words, given the primitive state of the field, it is more important to avoid a Type II error (missing an effect that is really there). In addition, use of cross-sectional analyses precludes causal interpretations, and as such physical illnesses may lead to lower conscientiousness, or the reverse. Moreover, it is possible that there may be a third underlying factor affecting both personality and health. Second, the age range of the MIDUS ranges between age 25 and 74, which limits our ability to examine the full range of ages across the lifespan. Third, it should be noted that measurement of physical illness was by self-report and not objective assessment, and therefore may be vulnerable to self-report bias and to the influence of neuroticism in particular. Therefore, replication is needed with data using objective assessment of physical health.

In sum, these data suggest consistent linkages between conscientiousness and improved health outcomes, compared with those lower on conscientiousness. Moreover, conscientiousness was associated with significantly improved functional health status, in terms of lower levels of functional impairment, among adults with physical illnesses. Confirmation of the importance of

conscientiousness to health using a nationally representative sample, potentially very important to understanding major psychosocial influences on public health, should encourage future studies that employ research designs which focus more directly on the specific causal links among conscientiousness, behavior, psychophysiology and health.

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