



Short communication

Personality and pain: An individual-participant meta-analysis of seven samples

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ABSTRACT

Objective: To examine the association between personality domains and concurrent and incident pain to identify psychological risk and protective factors.

Method: Participants were middle-aged and older adults ($N > 40,000$; Age-range: 23–104, Mean Age = 65.52) from seven cohort studies from the US, England, and Japan. In each sample, personality, demographic factors, disease burden, depressive symptoms, and pain were assessed at baseline. Pain was assessed again 5 to 15 years later.

Results: Random-effects meta-analyses indicated that neuroticism was associated with higher likelihood of concurrent (Odds Ratio [OR] = 1.33, 95%CI: 1.26–1.40, $p < .001$) and incident (OR = 1.16, 95%CI: 1.11–1.21, $p < .001$) pain. In contrast, higher extraversion and conscientiousness were related to a lower likelihood of concurrent (extraversion OR = 0.86, 95% CI = 0.81–0.93, $p < .001$; conscientiousness OR = 0.85, 95% CI = 0.83–0.87, $p < .001$) and incident (extraversion OR = 0.93, 95% CI = 0.90–0.97, $p < .001$; conscientiousness OR = 0.93, 95% CI = 0.90–0.97, $p < .001$) pain. Openness and agreeableness were unrelated to both concurrent and incident pain. Disease burden and depressive symptoms partially accounted for the association between personality and pain. Age and sex did not systematically moderate these associations.

Conclusion: The present study found replicable associations between personality and concurrent and incident pain. Neuroticism may be a risk factor of pain, whereas extraversion and conscientiousness may be protective factors, suggesting that personality assessment could inform personalized pain interventions.

1. Introduction

Five Factor Model personality traits [FFM, [1]] are associated with pain. Higher neuroticism is related to greater pain in clinical samples [2–5] and the general population [6–8]; although null associations have also been reported [9,10]. Extraversion and conscientiousness have been linked to lower pain in some studies [2,3,5–9,11] but not in others [2–4,7,9–11]. Openness and agreeableness are unrelated to pain across most studies [2,3,5,7,8,10,11], except one study that found an association between higher openness and higher pain experience [9].

The present research seeks to build a stronger evidence base for the association between personality and pain through a large-scale, multi-sample coordinated analysis of all FFM personality traits and both concurrent and incident pain over time in the general population. It was

hypothesized that higher neuroticism would be associated with a higher risk of concurrent and incident pain. In contrast, higher extraversion and higher conscientiousness were expected to be related to lower risk of concurrent and incident pain. No associations with openness and agreeableness were expected. Additional analyses examined whether disease burden and depressive symptoms accounted for the association between personality and pain. Exploratory analyses further examined whether this association was moderated by age and sex.

2. Methods

2.1. Participants

Participants were from seven samples: The Health and Retirement

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0022-3999/© 2026 Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

Study (HRS), the English Longitudinal Study of Aging (ELSA), the Midlife in the United States Study (MIDUS), the Midlife in Japan Study (MIDJA), the National Health and Aging Trends Study (NHATS), the National Social Life, Health, and Aging Project (NSHAP), and the Wisconsin Longitudinal Study (WLS). A systematic search of publicly available datasets was conducted, and these samples were selected because they included an assessment of FFM personality traits, pain, and were publicly available data. No Institutional Review Board (IRB) approval was required for the present study because de-identified anonymized publicly available data were used. Written informed consent was obtained from participants in each sample. Across the seven samples, participants were included if they had complete data on the five traits, demographic factors, and pain. When available, pain data from the last wave were used for prospective analyses. Detailed samples characteristics are in Table S1, and descriptive statistics are in Table S2. Attrition analyses are in supplementary material.

2.2. Personality

The Midlife Development Inventory (MIDI) [12] was used to assess the five personality traits in the HRS (26-item version), ELSA (26-item), MIDUS (26-item), MIDJA (26-item) NHATS (10-item), and NSHAP (21-item). Personality traits were assessed using a 29-item version of the Big Five Inventory (BFI) [13] in the WLS (see details in supplementary material).

2.3. Pain

Participants were asked “Are you often troubled with pain?” in the HRS and ELSA, “Do you have chronic pain, that is do you have pain that persists beyond the time of normal healing and has lasted from anywhere from a few months to many years?” in the MIDUS and MIDJA, “In the last month, have you been bothered by pain?” in the NHATS, “In the past four weeks, have you had any pain?” in NSHAP, and “During the past four weeks, have you had any trouble with pain or discomfort?” in WLS. Participants responded yes or no in each sample. The same questions were asked at baseline and follow-up and were used for both the concurrent and incident analyses.

2.4. Covariates

Age, sex, and education were controlled in the seven samples. Race was included as a covariate in all samples except the MIDJA (all participants were Japanese) and the WLS (all participants were white). Ethnicity was controlled in the HRS, NHATS, and NSHAP. Disease burden and depressive symptoms were included in additional analyses (see details in Supplementary Material).

2.5. Data analysis

The association between personality traits and the likelihood of concurrent and incident pain was tested with logistic regression in each sample. For analyses of incident pain, participants who reported pain at baseline were excluded. The MIDJA was not included in the analysis because of the small number of incident cases (30). Demographic factors were controlled in all analyses. Separate analyses were conducted for each trait. Continuous variables were standardized to z-score (mean = 0, SD = 1). Estimates from each sample were combined in a random-effect meta-analysis using STATA.

Disease burden and depressive symptoms were included as additional covariates for both the concurrent and longitudinal analyses. An interaction between age and sex and each trait was computed to test whether age or sex moderated the association between personality traits and concurrent and incident pain.

3. Results

Neuroticism was associated with higher likelihood of concurrent pain (Table 1). Extraversion and conscientiousness were associated with a lower likelihood of pain (Table 1). No significant association was found between openness and agreeableness and concurrent pain (Table 1). The association between neuroticism, extraversion, and conscientiousness and concurrent pain was attenuated by 45%, 50%, and 53%, respectively, when disease burden and depressive symptoms were included in the analyses, but remained significant (Supplementary Table S3). Consistent with the cross-sectional analysis, the longitudinal analysis indicated that higher neuroticism was associated with a higher likelihood of incident pain and higher extraversion and conscientiousness to a lower likelihood of incident pain (Table 2). Openness and agreeableness were unrelated to incident pain. The association between neuroticism and extraversion and incident pain was reduced by 37% and 29%, respectively, when disease burden and depressive symptoms were included in the analysis, but remained significant (Supplementary Table S4). The association with conscientiousness was attenuated by 57% and was no longer significant (Supplementary Table S4).

Conscientiousness was slightly more strongly related to lower concurrent pain among younger participants in HRS and ELSA. No other interaction replicated (see supplementary material).

4. Discussion

With a coordinated analysis of seven samples that included more than 40,000 middle-aged and older adults, the present study found that neuroticism was the strongest personality correlate of both concurrent and incident pain. This finding is consistent with existing cross-sectional research [2–7] and expands knowledge by providing new evidence for an association between neuroticism and incident pain over time. Higher neuroticism is associated with greater disease burden [14,15] and depressive symptoms [16] that may be accompanied by pain. In support of this hypothesis, disease burden and depressive symptoms partially accounted for the association between neuroticism and pain. Higher neuroticism is also associated with poor physical function, such as higher dyspnea and poor lung function [17], poor muscle strength [18] and mobility limitations [19], which may result in more pain. Neuroticism is also associated with health-risk behaviors (e.g., physical inactivity [20], smoking [21], alcohol consumption [22]) that may lead to greater pain.

Despite previous mixed findings [2–7,9,11], extraversion and conscientiousness were associated with lower likelihood of concurrent and incident pain. Extraversion and conscientiousness have been associated with better physical and mental health [14–16], which may result in lower pain. Consistent with this assumption, the association between these two traits and pain was partially accounted for by disease burden and depressive symptoms. Furthermore, extraversion and conscientiousness are associated with better physical function, [17,18] and lower risk of obesity [23] that may help maintain fitness, avoid injuries, and reduce the likelihood of experiencing pain. In addition, extraversion and conscientiousness are related to greater physical activity [20] that may contribute to lower likelihood of pain. Finally, both traits have been linked with lower inflammation [24], which may result in less pain. Consistent with existing research [2–8], openness and agreeableness were unrelated to concurrent and incident pain.

There was evidence of heterogeneity in the association between personality and concurrent pain across the samples, which was more pronounced than for the prospective associations. Such heterogeneity could be explained by sample differences in age, country, and measures of personality and pain. The observational design of the present study precludes judgment of causality. The association between personality and pain could be reciprocal, with pain shaping changes in personality, especially persistent and severe pain. Another limitation is the lack of clinically validated standardized tools (such as the Visual Analogue

Table 1

Summary of logistic regression analysis predicting concurrent pain from personality traits.

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
HRS ^a	1.44*** (1.39–1.50)	0.79*** (0.76–0.82)	0.93*** (0.89–0.97)	0.97 (0.94–1.01)	0.83*** (0.80–0.87)
ELSA ^b	1.37*** (1.31–1.44)	0.75*** (0.72–0.79)	0.90*** (0.86–0.95)	1.00 (0.96–1.05)	0.82*** (0.78–0.86)
MIDUS ^b	1.35*** (1.28–1.43)	0.90*** (0.86–0.95)	1.01 (0.96–1.07)	0.95 (0.90–1.01)	0.87*** (0.82–0.92)
MIDJA ^c	1.32* (1.04–1.67)	0.98 (0.79–1.22)	1.12 (0.89–1.40)	1.05 (0.85–1.31)	0.97 (0.77–1.22)
NHATS ^a	1.28*** (1.18–1.38)	0.95 (0.88–1.02)	1.04 (0.97–1.13)	1.02 (0.95–1.11)	0.90** (0.83–0.97)
NSHAP ^a	1.31*** (1.19–1.45)	0.88* (0.79–0.97)	0.93 (0.84–1.02)	1.02 (0.93–1.13)	0.83*** (0.75–0.92)
WLS ^c	1.20*** (1.14–1.25)	0.90*** (0.86–0.94)	1.02 (0.97–1.07)	0.87*** (0.83–0.91)	0.85*** (0.82–0.89)
Random-Effect	1.33*** (1.26–1.40)	0.86*** (0.81–0.93)	0.98 (0.93–1.02)	0.97 (0.92–1.02)	0.85*** (0.83–0.87)
Heterogeneity Tau ²	0.004	0.007	0.0029	0.003	0.0001
Heterogeneity I ²	81.03	89.64	76.72	77.54	11.30

Note. The coefficients are odds ratios and 95% confidence intervals. HRS: *N* = 12,651; ELSA: *N* = 8114; MIDUS: *N* = 6269; MIDJA: *N* = 362; NHATS: *N* = 2764; NSHAP: *N* = 1859; WLS: *N* = 8369;^a Adjusted for age, sex, education, race, and ethnicity; ^b Adjusted for age, sex, education, and race; ^c Adjusted for age, sex, and education.

* *p* < .05, ** *p* < .01, *** *p* < .001.

Table 2

Summary of logistic regression analysis predicting incident pain from personality traits.

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
HRS ^a	1.23*** (1.14–1.31)	0.90** (0.84–0.96)	0.97 (0.90–1.04)	1.02 (0.95–1.10)	0.93* (0.87–1.00)
ELSA ^b	1.21*** (1.10–1.33)	0.94 (0.85–1.03)	1.08 (0.98–1.19)	1.10 (1.00–1.22)	0.97 (0.88–1.06)
MIDUS ^b	1.11* (1.01–1.22)	0.97 (0.88–1.06)	1.02 (0.93–1.12)	1.00 (0.91–1.09)	0.92 (0.84–1.00)
NHATS ^a	1.08 (0.87–1.34)	0.90 (0.73–1.11)	0.90 (0.72–1.11)	0.76* (0.61–0.94)	0.97 (0.79–1.20)
NSHAP ^a	1.11 (0.90–1.36)	1.03 (0.84–1.27)	0.94 (0.76–1.16)	1.13 (0.91–1.40)	0.98 (0.80–1.21)
WLS ^c	1.12*** (1.05–1.20)	0.93* (0.88–1.00)	1.04 (0.98–1.12)	0.95 (0.89–1.01)	0.92** (0.86–0.98)
Random-Effect	1.16*** (1.11–1.21)	0.93*** (0.90–0.97)	1.01 (0.97–1.06)	1.00 (0.93–1.07)	0.93*** (0.90–0.97)
Heterogeneity Tau ²	0.0009	0.0000	0.0004	0.005	0.0000
Heterogeneity I ²	26.66	0.02	14.61	65.94	0

Note. The coefficients are odds ratios and 95% confidence intervals. HRS: *N* = 4094; ELSA: *N* = 2018; MIDUS: *N* = 2523; NHATS: *N* = 363; NSHAP: *N* = 383; WLS: *N* = 3966;^a Adjusted for age, sex, education, race, and ethnicity; ^b Adjusted for age, sex, education, and race; ^c Adjusted for age, sex, and education.

* *p* < .05, ** *p* < .01, *** *p* < .001.

Scale or Numerical Pain Ratings) to assess pain. In addition, caution about the clinical implications of the study must be taken given that the meta-analysis combined results from distinct temporal constructs of pain (e.g., chronic pain vs. discomfort in the past four weeks). It was not possible to differentiate the specific etiology or physiological origin of the reported pain (e.g., nociceptive, neuropathic, post-surgical, inflammatory). The inability to classify the type of pain limits the direct translation of these findings into targeted clinical interventions or rehabilitation protocols. More research is needed to test whether these associations generalize to middle- and low-income countries. Finally, future research may examine whether the association between personality and pain differs depending upon the type of pain, such as chronic, persistent or acute pain. In conclusion, the present study showed that higher neuroticism was associated with higher likelihood of concurrent and incident pain, whereas extraversion and conscientiousness were related to lower likelihood of pain both concurrently and over time.

CRedit authorship contribution statement

Yannick Stephan: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Angelina R. Sutin:** Writing – review & editing, Visualization, Methodology, Conceptualization. **Martina Luchetti:** Writing – review & editing, Methodology, Conceptualization. **Selin Karakose:** Writing – review & editing, Visualization, Methodology. **Antonio Terracciano:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Formal analysis, Conceptualization.

Ethical approval

The HRS was approved by the University of Michigan Institutional Review Board (IRB). ELSA was approved by the National Research Ethics Service. The MIDUS and MIDJA studies were approved by the

Education and Social/Behavioral Sciences and the Health Sciences IRB at the University of Wisconsin-Madison. The NSHAP was approved by the Social and Behavioral Sciences IRB at the University of Chicago and the NORC IRB. The NHATS was approved by the Johns Hopkins Bloomberg School of Public Health IRB. The Health Sciences Institutional Review Board (IRB) at the University of Wisconsin-Madison approved the WLS. This study was based on publicly available de-identified datasets and therefore was exempt from Institutional Review Board review.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychores.2026.112938>.

Data availability

HRS data are publicly available at <http://hrsonline.isr.umich.edu/>. ELSA data are publicly available from the UK Data Service (UKDS,

<https://www.ukdataservice.ac.uk/>). MIDUS and MIDJA data can be accessed at <http://midus.wisc.edu/index.php>. Information on how to access the NSHAP data can be found at: <http://www.norc.org/Research/Projects/Pages/national-social-life-health-and-aging-project.aspx>. NHATS data are available for public download at: <http://www.nhats.org>. WLS data can be downloaded from: <https://researchers.wls.wisc.edu/>

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