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Personality traits and healthcare use: A coordinated analysis of 15 international samples

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Abstract

Some people use healthcare services more than others. Identifying factors associated with healthcare use has the potential to improve the effectiveness, efficiency, and equity of healthcare. In line with the Andersen behavioral model of healthcare utilization and initial empirical findings, personality traits may be key predisposing factors associated with healthcare use. Across 15 samples, the present study examined cross-sectional and prospective associations between Big Five personality traits and the likelihood of dental visits, general medical practitioner visits, and hospitalizations. Using coordinated data analysis, we estimated models within each of 15 samples individually (sample *N*s ranged from 516 to 305,762), and then calculated weighted mean effect sizes using random effects meta-analysis across samples (total $N = 358{,}803$). According to the synthesized results, people higher in conscientiousness, agreeableness, extraversion, and openness,

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and lower in neuroticism were more likely to visit the dentist; people higher in neuroticism were more likely to visit general medical practitioners; and people lower in conscientiousness and agreeableness and higher in neuroticism were more likely to be hospitalized. Associations tended to be small with odds ratios around 1.20 (rs ≈ .05). These findings provide evidence across 15 international samples for small but consistent associations between personality traits and healthcare use and demonstrate that personality-healthcare associations differ by type of care. We discuss directions for future research, including examining more specific personality facets (e.g., productiveness vs. responsibility) as well as important dimensions of healthcare (e.g., preventative vs. reactive care; acute vs. chronic care).

Keywords

Andersen behavioral model; Big Five; healthcare utilization; personality

Visiting a dentist, seeing the doctor, and going to the hospital are among the most impactful behaviors that many people engage in on a routine basis. Understanding who uses different kinds of healthcare services has important implications for individuals who receive care as well as for the societal systems that provide care. This information can be used to promote effective, efficient, and equitable healthcare. Theoretical frameworks and burgeoning empirical evidence suggest that personality traits may be key predisposing factors that predict healthcare use (e.g., Chapman et al., 2009; Friedman et al., 2013; Condon, Weston, & Hill, 2017). Using data from 15 international samples, the present research tested the hypothesis that personality traits are associated with healthcare use across multiple types of healthcare services.

Behavioral Model of Healthcare Utilization

The Andersen behavioral model of healthcare utilization posits that healthcare use is influenced by characteristics of the individual seeking care, as well as characteristics of the health service system (Andersen & Newman, 2005). Individual determinants can be conceptualized as predisposing factors, enabling factors, and need factors (Andersen, 1995; Andersen & Newman, 2005). Predisposing factors are individual characteristics that influence propensity toward healthcare use, such as sociodemographic characteristics (e.g., sex, age) and beliefs (e.g., attitudes toward health services and health conditions, knowledge about diseases, preferences for self-reliance). Enabling factors refer to resources of the individual or the community to which they belong that make it possible to access care, such as income and insurance coverage. Need factors refer to perceived and objective health conditions requiring care (e.g., cardiovascular disease).

Within the behavioral model, personality traits are likely one of several predisposing factors. Similar to beliefs, personality traits shape how a person perceives, feels, and behaves in the world, and may also influence healthcare use. Personality traits may also be related to healthcare use through their connections with enabling and need factors, given previously documented associations between health and personality (e.g., Goodwin & Friedman, 2006; Weston et al., 2015) as well as between income and personality (e.g., Denissen et al., 2018; Nyhus & Pons, 2005). Finally, personality traits may interact with

the healthcare system to influence healthcare use. Personality traits may be differentially related to healthcare use depending on how healthcare is accessed or depending on features of the care itself. For example, people who are higher in conscientiousness may be more likely or better able to navigate complex healthcare systems, or people higher in conscientiousness may be more likely to use healthcare systems that involve greater levels of interaction. Given national differences in healthcare systems, a first step in understanding the interaction between individual- and healthcare system-level factors is to examine national differences in associations between personality traits and healthcare use. However, because multiple healthcare systems are sometimes present within the same country (e.g., Medicare, Medicaid, and private health insurance in the U.S.), and because countries' healthcare systems differ from one another in multiple ways, differences between countries may not fully capture the complexity of individual- and healthcare system-level interactions.

In the next section, we review empirical evidence for associations between personality traits and healthcare use. Importantly, although personality traits are theoretically considered predisposing factors in the Andersen model, the empirical evidence reviewed here, as well as the present research, focuses on correlational associations and thus cannot provide evidence for a causal effect of personality traits on healthcare use.

Empirical Evidence for Associations between Personality Traits and Healthcare Use

Although only a handful of studies have examined associations between the Big Five personality traits and healthcare use, most have found evidence to support associations between personality traits and healthcare use (Aarabi et al., 2022; Chapman et al., 2009; Friedman et al., 2013; Hajek et al., 2017; Hallgren et al., 2016; ten Have at al., 2005). The most consistent evidence comes from research on neuroticism. People who are higher in neuroticism tend to use more healthcare across a variety of service types, including physician visits (Hajek et al., 2017; van Hemert et al. 1993), mental healthcare (ten Have at al., 2005), emergency departments, custodial nursing home care, and skilled nursing facilities (Friedman et al., 2013). This is unsurprising given that people who are high in neuroticism are more likely to experience health problems (Goodwin & Friedman, 2006; Weston et al., 2015; Mroczek et al., 2009), to experience health-related anxiety (Anagnostopoulos & Botse, 2016), to respond strongly to health-related news (Weston & Jackson, 2016), and to seek care for perceived health problems (Costa & McCrae, 1987). Despite observed associations between neuroticism and healthcare use, evidence for an association between neuroticism and *hospital* use is more mixed. Some studies have found no association between neuroticism and hospital use (Hajek et al., 2017), and neuroticism has even been associated with *fewer* hospital days among individuals who were hospitalized at least once (Friedman et al., 2013). Yet another study found that neuroticism was associated with *increased* likelihood of hospitalization, but only among adults over age 65 (Hallgren et al., 2016).

In addition to neuroticism-healthcare associations, there are also theoretical reasons to expect that conscientiousness should be associated with healthcare use in various ways.

On the one hand, people who are higher in conscientiousness tend to engage in more positive health behaviors and health promotion activities (Lodi-Smith et al., 2010; Graham et al., 2020). Thus, conscientiousness may be associated with greater use of primary care or prevention-focused services. Consistent with this view, conscientiousness has been associated with more regular dentist visits (Aarabi et al., 2022). On the other hand, conscientious individuals tend to have better health and fewer accidents (Clarke & Robertson, 2005; Goodwin & Friedman, 2006), suggesting that higher conscientiousness may be associated with lower likelihood of health problems requiring emergency room visits and hospital admissions. However, when health problems do occur in individuals high in conscientiousness, they may be expected to take a more problem-solving focus including seeking second opinions or engaging with healthcare more broadly (Weston & Jackson, 2016). Somewhat consistent with this hypothesis, higher conscientiousness has been associated with fewer emergency room visits, but not with probability of hospitalization (Friedman et al., 2013). More empirical work is needed to further test hypotheses related to the potentially complex relationships between conscientiousness and healthcare use.

The expected associations between the other Big Five personality traits (i.e., agreeableness, extraversion, and openness) and healthcare use are less clear; however, some associations have been observed. For example, higher agreeableness has been associated with greater likelihood of custodial nursing home use (Friedman et al., 2013) and lower likelihood of emergency department use (Chapman et al., 2009); however, the emergency department finding was not replicated in a separate sample (Friedman et al., 2013). Higher levels of extraversion have been associated with increased probability of hospitalization (Hajek et al., 2017; Nettle, 2005), emergency department use (Chapman et al., 2009), and regular dentist visits (Aarabi et al., 2022); however, these associations have not been found in all studies (Friedman et al., 2013; Hallgren et al., 2016). Finally, higher openness has been associated with greater probability of using custodial home care (Friedman et al., 2013), alternative medicine (Honda & Jacobson, 2005), national mass health checkups (Iwasa et al. 2009), and regular dentist visits (Aarabi et al., 2022). Higher levels of openness have also been associated with less use of emergency departments and skilled nursing facilities, but only among individuals using those types of services at least once (Friedman et al., 2013). Taken together, the relationships between agreeableness, extraversion, openness, and healthcare use are unclear and replication is needed.

The Present Research

In a coordinated data analysis of 15 international samples, we examined associations between Big Five personality traits and a variety of healthcare service types, including dental visits, general medical practitioner visits, and hospitalizations. Coordinated data analysis is a form of Integrated Data Analysis (Curran & Hussong, 2009; Hofer & Piccinin, 2009, Weston et al., 2020) that applies identical data-analytic models and statistical code to multiple independent datasets to answer a given research question (e.g., Graham et al., 2021). Then, using tools borrowed from meta-analysis (Borenstein et al., 2010), the results are summarized across samples leading to greater confidence in the replicability and generalizability of findings. The coordinated data analysis approach is particularly promising for the present research question, given inconsistent findings among the small

number of existing single-study papers that have examined personality traits and healthcare use. Examining associations between personality traits and healthcare use across 15 high-quality international datasets will increase the field's confidence in these relationships and will lay groundwork for more complex research on this topic.

Based on previous theoretical and empirical work, we hypothesized higher levels of neuroticism would be associated with greater likelihood of all types of care, including visiting the dentist, visiting a general medical practitioner, and being admitted to the hospital. In contrast, given opposite relationships of conscientiousness to preventative versus reactive healthcare, we predicted that higher levels of conscientiousness would be associated with greater likelihood of visiting the dentist and visiting a general medical practitioner, but lower likelihood of being admitted to a hospital. Although we cannot perfectly map these three healthcare service types onto *why* they are used (i.e., for preventative vs. reactive care), dentists and general medical practitioners are commonly used for preventative services, whereas being admitted to a hospital is more commonly associated with treatment of health problems, particularly those requiring more intensive care. We did not make specific predictions concerning the relationships between openness, extraversion, agreeableness, and any of the healthcare services, so analyses for these traits were exploratory.

We also examined two study-level moderators: average sample age and country of data collection. We chose these two moderators because they are likely to influence healthcare use, given different healthcare needs between younger and older indiviudals and national differences in healthcare systems. We compared U.S. samples ($n = 7$ samples) to other countries ($n = 7$ samples) because the healthcare system in the U.S. is unique in that the majority of individuals receive healthcare benefits through private insurance companies. Importantly, this is a simplistic first step in understanding whether personality and healthcare use associations differ between countries, given that our samples are not representative of all countries and world regions, and given that the non-U.S. countries (Germany, Australia, Netherlands, Sweden, Japan) also differ from one another in aspects of their healthcare systems.

Method

Transparency and Openness

The research questions, hypotheses, and analytic approach were preregistered in the Open Science Framework (OSF; https://osf.io/g8vqm/?view_only=c954b01b32444f0892154c4b758cd120). We used R version 4.2.1. for all analyses. R code for individual study analyses and meta-analyses can also be found on OSF (https://osf.io/g8vqm/?view_only=c954b01b32444f0892154c4b758cd120). The present research involved secondary analysis of 15 existing datasets. Sample size was predetermined based on the number of participants in each existing dataset that met inclusion criteria. Inclusion criteria were preregistered and reported in the manuscript. The measures used in the present research were drawn from these larger studies and were also preregistered. Seven of the datasets used in the present research are publicly available; the remaining eight datasets require an application process and/or data use contract for access. Details about data access are described in Supplementary Table S1.

Samples

The 15 samples used in the present research were primarily identified using the Integrative Analysis of Longitudinal Studies on Aging and Dementia (IALSA) network, including several datasets that are publicly available independent of their IALSA affiliation. These datasets are population cohorts with typically low prevalence of dementia. Additional studies not included in IALSA were identified through literature searches and the authors' knowledge of relevant datasets. Within each study, we used the first available measurement occasion that included measures of both personality traits and healthcare use. When available, we also used healthcare use data from the next available measurement occasion for prospective analyses. We used data from all participants who had personality trait and healthcare use data at one or both timepoints. Study characteristics are shown in Table 1 and sample sizes and descriptive statistics for each variable in each sample are shown in Table 2. Sample characteristics are reported for the final analytic sample and sample age is reported at analytic baseline.

Berlin Aging Study (BASE and BASE-II)—The Berlin Aging Study (BASE) is a study of older adults over age 60 who lived in former West Berlin, Germany (M_{age}=85, SD_{Age}=9; 50% Male) when data collection began in 1990. In the present study, we used personality trait data and healthcare use data from the baseline measurement occasion in 1990–93. The Berlin Aging Study-II (BASE-II) is an ongoing longitudinal study of adults living in Berlin, Germany (M_{age}=67, SD_{Age}=4; 51% Male) (Bertram et al., 2013; Gerstorf et al., 2016). In the present study, we used personality trait data from 2009 and healthcare use data from 2009 (in cross-sectional analyses) and 2011 (in prospective analyses).

Canberra Longitudinal Study (CLS)—The CLS is a community-based cohort study of Australian adults over age 70 (M_{age}=77, SD_{Age}=5; 51% Male) (Christensen et al., 2004). Data collection began in 1990 and continued in 4-year intervals for 12 subsequent years. In the present study, we used personality trait data from 1990 and healthcare use data from 1990 (in cross-sectional analyses) and 1994 (in prospective analyses).

Health and Retirement Study (HRS)—The HRS is a longitudinal panel study that surveys a representative sample of U.S. adults over age 50 and their spouses (M_{age}=68, SD_{Age}=11; 41% Male) (Sonnega et al., 2014). In the present study, approximately half the sample completed a personality trait inventory for the first time in 2006 and the other half completed a personality trait inventory for the first time in 2008. We used healthcare use variables from the same timepoints (in cross-sectional analyses) and four years later in 2010/2012 (in prospective analyses) (Health and Retirement Study, 2006, 2020, 2021a, 2021b).

Longitudinal Aging Study Amsterdam (LASA)—The LASA is a longitudinal study of older adults in the Netherlands (M_{age}=71, SD_{Age}=9; 52% Male) (Huisman et al., 2011). Data collection began in 1991 and is ongoing. In the present study, we used personality trait data from 1992 and healthcare use data from 1992/1993 (in cross-sectional analyses) and 1995/1996 (in prospective analyses).

Long Beach Longitudinal Study (LBLS)—The LBLS is a representative multi-panel study of adults living in Long Beach, CA or nearby cities (M_{age}=69, SD_{Age}=13; 48% Male) (Zelinski & Kennison, 2001). The first panel was recruited in 1978 and the second panel was recruited in 1994. In the present study, we used personality trait data from the second panel in 1994 and healthcare use data from 1994 (in cross-sectional analyses) and 1997 (in prospective analyses).

Midlife in Japan Study (MIDJA)—The MIDJA study is a probability sample of Japanese adults aged 30 to 79 from the Tokyo metropolitan area (M_{age}=54, SD_{Age}=14; 49% Male). Data collection took place in 2008/2009 and 2012/2013. In the present study, we used personality trait data from 2008 and healthcare use data from 2008/2009 (in cross-sectional analyses) and 2012/2013 (in prospective analyses).

Midlife in the United States (MIDUS)—The MIDUS is a longitudinal probability sample of U.S. adults (M_{age}=47, SD_{Age}=13; 47% Male). Data collection began in 1995 and continued in approximately 9-year intervals. In the present study, we used personality trait data from 1995/1996 and healthcare use data from 1995/1996 (in cross-sectional analyses) and 2004 (in prospective analyses).

Normative Aging Study (NAS)—The NAS is a longitudinal study of men residing in the Boston area (M_{age}=74, SD_{Age}=7; 100% Male) that was initiated by the U.S. Department of Veterans Affairs in 1963 (Bell et al., 1972). In the present study, we used personality trait data from 2003 and healthcare use data from 2003 (in cross-sectional analyses) and 2006 (in prospective analyses).

Synthetic Aperture Personality Assessment (SAPA)—The SAPA data are a cross-sectional sample of survey respondents hosted at SAPA-Project.org (M_{age}=33, SD_{Age}=16; 65% Male) (Condon et al., 2017). We used Big Five personality and healthcare use data collected between February 2017 and November 2019 (in cross-sectional analyses). Personality was assessed using a hierarchical model with two levels (Condon, 2018), including the Big Five measures used in the present study.

Swedish Adoption Twin Study of Aging (SATSA)—The SATSA is a longitudinal study of twins drawn from the Swedish Twin Registry (M_{age}=59, SD_{Age}=14; 42% Male) (Pederson et al., 1991). Data collection began in 1984 and is ongoing. In the present study, we used personality trait data from 1984 and healthcare use data from 1984 (in cross-sectional analyses) and 1987 (in prospective analyses).

Seattle Longitudinal Study (SLS)—The SLS is a study of psychological development in adulthood that began in 1956 (M_{age}=66, SD_{Age}=14; 44% Male) (Schaie et al., 2004). Beginning in 2001, Big Five data were collected. In the present study, we used personality trait data from 2005 and healthcare use data from 2005 (in cross-sectional analyses) and 2008 (in prospective analyses).

German Socio-Economic Panel Study (SOEP)—The SOEP is an longitudinal study that began in 1984 and surveys 15,000 German households (M_{age}=50, SD_{Age}=18; 47%

Male) (Goebel et al., 2018; Wagner et al., 2007). In the present study, we used personality trait data from 2009 and healthcare use data from 2009 (in cross-sectional analyses) and 2013 (in prospective analyses).

Wisconsin Longitudinal Study (WLS Graduate and Sibling Samples)—The WLS is a longitudinal cohort study of high school graduates, born primarily in 1939 (WLS-G) (M_{age}=64, SD_{Age}=1; 46% Male), as well as a randomly selected sibling from each member of the WLS-G cohort (WLS-S) (M_{age}=64, SD_{Age}=7; 47% Male) (Herd et al., 2014). In the present study, we treat the WLS-G and the WLS-S as separate samples. Personality trait data and healthcare use data were taken from 2004 because this is the only timepoint at which both sets of variables were assessed.

Measures

Personality—At least a subset of the Big Five personality traits were assessed in all samples. The samples differed in the measures used to assess Big Five personality traits, however, previous research has found that different measures of the same trait are highly correlated (McCrae & Costa Jr., 1985). Four samples (BASE-II, SOEP, WLS-G, WLS-S) used versions of the Big Five Inventory (John et al., 1991; John and Srivastava, 1999; Lang et al., 2011); four samples (BASE, LBLS, SATSA, SLS) used versions of the NEO Personality Inventory (Costa & McCrae, 1985a, 1985b; Costa & McCrae, 1992); three samples (HRS, MIDJA, MIDUS) used the MIDI personality scale (Lachman and Weaver, 1997); NAS used the Goldberg (1992) personality questionnaire; the CLS and SATSA used the Eysenck Personality Inventory (Eysenck, 1975) to assess extraversion and neuroticism only. The SAPA project used the SAPA Personality Inventory (SPI; Condon, 2018), an empirical assessment drawing on items from the International Personality Item Pool (Goldberg et al., 2006). Finally, LASA used the Dutch Personality Questionnaire (Luteijn et al., 2000). For analyses, the raw personality scores were z-standardized within each study to increase the interpretability of coefficients. For descriptive purposes, all personality trait composite scores were converted to a 0–10 scale using POMP scoring to enable comparisons across samples (Cohen et al., 1999). See Table 1 for measurement instrument and Table 2 for descriptive statistics for the personality variables across the 15 samples.

Healthcare Use—We examined three types of healthcare services: dental visits, general medical practitioner visits, and hospitalizations. The items and response options used to assess healthcare use differed across samples. To maximize cross-sample consistency, all healthcare use variables were recoded as binary variables (0 = did not use service type; 1 = used service type). The time-period within which healthcare use was assessed also differed across samples and ranged from 3 months to 24 months (e.g., did you use the service type within the past 3 months?). See Table 1 for measurement instrument and Table 2 for descriptive statistics for the healthcare use variables across the 15 samples.

We focused on the likelihood of using each type of care at least once, rather than the number of times each type of care was used for two reasons. First, some argue that individual characteristics are most likely to influence whether any services are received, whereas characteristics of the physician and the health service system are more likely to influence the

volume of services (Andersen & Newman, 2005). Because the samples used in the present study are cross-national, health service systems are markedly across samples and these factors may drive differences in healthcare *volume* between samples. Second, all samples included a measure of whether or not each type of care was used at least once allowing for maximum harmonization across samples and care types, whereas only a subset of studies assessed the *volume* of each type of care. Thus, by using binary data on whether or not the services were used, we were able to include more samples in the current investigation.

Covariates—In primary analyses, we adjusted for sociodemographic predisposing factors (i.e., sex and age) that have been shown to influence both personality traits and healthcare use. Baseline age was assessed in years. Sex was coded as a binary variable (0=female; 1 = male) based on how it was assessed in the majority of studies. In subsequent sensitivity analyses (see Supplementary Online Materials), we additionally adjusted for economic enabling factors (i.e., income and insurance) and health-related need factors (i.e., number of chronic health conditions).

Data Analysis

We report 95% confidence intervals (CIs) and odds ratios (exponentiated coefficient) for all associations. Meta-analytic CIs that do not contain 1 were considered evidence for a statistically significant association. We examined both cross-sectional associations and, when possible, prospective associations across 2–9 years.

Individual Sample Analysis—In primary analyses, we assessed cross-sectional associations between the Big Five personality traits and healthcare use using a series of up to 15 binary logistic regressions within each sample. In each model, one of the Big Five personality traits was entered as the predictor of one of the three types of healthcare use (dental visits, general medical practitioner visits, and hospitalizations) assessed at the same timepoint. Participant age and sex were included as covariates. We used the same approach to assess prospective associations between Big Five personality and healthcare use. In the models for prospective analyses, healthcare use was assessed 2–9 years after the personality trait assessment.

Sensitivity Analyses—We conducted sensitivity analyses adjusting for economic enabling factors and health-related need factors. Economic enabling factors and health-related need factors may confound relationships between personality traits and healthcare use by influencing both personality traits as well as access to or need for healthcare services. However, the causal relationships between these variables are complex, given that personality traits and healthcare use may also influence economic and health-related factors. Given these complex causal relationships, it is not clear whether economic and health-related factors are better characterized as confounders (i.e., variables that influence personality and healthcare use) or colliders (i.e., variables that are influenced *by* personality and healthcare use). Because adjusting for a collider can introduce a spurious relationship between the predictor and outcome variable (Rohrer, 2018), we only consider whether statistically significant associations hold when adjusting for these covariates, and not whether previously unobserved associations emerge.

In the first set of sensitivity analyses, we adjusted for enabling factors (i.e., income and, when available, insurance coverage). In a second set of sensitivity analyses, we additionally adjusted for need factors (i.e., number of chronic health conditions). The number of chronic health conditions was summed from a list of common conditions (i.e., heart conditions, lung conditions, stroke, diabetes, cancer, and hypertension). Income was z-standardized within each study. In countries without universal health insurance coverage, we additionally included health insurance data when available (MIDUS, NAS, SAPA, WLS-G, and WLS-S). Insurance coverage was recoded as a binary variable (0 = uninsured; 1 = insured) for comparability across this subset of samples. Because very few studies included measures of dental insurance, we did not adjust for insurance in the models predicting dentist use. Because several samples did not include insurance data, we report models including only income data and models including income and insurance data.

Meta-analysis—We used random-effects models (Borenstein et al., 2010) to calculate the overall weighted mean effect size, standard error, and 95% CIs across samples. We used the 95% CI around the meta-analytic effect size in primary models to test our hypotheses. In line with our preregistration, cross-sectional models adjusting for participant age and sex were used to draw primary conclusions.

To examine between-study heterogeneity in effect sizes, we calculated Cochrane's Q (see Figures 1–5). In line with our preregistration, we also report I^2 for all primary analyses (see Figures 1–5). I^2 tells us what proportion of between-study variance in effect sizes is due to meaningful heterogeneity rather than due to random error (Higgins & Green, 2008). However, I^2 is imprecise and can be biased in small meta-analyses like those reported here and thus should be interpreted with caution (von Hippel, 2015). To test potential systematic sources of heterogeneity, we investigated two preregistered between-sample moderators: average sample age and country of data collection (U.S. compared to other countries).

Results

Primary Analyses: Personality and Healthcare Use

Forest plots depicting the odds ratio and 95% CI for each individual sample as well as the meta-analytic estimate of the odds ratio and the 95% CI are shown in Figures 1–5. Each figure depicts the results of primary analyses for a given trait. Table 3 provides a results summary for each trait and healthcare service type, including the direction of the overall meta-analytic association, as well as the number of individual study results that were null, significantly positive, and significantly negative. These results are also presented in their entirety in Supplementary Tables S2–S6.

Neuroticism—Our hypothesis that higher levels of neuroticism would be associated with greater likelihood of visiting a dentist was not supported. Instead, neuroticism was associated with significantly lower likelihood of visiting the dentist cross-sectionally (meta-analytic OR = 0.92, 95% CI = 0.88, 0.96) and prospectively (meta-analytic OR = 0.89, 95% CI = 0.83, 0.95). The cross-sectional association was either negative and statistically significant (n=4) or null (n=5). Within the samples with longitudinal data, the prospective association was either negative and statistically significant (n=2) or null (n=5).

Consistent with our hypothesis, higher neuroticism was significantly associated with greater likelihood of visiting a general medical practitioner cross-sectionally (meta-analytic OR = 1.18, 95% CI = 1.09, 1.28). The association was also positive and statistically significant in approximately half of the individual samples (*n*=6 out of 13). However, this association did not replicate prospectively (meta-analytic OR = 1.08, 95% CI = 0.99, 1.18). Of the samples with longitudinal data, the prospective association was positive and statistically significant in two individual samples, null in several others (*n*=7), and negative and statistically significant in one sample.

Finally, consistent with our hypothesis, greater neuroticism was associated with greater likelihood of being admitted to a hospital cross-sectionally (meta-analytic OR = 1.22, 95% CI = 1.17, 1.27) and prospectively (meta-analytic OR = 1.17, 95% CI = 1.14, 1.21). The cross-sectional association was positive and statistically significant in the majority of individual samples (*n*=10 out of 12). Within the samples with longitudinal data, the prospective association was either positive and statistically significant (*n*=3) or null (*n*=5).

Conscientiousness—Consistent with our hypothesis, greater conscientiousness was associated with greater likelihood of visiting the dentist cross-sectionally (meta-analytic OR = 1.24, 95% CI = 1.17, 1.31) and prospectively (meta-analytic OR = 1.32, 95% CI = 1.24, 1.40). The cross-sectional and prospective associations were positive and statistically significant in the majority of samples (*n*=7 out of 8 for cross-sectional analyses and *n*=5 out of 5 for prospective analyses).

Our hypothesis that higher levels of conscientiousness would be associated with greater likelihood of visiting a general medical practitioner was not supported. Conscientiousness was not significantly associated with the likelihood of visiting a general medical practitioner cross-sectionally (meta-analytic OR = 1.01, 95% CI = 0.92, 1.11) or prospectively (meta-analytic OR = 1.11, 95% CI = 0.99, 1.24). The association was also null in the majority of individual samples (*n*=6 out of 10 for cross-sectional analyses and *n*=4 out of 8 for prospective analyses).

Finally, consistent with our hypothesis, greater conscientiousness was associated with lower likelihood of being admitted to a hospital both cross-sectionally (meta-analytic OR = 0.89, 95% CI = 0.86, 0.91) and prospectively (meta-analytic OR = 0.94, 95% CI = 0.89, 0.99). The cross-sectional association was negative and statistically significant in the majority of individual samples (*n*=6 out of 11). Within the samples with longitudinal data, the prospective association was either negative and statistically significant (*n*=1) or null (*n*=7).

Agreeableness—We did not make specific predictions regarding associations between agreeableness and healthcare use. Greater agreeableness was associated with greater likelihood of visiting a dentist cross-sectionally (meta-analytic OR = 1.08, 95% CI = 1.04, 1.12), but not prospectively (meta-analytic OR = 1.08, 95% CI = 1.05, 1.12). The cross-sectional association was positive and statistically significant in half of the samples (*n*=4) and null in the other half (*n*=4). Within the samples with longitudinal data, the prospective association was either positive and statistically significant (*n*=2) or null (*n*=3).

Agreeableness was not associated with likelihood of visiting a general medical practitioner cross-sectionally (meta-analytic OR = 1.05, 95% CI = 0.99, 1.10) or prospectively (meta-analytic OR = 1.06, 95% CI = 0.96, 1.17). The association was null in the majority of individual samples (*n*=8 out of 10 in cross-sectional analyses and *n*=4 out of 8 in prospective analyses).

Finally, higher levels of agreeableness were significantly associated with lower likelihood of being admitted to a hospital cross-sectionally (meta-analytic OR = 0.96, 95% CI = 0.92, 0.998) but not prospectively (meta-analytic OR = 1.00, 95% CI = 0.97, 1.03). Despite a statistically significant meta-analytic cross-sectional association, the association was null in the majority of individual samples (*n*= 9 out of 11 in cross-sectional analyses and *n*=8 out of 8 in prospective analyses).

Extraversion.: We did not make specific predictions regarding associations between extraversion and healthcare use. Greater extraversion was associated with greater likelihood of visiting a dentist cross-sectionally (meta-analytic OR = 1.10, 95% CI = 1.06, 1.15), but not prospectively (meta-analytic OR = 1.11, 95% CI = 0.98, 1.26). The association was positive and statistically significant in the majority of individual samples (*n*=6 out of 10 in cross-sectional analyses and *n*=3 out of 6 in prospective analyses).

Extraversion was not significantly associated with the likelihood of visiting a general medical practitioner cross-sectionally (meta-analytic OR = 1.02, 95% CI = 0.97, 1.07) or prospectively (meta-analytic OR = 1.05, 95% CI = 0.97, 1.13). The association was null in the majority of individual samples (*n*=10 out of 12 in cross-sectional analyses and *n*=8 out of 9 in prospective analyses).

Finally, extraversion was not significantly associated with likelihood of being admitted to a hospital cross-sectionally (meta-analytic OR = 0.97, 95% CI = 0.93, 1.02), or prospectively (meta-analytic OR = 0.97, 95% CI = 0.94, 1.01). The association was null in the majority of individual samples (*n*=8 out of 12 in cross-sectional analyses and *n*=6 out of 8 in prospective analyses).

Openness.: We did not make specific predictions regarding associations between openness and healthcare use. Openness was associated with significantly greater likelihood of visiting a dentist cross-sectionally (meta-analytic OR = 1.17, 95% CI = 1.08, 1.26), and prospectively (meta-analytic OR = 1.20, 95% CI =1.12, 1.27). The association was positive and statistically significant in the majority of individual samples (*n*=5 out of 9 in cross-sectional analyses and *n*=3 out of 5 in prospective analyses).

Openness was not significantly associated with the likelihood of visiting a general medical practitioner cross-sectionally (meta-analytic OR = 1.03, 95% CI = 0.999, 1.06) or prospectively (meta-analytic OR = 1.02, 95% CI = 0.92, 1.13). The association was null in the majority of individual samples (*n*=10 out of 11 in cross-sectional analyses and *n*=6 out of 8 in prospective analyses).

Finally, openness was not significantly associated with likelihood of being admitted to a hospital cross-sectionally (meta-analytic OR = 0.97, 95% CI = 0.93, 1.02), but higher levels

of openness predicted lower likelihood of being admitted to a hospital prospectively (meta-analytic OR = 0.95, 95% CI = 0.92, 0.98). Despite a statistically significant meta-analytic prospective association, the association was null in the majority of individual samples (n=19 out of 12 in cross-sectional analyses and n=6 out of 8 in prospective analyses).

Sensitivity Analyses: Adjusting for Enabling and Need Factors

Table 4 shows meta-analytic results from sensitivity analyses adjusting for enabling and need factors. The direction of all meta-analytic cross-sectional associations remained the same in these sensitivity analyses. The positive association between neuroticism and likelihood of visiting a general practitioner and the negative association between agreeableness and likelihood being admitted to a hospital were directionally consistent with primary models but were not statistically significant in sensitivity analyses. Notably, in addition to adjusting for enabling and need factors, the sensitivity analyses necessarily included fewer samples because some samples did not have measures of the covariates.

Meta-analytic Moderation

Table 5 shows meta-analytic moderation of the primary models. Regarding average sample age, the association between neuroticism and greater likelihood of being admitted to a hospital was weaker in older samples. In contrast, the positive association between openness and greater likelihood of visiting a dentist was stronger in older samples. Average baseline age also moderated the associations of extraversion and openness with likelihood of being admitted to a hospital. These latter associations were not observed in the overall meta-analytic estimates, and the observed interaction suggested small positive effects for younger samples and small negative effects for older samples. Regarding country of data collection, the negative association between conscientiousness and likelihood of being admitted to a hospital was stronger in the U.S. samples and a negative association between openness and hospital use was observed only in the U.S. samples.

Discussion

The present research tested the hypothesis that personality traits are associated with healthcare use. Using data from 15 international samples, we investigated cross-sectional and prospective associations between the Big Five personality traits and the use of three types of healthcare services: dentists, general medical practitioners, and hospitals. In primary analyses, people higher in conscientiousness, agreeableness, extraversion, and openness, and lower in neuroticism were more likely to visit the dentist; people higher in neuroticism were more likely to visit general medical practitioners; and people lower in conscientiousness and agreeableness and higher in neuroticism were more likely to be admitted to a hospital. Study findings were generally consistent across sensitivity analyses adjusting for enabling and need-based factors, and we did not find evidence for moderation by average sample age or country of data collection. Consistent with Andersen's behavioral model, these findings highlight the role of personality traits in helping us to better understand who uses healthcare and further demonstrate that personality-healthcare associations vary by type of care. However, associations between personality traits and

healthcare use were generally small (rs ≈ .05) (Funder & Ozer, 2019), suggesting that broad personality traits may be just one factor that contribute to healthcare use.

These findings build on a larger body of work demonstrating associations between personality traits, everyday behaviors (e.g., Ching et al., 2014), and health (e.g., Hampson & Friedman, 2008). Specifically, our study provides insights into the connections between personality traits and specific behaviors that have implications for health and health interventions. Whereas the majority of prior work on personality and health has focused on broad health status outcomes (e.g., self-rated health, morbidity and mortality), a relatively smaller body of research has examined specific and contextualized behavioral outcomes such as healthcare use.

Associations between Personality Traits and Healthcare Use

Findings for neuroticism and conscientiousness were partially consistent with previous research and our preregistered hypotheses. Based on prior research, we predicted that neuroticism would be associated with higher likelihood of all three types of healthcare use. Higher levels of neuroticism were indeed associated with greater likelihood of using general medical practitioners and hospitals but were associated with *lower* likelihood of visiting a dentist. The positive association between neuroticism and likelihood of visiting a general medical practitioner is generally consistent with prior research (Hajek et al., 2017; van Hemert et al. 1993), and may be explained by greater health problems and greater health-related anxiety among people high in neuroticism. Although evidence for an association between neuroticism and hospital use has been more inconsistent in past research (Friedman et al., 2013; Hajek et al., 2017; Hallgren et al., 2016), the consistency of the association across samples in the present research provides strong evidence for a positive association between neuroticism and hospital use. Further, although the negative association between neuroticism and dentist use is contrary to our hypothesis, it is not entirely surprising given limited prior work on this type of healthcare. The negative association may be driven by dental anxiety among people high in neuroticism (Vassend et al., 2011). Alternatively, it is possible that individuals higher in neuroticism have less access to dental care or that having limited access to dental services make individuals more anxious. Dental anxiety and dentalcare access are potential avenues for future investigations.

As predicted, higher levels of conscientiousness were associated with greater likelihood of visiting a dentist and lower likelihood of hospitalization. This suggests that people higher in conscientiousness are more likely to manage their health by using some types of routine healthcare services such as dentists but are less likely to require hospitalization. Unexpectedly, conscientiousness was not associated with visiting a general medical practitioner. The absence of an association between conscientiousness and general medical practitioner use may be due to the fact that general medical practitioners provide many types of care. On the one hand, more conscientious individuals may be more likely to seek preventative care and treatment for health problems when they do arise (Weston & Jackson, 2016). On the other hand, more conscientious individuals may be generally healthier (Goodwin & Friedman, 2006; Weston et al., 2015) and therefore require fewer doctor visits for health problems. Because the care administered by general medical practitioners is quite

heterogeneous, more fine-grained measures of type and context of healthcare use may be needed to clarify this association. In sum, the present findings are largely consistent with prior theory and research and provide strong support for associations between neuroticism, conscientiousness, and healthcare use.

Relative to neuroticism and conscientiousness, theory and prior research make fewer clear predictions about agreeableness, extraversion, and openness. However, we found that higher levels of agreeableness, extraversion, and openness were associated with greater likelihood of visiting a dentist, and higher levels of agreeableness were associated with greater likelihood of hospitalization. The meta-analytic associations between these traits and dentist visits were observed in several individual samples and are partially consistent with past research. For example, Aarabi et al., 2022 also found that higher levels of extraversion and openness (but not agreeableness) were associated with more routine dentist visits. In contrast, the finding linking agreeableness to greater likelihood of hospitalization should be interpreted with some caution, given that this finding is inconsistent with prior research (e.g., Chapman et al., 2009, Friedman et al., 2013), and because the majority of associations within individual study were null.

Heterogeneity Across Samples

In addition to interpreting the meta-analytic effects, we can also learn from heterogeneity across samples. For example, there was considerable heterogeneity in the *strength* of the association between neuroticism and hospital use, as well as conscientiousness and dentist use, but the direction and statistical significance of both effects were relatively consistent across samples. In other words, the present research provided ten independent replications of the positive association between neuroticism and hospital use and seven independent replications of the positive association between conscientiousness and dentist use, by one indicator of replication (Anderson & Maxwell, 2016).

We examined two potential sample-level moderators that may partially explain the observed heterogeneity in effect sizes: average age of the sample and country of data collection. The association between neuroticism and greater likelihood of being admitted to a hospital was weaker in older samples. This may be because health problems requiring hospitalization are more common in older adulthood, limiting the potential effects of personality on hospital admission (Shanahan et al., 2014). In contrast, the positive association between openness and greater likelihood of visiting a dentist was stronger in younger samples. This may suggest that openness is protective against the common decline in dental visits that have been observed in older adulthood (Zhang et al., 2019). Average baseline age also moderated the associations of extraversion and openness with likelihood of being admitted to a hospital. However, it is difficult to interpret these effects given the cross-over shape of the interaction and because effects are very small for both younger and older samples.

We also found some evidence for moderation by country of data collection. The association of conscientiousness with lower likelihood of being admitted to a hospital was stronger in the U.S. samples. This may suggest that conscientiousness is more critical to maintaining good health in the U.S., perhaps due to limited access to routine healthcare for those who are underinsured. Alternatively, this may be because hospital admission in the U.S.

is usually reserved for the most serious health conditions, whereas other types of care are sometimes provided in hospital settings in other countries. We also found a negative association between openness and hospital use only in the U.S. samples. This is somewhat consistent with prior research which has found a negative association between openness and use of emergency rooms and skilled nursing facilities in a U.S. sample (Friedman et al., 2013).

Taken together, there was substantial explained and unexplained heterogeneity in the strength of effects, but many of the strongest effects were remarkably consistent across individual samples.

The Role of Enabling and Need Factors

The Andersen behavioral model of healthcare utilization posits that factors that enable healthcare use (e.g., income and insurance) and that influence need for healthcare (e.g., chronic conditions) influence healthcare use. These same factors have also been associated with personality. Thus, the current investigation considered economic enabling and health-related need factors as potential third variable confounds that explain the links between personality traits and healthcare use. The direction of all meta-analytic effects remained the same when accounting for these factors, and in most cases statistically significant effects remained significant when adjusting for these factors. Thus, the association between personality and healthcare use appears to be mostly independent from access to healthcare and need for healthcare, at least as operationalized in the present study. Importantly, income and insurance are just two factors that influence healthcare access, and chronic health conditions are just one factor that may influence healthcare need. The present investigation did not account for other enabling factors (e.g., proximity to healthcare and quality of available care) or other need factors (e.g., accidents and injuries, acute illnesses, and undiagnosed conditions). Moreover, the majority of studies did not include insurance data, and we were primarily only able to examine the role of insurance in the U.S. samples, in part due to data availability and in part due to the nature of the health insurance system in the U.S. relative to the other countries included in the present research.

Implications for Healthcare Delivery and Policy

Incorporating personality assessment into precision medicine approaches (Ziegelstein, 2015) may help practitioners predict how an individual is likely to engage with the healthcare system or understand more precisely how the healthcare system is not working for the individual. For example, understanding how personality and other individual-level factors influence healthcare use has the potential to inform personalized medicine by identifying who could benefit the most from targeted interventions that promote effective healthcare use, and how to tailor health promotion communication to improve individuals' healthy use of services and the delivery of patient-centered health services (Condon et al., 2017; Mroczek, Weston, & Willroth, 2020; Israel et al., 2014; Ziegelstein, 2015). However, several open questions would need to be addressed before the present findings could be applied to healthcare delivery or policy.

First, the observed associations between broad categories of healthcare and broad personality traits were small. The effects of precision medicine efforts based on these small associations would likely be even smaller. More precise investigations using healthcare variables designed to distinguish important dimensions of care (e.g., preventative vs. reactive care; acute vs. chronic care) and specific types of care (e.g., dialysis vs. wound treatment vs. dental cleaning) are needed to better understand the nature of associations between personality traits and healthcare use. In addition to our focus on broad types of healthcare use, we also focused on broad Big Five traits because the same five traits (or a subset of them) were assessed in all 15 datasets. However, more specific personality facets or nuances (Stewart et al., 2022) may be more strongly associated with healthcare use and may provide more information about why traits are associated with healthcare use (e.g., Atherton et al., 2021). Future research should examine associations between personality traits, facets, and nuances, and more specific types of healthcare use. For example, the responsibility facet of conscientiousness may be associated with receiving recommended health screenings. Such nuanced investigations may reveal stronger associations compared to the small associations observed here between broad traits and broad categories of care. Further, these more specific associations may reflect multiple potentially competing pathways that underlie the observed broad associations. Building on the previous example, people who are high in the responsibility facet of conscientiousness may be more likely to receive recommended health screenings, but this may also reduce their use of other types of health care, such as treatments for health problems. Understanding these more specific associations would inform precise, and potentially more impactful, targeting and tailoring efforts.

A major challenge in this regard stems from the limited use of longer and more detailed personality assessments in large-scale datasets. In particular, most of the longitudinal studies focused on health and aging (e.g., HRS, MIDUS) use brief Big Five measures that do not adequately capture underlying personality facets. Similarly, few of the datasets included in the present analyses use personality-related content that lies beyond the Big Five such as other trait frameworks or measures of values, interests, and goals/motivations. As the present work contributes to a growing body of findings for small or null effects between the Big Five traits and health behaviors (e.g., Atherton et al., 2022) and given research demonstrating stronger associations for personality facets ad nuances relative to broad trait domains (e.g., Stewart et al., 2022), there is growing need to expand the assessment of personality in these large ongoing studies. Of course, the prospect of expanding assessment in these studies is a challenge in itself, as the demands on participants' time and attention are already substantial. We urge personality scientists to lead the way, in advocating for the inclusion of more robust assessments in existing studies, perhaps in a subset of longitudinal waves, for a subset of participants, or for a subset of facets, in advocating for the inclusion of robust personality assessments in new studies (e.g., AllOfUs; All of Us Research Program Investigators, 2019), and by conducting studies of their own that complement and enrich existing studies by deliberately focusing on specific facets and nuances and other content that is likely to be most promising for revealing actionable insights (e.g., Olaru et al., 2022; Mõttus et al., 2020, 2022; Revelle et al., 2021).

Second, although personality traits are not typically assessed in healthcare settings currently, there is a precedent for doing so given that other personality-related questions are often

asked in routine care settings as screeners (e.g., “to what extent have you felt sad lately” as a screener for depression) and recent research has begun to examine the utility of assessing social determinants of health in healthcare settings (e.g., Ordonez et al., 2021). Incorporating personality assessment into healthcare systems in an efficient manner would be necessary before direct healthcare applications are possible. One potentially promising approach is to assess personality at multiple timepoints, as well as other individual characteristics such as life circumstances and psychosocial well-being, using short-form methods and entering them into electronic health records as we would depression screenings or otherwise (Condon et al., 2017; Gorini & Pravettoni, 2020; Matthews et al., 2016).

Finally, it is important that any healthcare delivery or policy applications are carried out in an ethical manner. Information on personality collected within a healthcare system should be treated with the same level of autonomy, privacy, and care as other types of protected health information. Patients should be briefed on the potential benefits and costs, allowed to opt in and out whenever they please, and rest assured knowing that their data are confidential similar to the rest of their health information. Interventions should be designed based on the best available evidence to avoid waste, and their efficacy and effectiveness should be thoroughly evaluated. We also recommend that such interventions focus on changing the healthcare system to better meet individual’s different needs, rather than changing individuals’ personalities to fit the healthcare system. In this vein, a range of other contextual and individual factors beyond personality should be considered when designing and delivering healthcare services to better meet the needs of the population. The utility of personality assessment in this context might simply serve as a marker of who the healthcare system is not working for and why it is not working for them.

Limitations

The following limitations should be considered when drawing conclusions from the present research. First, the present study cannot distinguish appropriate healthcare use from under-use or over-use. This distinction is particularly important given that underuse of healthcare is detrimental to individuals’ health and can result in increased healthcare costs over the long-term (e.g., Maciosek et al., 2010), and at the same time, overuse of healthcare can lead to unnecessary and sometimes invasive diagnostic tests and medical interventions and greater immediate healthcare costs (Emanuel & Fuchs, 2008). Moreover, differences in healthcare use between individuals and groups can lead to inequitable distribution of care (Andersen & Aday, 1978; Burgess et al., 2008; Shelley et al., & Fahs, 2011). Thus, future research that incorporates the *context* of healthcare and *quantity* of use is needed.

Second, although we used samples from different countries with different healthcare systems, all samples were from the U.S., Australia, Japan, or Western Europe, and thus the extent to which the present findings generalize to lower- and middle-income countries is unclear. Future research should examine the generalizability versus specificity of these associations across cultures, as well as across particular sociocultural identities (e.g., race, ethnicity, sexual orientation, gender identity, immigrant status) who often experience disproportionate barriers to healthcare services.

Finally, the present analyses were correlational and thus we cannot draw conclusions about causality. We have discussed how personality may impact healthcare use. However, it is also plausible that healthcare use impacts personality (e.g., through effects on health status), or that an unmeasured confounder influences both personality and healthcare use. We expect that a combination of these causal pathways may contribute to the observed correlational associations. The present findings provide a strong framework upon which to conduct future research on potential causal relationships between personality and healthcare use.

Concluding Remarks

The present research has several key strengths that make it a firm foundation for future research on personality trait-healthcare associations. First, we used a coordinated data analysis approach across 15 samples. This provided up to 15 independent opportunities for replication for each effect; and thus, the meta-analytic estimates and body of individual study results in the present research may be more informative than prior single-study findings. The use of a coordinated data analysis increases confidence that the observed findings are at least somewhat generalizable and not an idiosyncrasy of any individual sample or measure. Second, we examined a range of different types of healthcare, increasing our understanding of how personality-healthcare use associations differ based on healthcare type. In sum, results suggest that personality traits are associated with who uses healthcare and personality-healthcare use associations differ across different types of care. Future research should examine more nuanced relationships between personality facets and nuances, and specific types of care (e.g., routine physicals vs. emergent surgeries).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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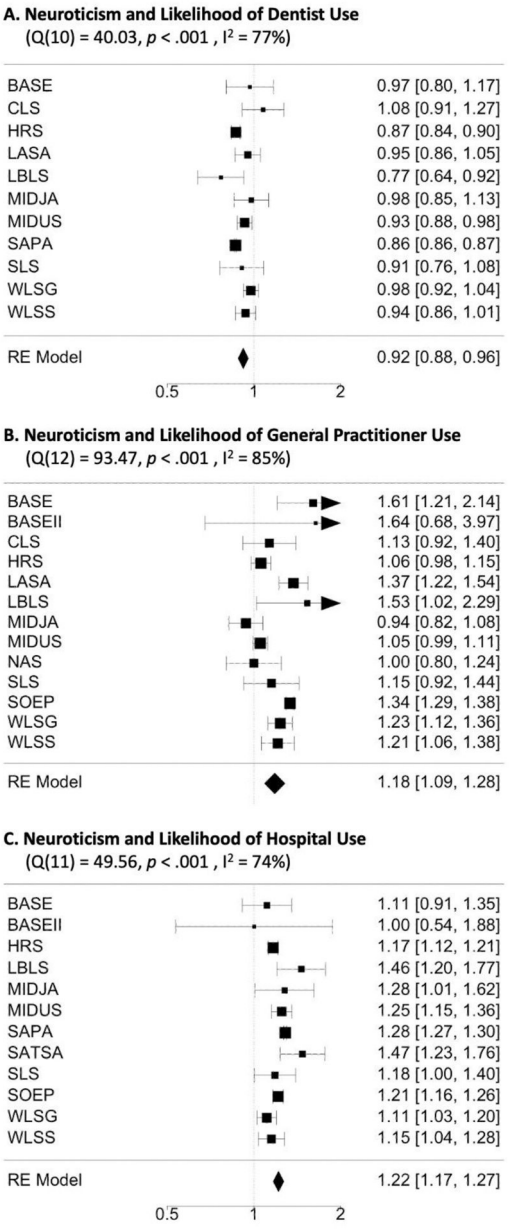

Figure 1.

Forest plots depicting results of primary cross-sectional results for neuroticism and three types of healthcare use, while adjusting for participant age and sex. RE Model = random-effects meta-analytic estimate. Between-study heterogeneity statistics (Q, I^2) are shown above each forest plot.

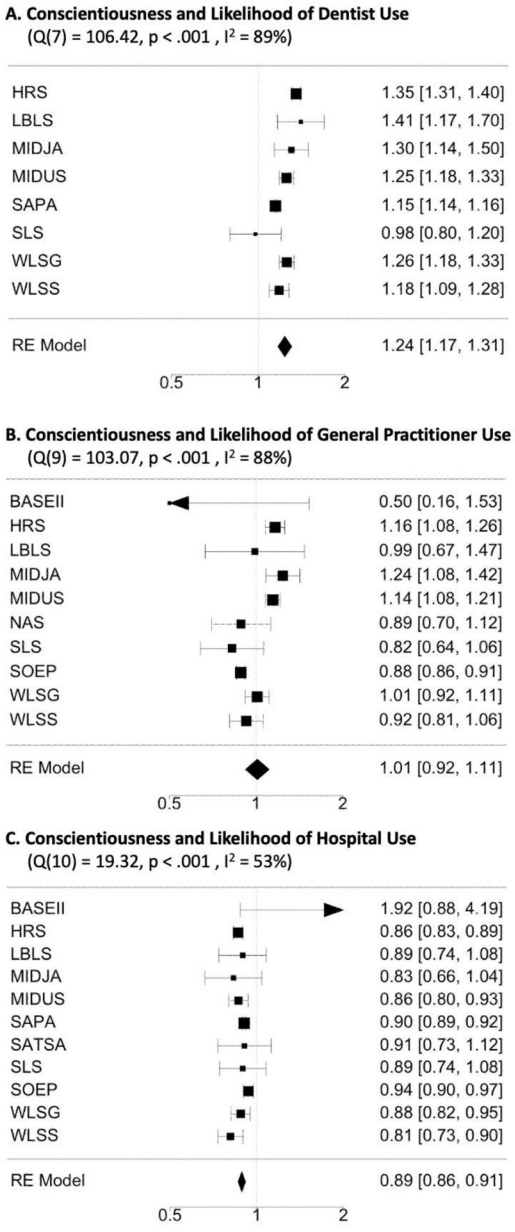

Figure 2.

Forest plots depicting results of primary cross-sectional results for conscientiousness and three types of healthcare use, while adjusting for participant age and sex. RE Model = random-effects meta-analytic estimate. Between-study heterogeneity statistics (Q, I^2) are shown above each forest plot.

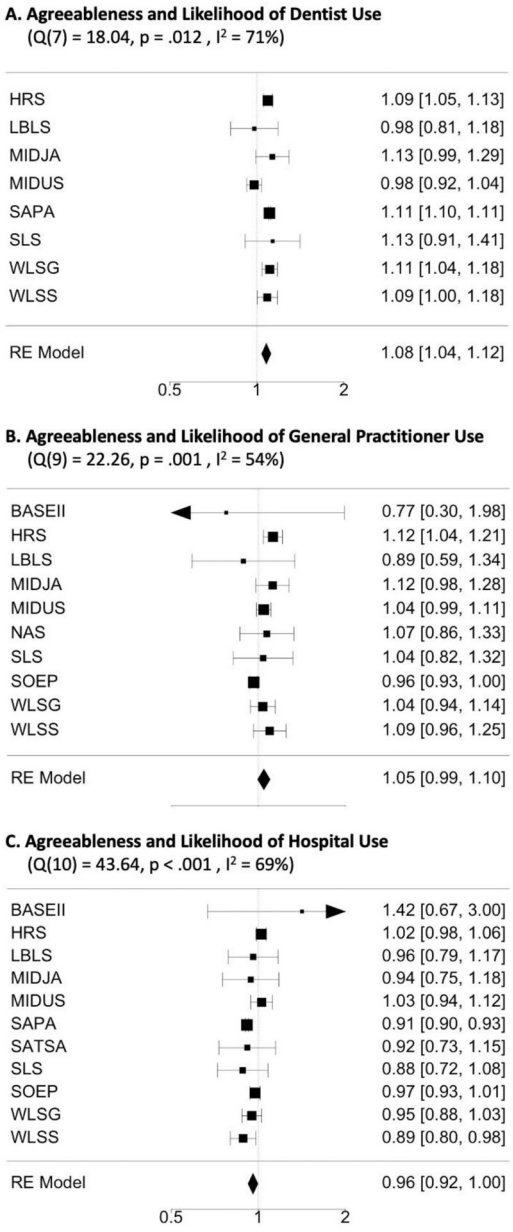

Figure 3.

Forest plots depicting results of primary cross-sectional results for agreeableness and three types of healthcare use, while adjusting for participant age and sex. RE Model = random-effects meta-analytic estimate. Between-study heterogeneity statistics (Q, I^2) are shown above each forest plot.

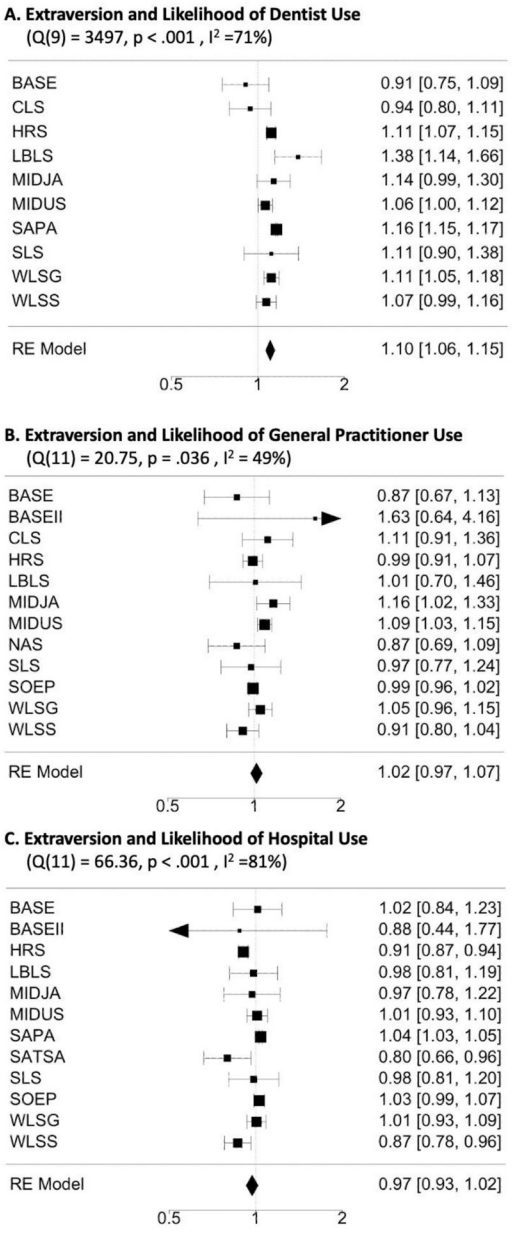

Figure 4.

Forest plots depicting results of primary cross-sectional results for extraversion and three types of healthcare use, while adjusting for participant age and sex. RE Model = random-effects meta-analytic estimate. Between-study heterogeneity statistics (Q, I^2) are shown above each forest plot.

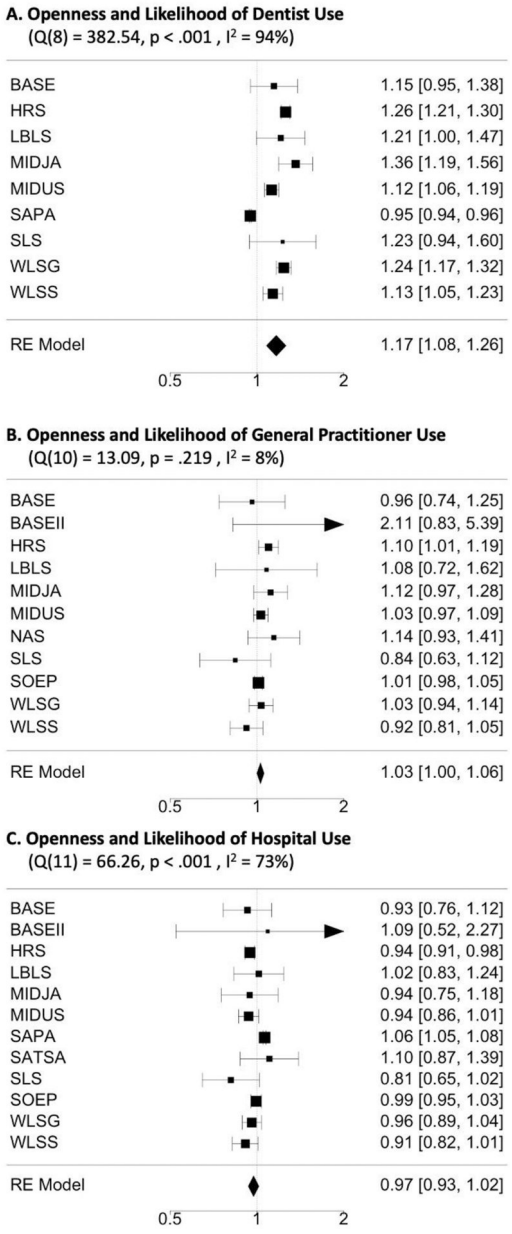

Figure 5.

Forest plots depicting results of primary cross-sectional results for openness and three types of healthcare use, while adjusting for participant age and sex. RE Model = random-effects meta-analytic estimate. Between-study heterogeneity statistics (Q, I^2) are shown above each forest plot.

Table 1

Measurement of Personality and Healthcare Use Variables

	Personality Inventory	Dentist Use	General Practitioner Use	Hospital Use	Time Lag between MO
BASE	NEO	In the past 12 months, have you been to a dentist?	How many times have you been to a doctor in the past 12 months?	Have you been in the hospital at least one day in the past 12 months?	--
BASE II	BFI-S	--	How many times have you been to a doctor in the past 12 months?	How many times did you stay overnight in the hospital in the past 12 months?	2 years
CLS	Eysenck	In the last six months, have you had advice or help from any of the following: A dentist?	In the last six months, have you had advice or help from any of the following: A general practitioner?	--	4 years
HRS	MIDI	In the last two years, have you seen a dentist for dental care, including dentures?	How many times have you seen or talked to a medical doctor about your health, including emergency room or clinic visits in the last two years?	In the last two years, have you been a patient in a hospital overnight?	4 years
LASA	DPQ	Indicate whether you have had contact with one of these persons or services in the past six months: dentist	Indicate whether you have had contact with one of these persons or services in the past six months: family physician	--	3 years
LBLS	NEO	Visits to the dentist the in past 12 months	number of times seen a physician in past 12 months	In the hospital for at least one day past 12 months?	3 years
MIDJA	MIDI	In the past 12 months, did you see a dentist for a routine check-up or exam?	In the past 12 months, did you see a doctor, hospital or clinic for a routine physical check-up or gynecological exam?	Have you been hospitalized overnight in the past 12 months?	4 years
MIDUS	MIDI	Number of times dental routine exam (past 12 months)	Number of times routine physical check-up or gynecological exam (past 12 months)	Number of times hospitalized overnight (past 12 months)	9 years
NAS	Goldberg	--	How many times did you see a medical doctor during the past 6 months for shots, x-ray, test, or an exam? How many times did you get medical advice from a doctor over the telephone during the past 6 months?	--	3 years
SAPA	EPQ, NEO-PI	How often do you go to the dentist?	--	How many times have you been admitted to an emergency room in the last 6 months?	--
SATSA	NEO-PI-R	--	--	How many of these days during the past 6 months have you been hospitalized, in a convalescent home, in a resting home or similar?	3 years
SLS	BFI-S	In the past 12 months, have you been to a dentist?	Approximately how many times have you seen a doctor in the past 12 months?	Have you been in the hospital at least one day (including outpatient procedures) in the past 12 months?	3 years
SOEP	BFI 4a and 5a	--	Have you seen a doctor in the past 3 months?	Were you admitted to the hospital once or several times for at least one night in [year]?	4 years
WLS-G	BFI 4a and 5a	In the past 12 months, have you seen a dentist or oral surgeon in an office, clinic, or health center?	In the past 12 months, have you seen a dentist or oral surgeon in an office, clinic, or health center, not including visits to mental health professionals?	In the past 12 months, have you been a patient in the hospital for at least one night?	--

	Personality Inventory	Dentist Use	General Practitioner Use	Hospital Use	Time Lag between MO
WLS-S	BFI 4a and 5a	In the past 12 months, have you seen a dentist or oral surgeon in an office, clinic, or health center?	In the past 12 months, have you seen a dentist or oral surgeon in an office, clinic, or health center, not including visits to mental health professionals?	In the past 12 months, have you been a patient in the hospital for at least one night?	--

Table 2

Descriptive Statistics of Personality and Healthcare Use Variables

	Neuroticism M(SD) / N	Conscient. M(SD) / N	Extraversion M(SD) / N	Agreeable. M(SD) / N	Openness M(SD) / N	Dentist %T1/%T2 N T1/N T2	GP %T1 %T2 N T1/N T2	Hospital %T1/%T2 N T1/N T2
BASE	3.4(1.9) / 516	--	5.8(1.5) / 516	--	6.8(1.8) / 516	56 / −495 / -	85 / −492 / -	29 / −516 / -
BASE II	4.7(2.2) / 663	7.8(1.7) / 662	6.4(2.0) / 662	7.1(1.7) / 663	6.5(2.0) / 663	--	90 / 84 61 / 874	20 / 1861 / 862
CLS	2.7(2.4) / 799	--	5.3(2.1) / 799	--	- -	23 / 24 883 / 595	86 / 84 883 / 597	--
HRS	3.5(2.1) / 14,490	7.8(1.6) / 14,441	7.3(1.9) / 14,480	8.4(1.6) / 14,491	6.4(1.9) / 14,386	65 / 65 14,548 / 12,080	95 / 93 13,772 / 11,462	27 / 30 14,538 / 12,083
LASA	2.0 (1.9) / 2,094	--	--	--	--	34 / 29 2,582 / 2,287	75 / 78 2,967 / 2,287	--
LBLS	4.1(1.1) / 600	6.3(0.9) / 600	5.4(1.0) / 600	6.5(0.8) / 600	5.5(0.9) / 600	70 / 71 639 / 401	95 / 96 640 / 392	26 / 26 647 / 398
MIDJA	3.7(1.9) / 1,023	5.6(1.8) / 1,024	4.8(2.3) / 1,024	5.4(2.1) / 1,024	4.0(2.0) / 1,021	35 / 40 995 / 636	66 / 75 1009 / 639	9 / 9 1019 / 656
MIDUS	4.1(2.2) / 6,253	8.1(1.5) / 6,258	7.3(1.9) / 6,259	8.3(1.6) / 6,259	6.7(1.8) / 6,252	74 / 75 6,136 / 3,826	70 / 81 6,154 / 3,898	11 / 14 6,165 / 3,910
NAS	2.5(1.5) / 824	8.1(1.5) / 830	6.5(1.7) / 827	8.1(1.5) / 829	7.8(1.4) / 824	--	89 / 91 853 / 391	--
SAPA	5.4(1.7) / 305,762	6.3(1.4) / 305,762	5.0(1.5) / 305,762	6.8(1.3) / 305,762	7.3(1.1) / 305,762	64 / −−287,419 / --	--	10 / -- 294,024 / --
SATSA	3.2(2.6) / 1,538	6.9(1.2) / 1,228	5.3(2.6) / 1,540	7.2(1.0) / 1,236	5.0(1.2) / 1,187	--	--	21 / 9 708 / 1,338
SLS	4.0(1.1) / 1,058	6.2(1.0) / 807	5.5(1.1) / 848	6.7(0.9) / 803	6.1(1.0) / 618	85 / 88 1,053 / 778	93 / 92 961 / 700	27 / 27 1,048 / 772
SOEP	4.7(2.0) / 21,097	8.0(1.6) / 21,093	6.3(1.9) / 21,092	7.3(1.6) / 21,101	5.7(2.0) / 21,084	--	72 / 74 21,134 / 19,382	13 / 14 21,097 / 19,357
WLS-G	4.0(1.3) / 6,597	7.9(1.2) / 6,600	6.1(1.5) / 6,604	7.9(1.3) / 6,603	5.7(1.4) / 6,596	75 / -- 6,657 / --	92 / -- 6,677 / --	13 / -- 6,676 / --
WLS-S	4.1(1.3) / 3,815	7.7(1.2) / 3,822	6.0(1.5) / 3,822	7.7(1.3) / 3,821	5.7(1.3) / 3,819	75 / -- 3,862 / --	92 / -- 3,870 / --	13 / -- 3,865 / --

Note. For descriptive purposes, all personality trait scores were converted to a 0–10 scale using POMP scoring. T1 = Analytic baseline. T2 = Follow-up timepoint for prospective analyses. N = total number of participants with valid data for a given variable. M = Mean. SD = Standard deviation.

Table 3

Summary of Findings

	Dentist								General Practitioners								Hospitals							
	Cross-sectional				Prospective				Cross-sectional				Prospective				Cross-sectional				Prospective			
	meta	/	+	−	meta	/	+	−	meta	/	+	−	meta	/	+	−	meta	/	+	−	meta	/	+	−
N	Neg	7	0	4	Neg	5	0	2	Pos	7	6	0	Null	7	2	1	Pos	2	10	0	Pos	5	3	0
C	Pos	1	7	0	Pos	0	5	0	Null	6	3	1	Null	4	3	1	Neg	5	0	6	Neg	7	0	1
A	Pos	4	4	0	Null	3	2	0	Null	8	1	1	Null	4	3	1	Neg	9	0	2	Null	8	0	0
E	Pos	4	6	0	Null	3	3	0	Null	10	2	0	Null	8	1	0	Null	8	1	3	Null	7	0	1
O	Pos	3	5	1	Pos	2	3	0	Null	10	1	0	Null	6	1	1	Null	10	1	1	Neg	6	0	2

Note. N = Neuroticism. C = Conscientiousness. A = Agreeableness. E = Extraversion. O = Openness. Meta = meta-analytic effect. Null = null meta-analytic association. Pos = positive and statistically significant meta-analytic association. Neg = Negative and statistically significant meta-analytic association. / = number of individual study results that were null. + = number of individual study results that were significantly positive. - = number of individual study results that were significantly negative.

Table 4

Meta-analytic Results of Sensitivity Analyses Adjusting for Enabling and Need Factors

	Adjusting for Age, Sex, Income			Adjusting for Age, Sex, Income, Insurance			Adjusting for Age, Sex, Income, Chronic Conditions			Adjusting for Age, Sex, Income, Insurance, Chronic Conditions		
Neuroticism												
	samples	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**
Dentist	8	**0.93**	**0.89, 0.97**	-	-	-	7	**0.94**	**0.89, 0.98**	-	-	-
GP	10	**1.19**	**1.10, 1.29**	4	**1.13**	**1.05, 1.21**	8	**1.14**	**1.05, 1.24**	4	1.06*	0.99, 1.14*
Hospital	9	**1.20**	**1.15, 1.24**	5	**1.18**	**1.12, 1.25**	8	**1.14**	**1.08, 1.20**	5	**1.14**	**1.07, 1.22**
Conscientiousness												
	Adjusting for Age, Sex, Income			**Adjusting for Age, Sex, Income, Insurance**			**Adjusting for Age, Sex, Income, Chronic Conditions**			**Adjusting for Age, Sex, Income, Insurance, Chronic Conditions**		
	samples	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**
Dentist	7	**1.22**	**1.18, 1.26**	-	-	-	6	**1.21**	**1.18, 1.25**	-	-	-
GP	9	0.98	0.89, 1.07	4	1.04	0.94, 1.14	7	1.02	0.90, 1.15	4	1.10	0.99, 1.22
Hospital	9	**0.89**	**0.87, 0.93**	5	**0.88**	**0.85, 0.91**	8	**0.93**	**0.91, 0.95**	5	**0.92**	**0.90, 0.93**
Agreeableness												
	Adjusting for Age, Sex, Income			**Adjusting for Age, Sex, Income, Insurance**			**Adjusting for Age, Sex, Income, Chronic Conditions**			**Adjusting for Age, Sex, Income, Insurance, Chronic Conditions**		
	samples	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**
Dentist	7	**1.08**	**1.04, 1.13**	-	-	-	**6**	**1.09**	**1.04, 1.14**	-	-	-
GP	9	1.04	0.98, 1.09	4	**1.07**	**1.02, 1.11**	7	1.05	0.99, 1.12	**4**	**1.08**	**1.04, 1.13**
Hospital	9	**0.96**	**0.92, 0.999**	5	0.96	0.90, 1.01	8	0.97	0.93, 1.01	5	0.97	0.92, 1.02
Extraversion												
	Adjusting for Age, Sex, Income			**Adjusting for Age, Sex, Income, Insurance**			**Adjusting for Age, Sex, Income, Chronic Conditions**			**Adjusting for Age, Sex, Income, Insurance, Chronic Conditions**		
	samples	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**
Dentist	7	**1.10**	**1.06, 1.15**	-	-	-	6	**1.09**	**1.04, 1.14**	-	-	-
GP	9	1.00	0.95, 1.05	4	1.02	0.94, 1.10	7	1.04	0.98, 1.10	4	1.05	0.97, 1.14
Hospital	9	0.98	0.93, 1.04	5	0.97	0.90, 1.05	8	1.00	0.96, 1.05	5	1.00	0.93, 1.06
Openness												

	Adjusting for Age, Sex, Income			Adjusting for Age, Sex, Income, Insurance			Adjusting for Age, Sex, Income, Chronic Conditions			Adjusting for Age, Sex, Income, Insurance, Chronic Conditions		
	samples	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**	**samples**	**OR**	**95% CI**
Dentist	7	**1.10**	**1.02, 1.20**	-	-	-	6	**1.10**	**1.01, 1.21**	-	-	-
GP	9	1.02	0.997, 1.05	4	1.03	0.99, 1.08	7	**1.04**	**1.004, 1.08**	4	**1.07**	**1.004, 1.13**
Hospital	9	0.98	0.93, 1.03	5	0.98	0.92, 1.04	8	1.00	0.96, 1.05	5	1.00	0.95, 1.06

Note. Samples = number of samples with requisite data and thus included in analysis. OR = odds ratio. CI = Confidence interval. GP = General medical practitioner. Effects for which the 95% CI does not include 1 are bolded.

Table 5

Meta-Analytic Moderation of Primary Models

Moderation by Average Age of Sample						
	Dentist		**General Practitioner**		**Hospital**	
Neuroticism	**coeff**	**95% CI**	**coeff**	**95% CI**	**coeff**	**95% CI**
Intercept	−0.183	−0.349,−0.162	−0.121	−0.635, 0.394	0.343	0.305, 0.381
Mean Age of Sample	0.002	−0.001, 0.004	0.005	−0.004, 0.013	**−0.003**	**−0.004,−0.002**
Conscientiousness						
Intercept	0.065	−0.139, 0.268	0.283	−0.423, 0.990	−0.047	−0.156, 0.064
Mean Age of Sample	0.003	−0.001, 0.006	−0.005	−0.016, 0.007	−0.001	−0.004, 0.001
Agreeableness						
Intercept	0.064	−0.116, 0.244	−0.150	−0.446, 0.145	−0.112	−0.271, 0.047
Mean Age of Sample	0.000	−0.003, 0.003	0.003	−0.002, 0.008	0.001	−0.002, 0.004
Extraversion						
Intercept	0.205	0.070, 0.339	0.209	−0.070, 0.487	0.141	0.002, 0.281
Mean Age of Sample	−0.002	−0.004, 0.001	−0.003	−0.008, 0.001	**−0.003**	**−0.006,−0.001**
Openness						
Intercept	−0.151	−0.383, 0.081	−0.046	−0.213, 0.121	0.176	0.139, 0.213
Mean Age of Sample	**0.005**	**0.001, 0.009**	0.001	−0.002, 0.004	**−0.004**	**−0.005,−0.003**
Moderation by Country of Data Collection						
	Dentist		**General Practitioner**		**Hospital**	
Neuroticism	**coeff**	**95% CI**	**coeff**	**95% CI**	**coeff**	**95% CI**
Intercept (non−U.S.)	−0.015	−0.097, 0.067	0.220	0.096, 0.343	0.211	0.139, 0.283
Country (U.S.)	−0.079	−0.173, 0.016	−0.093	−0.256, 0.070	−0.043	−0.131, 0.045
Conscientiousness						
Intercept (non−U.S.)	0.265	0.080, 0.451	0.006	−0.194, 0.206	−0.070	−0.109, −0.031
Country (U.S.)	−0.039	−0.236, 0.157	0.002	−0.233, 0.236	**−0.080**	**−0.128,−0.031**
Agreeableness						
Intercept (non−U.S.)	0.123	−0.036, 0.283	−0.007	−0.074, 0.061	−0.033	−0.114, 0.047
Country (U.S.)	−0.062	−0.229, 0.105	0.071	−0.014, 0.156	0.006	−0.090, 0.102
Extraversion						
Intercept (non−U.S.)	0.017	−0.074, 0.108	0.038	−0.051, 0.128	−0.027	−0.118, 0.064
Country (U.S.)	0.081	−0.014, 0.176	−0.035	−0.148, 0.078	−0.023	−0.134, 0.089
Openness						
Intercept (non−U.S.)	0.243	0.113, 0.373	0.029	−0.030, 0.087	−0.008	−0.046, 0.031
Country (U.S.)	−0.064	−0.205, 0.076	0.005	−0.072, 0.081	**−0.052**	**−0.100,−0.004**