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Who is healthier? A meta-analysis of the relations between the HEXACO personality domains and health outcomes

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Abstract

Researchers and practitioners have long been interested in the relations of basic personality domains with health. Whereas previous meta-analyses have focused on the Big Five traits, we provide the first meta-analysis of the relations between the HEXACO domains, as assessed by HEXACO Personality Inventories, and various health outcomes (k = 276, N = 92,319). In general, relations of the HEXACO domains were strongest with mental health, followed by health behavior, whereas relations with physical health outcomes were weak and largely non-significant. All HEXACO domains were significantly linked to mental health and health behavior outcomes. Extraversion exhibited the strongest correlation with mental health ($\bar{\rho}$ = .48), whereas Honesty-Humility ($\bar{\rho}$ = .31), Agreeableness versus Anger ($\bar{\rho}$ = .25), and Conscientiousness ($\bar{\rho}$ = .31) were most predictive of health behavior. Physical health was only significantly associated with Emotionality ($\bar{\rho}$ = −.14) and Conscientiousness ($\bar{\rho}$ = .10). Honesty-Humility explained incremental variance over the Big Five in several health behavior outcomes, whereas it had little incremental validity for mental and physical health outcomes. Finally, comparing the variance that the HEXACO and the Big Five domains explained in specific health outcomes demonstrated that each personality model occasionally exhibited superior criterion-related validity. Hence, the choice of the more useful personality model could be outcome-dependent.

Keywords

personality traits, HEXACO, Big Five, health, meta-analysis

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Introduction

Being healthy is typically regarded as an important goal of human life. Correspondingly, researchers have long been searching for the predictors of health across various categories, including mental health, health behavior, and physical health, and several important correlates of health have been identified. These include environmental factors, such as climate change (Watts et al., 2015), discrimination (Pascoe & Richman, 2009), and social inequality (Kondo et al., 2009)—which all affect health negatively—as well as individual difference variables, such as cognitive abilities (Gottfredson & Deary, 2004), socioeconomic status (Adler & Ostrove, 1999), and personality traits (Friedman & Kern, 2014). Especially the idea that personality traits are related to health has been of interest to researchers and practitioners for a long time (Dammeyer & Zettler, 2018): Greek and Roman philosophers, such as Hippocrates or Galen, already investigated individual differences in the proclivity to be healthy. In recent decades, more rigorous research has emerged across disciplines, including medicine as well as clinical and health psychology (Chapman et al., 2011; Costa & McCrae, 1986; Ferguson, 2013).

Most recent research on the relations of personality traits with health has focused on the Big Five domains: Openness to Experience/Intellect, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (vs. Emotional stability). Findings from several meta-analyses indicate that these domains explain considerable variance in various health outcomes (e.g., Malouff et al., 2006; Ohi et al., 2016; Wilson & Dishman, 2015). For instance, meta-analyses found significant relations between Conscientiousness and subjective and psychological well-being (mean r = .36; Anglim et al., 2020), between Extraversion and schizophrenia (Hedges' g = −.79 comparing patients with healthy individuals; Ohi et al., 2016), and between Neuroticism and depressive symptoms (r = .39; Hakulinen et al., 2015).

Over the last two decades, advances in personality psychology have challenged the view that the Big Five reflect the largest set of replicable basic personality traits, instead suggesting a six-dimensional representation of basic personality (Saucier, 2009). Most prominently, this idea has

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been put forward in the HEXACO personality model (Lee & Ashton, 2004), comprising the basic domains of **H**onesty-Humility, **E**motionality, e**X**traversion, **A**greeableness versus Anger, **C**onscientiousness, and **O**penness to Experience (letters in **bold** form the HEXACO acronym; see Table 1 for definitions).

Importantly, notable differences between the Big Five and the HEXACO model exist in how they organize the personality space (Thielmann et al., 2022). By implication, the consideration of the HEXACO model might also be worthwhile in relation to health outcomes. Specifically, Honesty-Humility, the domain reflecting the most prominent difference between the HEXACO and other personality models, exhibits a positive meta-analytic correlation with subjective and psychological well-being (Anglim et al., 2020), and initial evidence has also linked Honesty-Humility to other health outcomes, such as emotional exhaustion (Yang et al., 2019) or alcohol consumption and smoking (Wetzel & Frick, 2020). There is also initial evidence for an association of the HEXACO domain Emotionality—the counterpart of Big Five Neuroticism, which, however, involves noteworthy conceptual differences—with health outcomes, such as mindfulness (Holden et al., 2020) and schizotypy (Janošević & Petrović, 2019). Other differences between the Big Five and the HEXACO model, such as those in the personality variance captured by Agreeableness (vs. Anger), might also affect relations with health. Prior research relating personality traits to health criteria solely based on the Big Five model might thus prevent a more comprehensive understanding of how basic personality *in general* relates to health outcomes. To address this issue, we meta-analytically examine for the first time the relations of the HEXACO domains with various indicators of health and compare effect sizes to those for the Big Five domains.

Specifically, we provide a meta-analysis of the relations of the HEXACO domains with mental health, health behavior, and physical health, as well as with more specific health criteria within these categories (e.g., life satisfaction, physical strength, and substance use). In addition, we compare the criterion-related validity of the HEXACO domains for specific health outcomes with the validity of the Big Five domains and examine if Honesty-Humility explains incremental variance over and above the Big Five in these outcomes. Our findings thereby foster a deeper understanding of how basic personality domains relate to various health outcomes, which has important implications for research. First, our findings can illuminate the various trait-based pathways to health. Second, our findings extend the nomological net of the HEXACO domains by examining their relations with various health outcomes, which have not been systematically examined before. Comparing results to those found for the Big Five further clarifies how structural differences between the two personality models affect outcome relations in the context of health.

Health

The World Health Organization (1946, p. 1) defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." This implies that not just diagnosed physical diseases, such as cancer or diabetes, but also broader conceptualizations including mental health or health behaviors are indicative of overall health. Following Strickhouser et al. (2017), who conducted a second-order meta-analysis of the relations between the Big Five domains and health, we distinguish between three health categories: mental health, health behavior, and physical health. Strickhouser et al. (2017) defined mental health as "outcomes that reflect cognitive, emotional, or social well-being, such as depression, happiness, and diagnosed psychopathologies"; health behaviors as "outcomes that reflect engagement in health promoting or deteriorating activities, such as exercise, risky sex, and substance use"[1]; and physical health as "outcomes that reflect the fitness of the body, including measures of one's physical condition, diagnosed physical diseases (e.g., cancer), and ultimately mortality" (all p. 3).

Health criteria included in any of the three categories have important large-scale implications for social cohesion and societal functioning: For example, being healthy facilitates actively participating in society, and it takes pressure from the health care system. The prediction and promotion of health is therefore an important aim of many societies, governments, and organizations. One cornerstone to develop and implement health-promoting interventions is

Table 1. Definitions of the HEXACO Domains.

HEXACO Domain	Defining Characteristics from Lexical Studies	Facets
Honesty-humility	Faithful/loyal, fair-minded, honest, modest/unassuming, sincere versus boastful, deceitful, greedy, hypocritical, pompous, pretentious, sly	Sincerity, fairness, greed avoidance, modesty
Emotionality	Anxious, emotional, fearful, oversensitive, sentimental, vulnerable versus brave, independent, self-assured, stable, tough	Fearfulness, anxiety, dependence, sentimentality
Extraversion	Active, cheerful, extraverted, lively, outgoing, sociable, talkative versus introverted, passive, quiet, reserved, shy, withdrawn	Social self-esteem, social boldness, sociability, liveliness
Agreeableness (vs. anger)	Agreeable, gentle, lenient, mild, patient, peaceful, tolerant versus choleric, ill-tempered, quarrelsome, stubborn	Forgivingness, gentleness, flexibility, patience
Conscientiousness	Careful, diligent, disciplined, organized, precise, thorough versus absent-minded, irresponsible, lazy, negligent, reckless, sloppy	Organization, diligence, perfectionism, prudence
Openness to experience	Creative, innovative, intellectual, ironic, unconventional versus conventional, shallow, unimaginative	Aesthetic appreciation, inquisitiveness, creativity, unconventionality

Note. Defining characteristics taken from Ashton and Lee (2007), p. 154 and Ashton and Lee (2008), p. 1953. More detailed definitions can be found on www.hexaco.org.

to know which individual differences variables are associated with being healthy.

Personality

Personality traits denote relatively stable tendencies to think, feel, and act. One common approach to structure personality traits is to categorize a large number of attributes on which individuals differ (taken from the lexicon) into a limited set of latent constructs. This so-called lexical approach to personality assumes that human personality is encoded in spoken languages. Using this approach provides a clear framework for the study of relatively enduring individual differences. For a long time, the Big Five model (or Five-Factor Model [FFM]; Goldberg, 1990; McCrae & Costa, 1992) has been the most commonly used, broad personality taxonomy. More recent evidence has shown, however, that six domains can be replicated across lexical studies in various languages, resulting in the HEXACO model which captures more personality variance than the Big Five (Ashton & Lee, 2019, 2020; Thielmann et al., 2022). Although the Big Five and the HEXACO model share several similarities, crucial differences exist. Most notably, the HEXACO model includes a sixth domain termed Honesty-Humility. This domain describes the tendency to be fair, genuine, and modest versus greedy, pretentious, and sly. Whereas Honesty-Humility is considerably correlated with Big Five Agreeableness ($\overline{\rho}$ = .47; Thielmann et al., 2022), variance captured by Honesty-Humility is insufficiently accounted for by the Big Five (Ashton & Lee, 2019; Thielmann et al., 2022).

The HEXACO domains Emotionality and Agreeableness versus Anger (in the following simply: Agreeableness) also differ substantially from their Big Five counterparts Neuroticism and Agreeableness, respectively. That is, the specific lower-order facets of these two domains are differently distributed across domains to facilitate the interpretability of the two factors. Emotionality describes the tendency to be fearful and anxious, but also to feel a close connection with others and to be dependent on them. Compared to Big Five Neuroticism, Emotionality thus lacks variance associated with irritability and anger, which is instead captured by (low) HEXACO Agreeableness. HEXACO Agreeableness describes the tendency to be forgiving, gentle, and patient with others, and to be willing to compromise with them. Compared to Big Five Agreeableness, it lacks variance associated with sentimentality, which is instead captured by HEXACO Emotionality. Big Five but not HEXACO Agreeableness also captures content related to compassion and empathy, which is captured by Emotionality in the HEXACO model.

Extraversion, Conscientiousness, and Openness to Experience are almost identical across models (for meta-analytic estimates, see Thielmann et al., 2022).

Big Five and Health

Various meta-analyses have reviewed the relations of the Big Five domains with several indicators of health (e.g., Connor-Smith & Flachsbart, 2007; Luo et al., 2022; Ohi et al., 2016; Samuel & Widiger, 2008; Saulsman & Page, 2004; Wilson & Dishman, 2015). Strickhouser et al. (2017) summarized (some of) these meta-analyses in a second-order meta-analysis, showing that Neuroticism (average $r = -.20$, range $-.48$ to .10), Conscientiousness (average $r = .19$, range $-.13$ to .53), and Agreeableness (average $r = .17$, range $-.03$ to .47) were, on average, the strongest predictors of overall health. Correlations of Extraversion (average $r = .08$, range $-.19$ to .40) and Openness to Experience (average $r = .05$, range $-.15$ to .45) with overall health were substantially weaker. Regarding the three health categories, correlations were generally stronger for mental health (average $r = |.06|$ to $|.27|$ across Big Five domains) compared to health behaviors (average $r = |.00|$ to $|.12|$) and physical health (average $r = |.00|$ to $|.03|$).

Crucially, the average correlations between the Big Five traits and health varied considerably across the criteria included in Strickhouser et al.'s (2017) meta-analysis. For example, although Openness/Intellect did not show a strong average correlation with overall health, criterion-specific correlations varied from $r = .03$ (physical activity) to $r = .45$ (resilience). The same held for the other Big Five domains, even when comparing criteria within the specific health categories. For example, although Neuroticism exhibited the strongest average correlation with mental health ($r = -.27$), the correlations differed for the specific mental health outcomes, ranging between $r = -.48$ (life satisfaction) to $r = .10$ (psychopathy). Despite these differences between criteria, we base our hypotheses, as described next, on the average correlations with the three health categories (i.e., mental health, health behavior, and physical health). Importantly, though, the high variability in correlations between specific health outcomes indicates that much is to be gained from such a finer-grained analysis—something that we offer in the current meta-analysis as well.

HEXACO and Health

Because personality traits are psychological variables, which likely exhibit stronger relations with outcomes on the same construct level, we generally expect that personality-health relations are strongest for mental health, somewhat weaker for health behaviors, and weakest for physical health. Indeed, this is also what Strickhouser et al. (2017) found (see also, Luo et al., 2022).

Honesty-Humility. Individuals scoring high on Honesty-Humility are fair-minded, honest, and sincere, more likely to cooperate with and help others, and less likely to show deviant behavior (Pletzer et al., 2019, 2021; Thielmann et al., 2020; Van Gelder & De Vries, 2012; Zettler et al., 2020). These characteristics could be positively associated with overall health because prosociality generally relates positively to health (Crocker et al., 2017; Hofmann et al., 2015; Hui, 2022; Ten Brinke et al., 2015). In addition, several unhealthy behaviors, such as substance abuse or gambling are, in essence, norm-violating and deviant, suggesting that Honesty-Humility should be negatively linked to those. Supporting this reasoning, previous research indicates that Honesty-Humility is positively related to subjective and psychological well-being (Anglim et al., 2020), and negatively to stress and risky behavior (Zettler et al., 2020). In addition, Big Five

Agreeableness, which correlates most strongly with Honesty-Humility among the Big Five, exhibits a moderate correlation with mental health and a weak correlation with health behavior, but no relation with physical health (Strickhouser et al., 2017). Taken together, we therefore expected positive relations of Honesty-Humility with mental health and health behaviors, but had no a priori expectations regarding its relation with physical health.

Emotionality. Individuals scoring high on Emotionality tend to worry a lot and struggle solving problems without others' help. Importantly, these individuals also tend to turn to others for help, which can be considered a coping strategy and thus a positive health behavior that may also be beneficial for mental and physical health. Then again, individuals scoring high on Emotionality may also engage in unhealthy behaviors in reaction to their worries (e.g., binge eating and substance use), especially if social support is missing. In their meta-analyses, Anglim et al. (2020) found that Emotionality generally correlates negatively with subjective and psychological well-being, and Zettler et al. (2020) found positive meta-analytic relations of Emotionality with stress, psychological strain, and anxiety. Emotionality was, however, negatively correlated with the two health behaviors aggression and risk-taking (Zettler et al., 2020). Taken together, we thus expected Emotionality to correlate negatively with mental health, but had no a priori expectations regarding its relations with health behavior and physical health.

Although HEXACO Emotionality differs to some extent from Big Five Neuroticism, the two domains still correlate substantially with each other ($\overline{\rho}$ = .63; Thielmann et al., 2022). For Big Five Neuroticism, Strickhouser et al. (2017) found that it exhibits a negative relation with mental health (average $r = -.27$) and with health behavior (average $r = -.07$), but no relation with physical health (average $r = .00$). We generally expect weaker relations with the three health categories for HEXACO Emotionality compared to Big Five Neuroticism because Emotionality does not capture variance associated with the tendency to be angry, which generally relates negatively to health (Kopper & Epperson, 1996), and also because Emotionality lacks content capturing sadness and depressiveness, which is included more comprehensively in Big Five Neuroticism and can be expected to be highly predictive of several (mental) health outcomes.

Extraversion. Extraversion describes the tendency to be confident in social situations and to generally feel positively about oneself. Many mental health outcomes (e.g., subjective well-being and relationship satisfaction) are strongly influenced by social relations, which extraverted individuals tend to have more of and which they enjoy more. Indeed, Extraversion relates positively to many (social) mental health outcomes, such as happiness, positive affect, and life satisfaction (Zettler et al., 2020). Because of their social nature, extraverted individuals might also engage more in health behaviors that often occur in groups, but these can be healthy (e.g., exercising) or unhealthy behaviors (e.g., unsafe sex and drinking). These relations might cancel each other out and result in an overall non-significant relation of Extraversion with health behavior, arguably spilling over to physical health. Strickhouser et al. (2017) found weak, yet positive correlations of Big Five Extraversion with mental health (average $r = .11$), but essentially zero relations with health behavior (average $r = -.02$) and physical health (average $r = -.02$). Overall, we thus expected a positive relation between HEXACO Extraversion and mental health, but neither a significant relation with health behavior nor with physical health.

Agreeableness. Individuals scoring high on HEXACO Agreeableness are gentle, forgiving, and flexible. In general, these characteristics should be positively related to health. Agreeable individuals get along with others and tend to shy away from conflicts. These characteristics should also be associated with increased relationship satisfaction and a decreased likelihood of experiencing conflicts with others, which is supported by prior research demonstrating that Agreeableness is negatively associated with aggression and antisocial behavior (Zettler et al., 2020).

Recent meta-analytic evidence (Anglim et al., 2020; Zettler et al., 2020) also indicates that HEXACO Agreeableness correlates positively with indicators of subjective and psychological well-being and negatively with anxiety, stress, and risk-taking, but relations with other health outcomes have not yet been meta-analytically examined. Primary studies do, however, indicate that agreeable individuals are less likely to engage in risky health behaviors, such as sexting (Morelli et al., 2020) or problematic gambling (McGrath et al., 2018). Based on these findings, we expected a positive correlation of HEXACO Agreeableness with mental health and health behavior. We had no a priori expectations for the relations of HEXACO Agreeableness with physical health.

For Big Five Agreeableness, which exhibits substantial overlap with HEXACO Agreeableness ($\overline{\rho}$ = .69; Thielmann et al., 2022), Strickhouser et al. (2017) found positive relations with mental health (average $r = .21$) and health behavior (average $r = .10$), but not with physical health (average $r = -.01$). It is important to note that HEXACO Agreeableness captures (reversed) anger variance that is part of Big Five Neuroticism, likely affecting its relations with health. As the experience of negative emotions, such as anger, is generally associated with reduced mental health (Kopper & Epperson, 1996), we expect stronger positive relations between HEXACO Agreeableness and mental health compared to Big Five Agreeableness. Relations with health behavior and physical health might also be stronger compared to those for Big Five Agreeableness.

Conscientiousness. Conscientiousness describes the proclivity to be organized, diligent, and accurate, which are characteristics that are arguably beneficial for health. Individuals with higher levels of Conscientiousness are more likely to make responsible decisions and to engage in behaviors that reduce health-related risks (Bogg & Roberts, 2004). Moreover, Conscientiousness is positively related to health-protective behaviors, such as refraining from smoking or using a seatbelt while driving (Bogg & Roberts, 2004; Raynor & Levine, 2009). Individuals with higher levels of Conscientiousness are also more likely to select themselves into healthier

environments and have more stable relationships (e.g., Roberts & Bogg, 2004), and they are generally more successful in life (e.g., higher education, career success, and income; Duckworth et al., 2012; Ozer & Benet-Martínez, 2006), which benefits health (Adler & Ostrove, 1999; Quon & McGrath, 2014). Conscientiousness also often acts as a buffer against the detrimental effects of various stressors (e.g., O'Connor et al., 2009). All of these tendencies suggest that Conscientiousness should be positively related to health. Indeed, Strickhouser et al. (2017) found positive relations of Big Five Conscientiousness with mental health (average r = .22) and health behavior (average r = .12), but no relation with physical health (average r = .03). In turn, we expect positive relations with mental health and health behavior, but no relations with physical health.

Openness to Experience. Openness to Experience reflects the tendency to be interested in novelties, and to be creative and innovative. On the one hand, individuals scoring high on Openness to Experience might be more likely to engage in behaviors that fulfill them (Salovey et al., 2000), which can generally be assumed to be beneficial for health. On the other hand, individuals scoring high on Openness to Experience are more inclined to engage in risky, novel behaviors (Joseph & Zhang, 2021), such as substance use or potentially dangerous behaviors (e.g., rock climbing and bungee jumping). Thus, the relation between Openness to Experience and health is complex, but likely relatively weak overall. In Strickhouser et al.'s (2017) meta-analysis, Big Five Openness/Intellect exhibited weak or close-to-zero relations with mental health (average r = .06), health behavior (average r = .00), and physical health (average r = .01). Given these findings and considering the conceptualization of Openness to Experience, we did not expect significant correlations of HEXACO Openness to Experience with outcomes in any of the three health categories.

Big Five versus HEXACO. Conceptual differences exist between the Big Five and the HEXACO model that likely affect relations of the respective domains with health. Importantly, trait variance captured by Honesty-Humility is insufficiently captured by the Big Five model (Ashton & Lee, 2019) and the HEXACO domains explain more variance in the Big Five than vice versa (Thielmann et al., 2022). To the extent that trait variance not sufficiently captured by the Big Five domains correlates with health, the HEXACO domains should thus explain more variance in health outcomes than the Big Five domains. For some health outcomes, this assumption seems reasonable given that trait variance related to prosociality and ethical behavior (as captured in Honesty-Humility) is significantly associated with well-being (Hui, 2022). Consequently, the HEXACO model—taken as a whole—may have higher criterion-related validity for specific health outcomes than the Big Five model. In addition, Honesty-Humility might explain incremental variance over the Big Five domains in specific mental health and health behavior outcomes (especially in those pertaining to prosociality, delinquency, and norm violations), but likely not in physical health outcomes.

Method

Literature Search

The goal of our literature search was to include as many studies as possible assessing at least one of the HEXACO domains and a relevant health outcome. As a starting point, we relied on the results of the literature search by Zettler et al. (2020), who conducted a large-scale meta-analysis of the nomological net of the HEXACO model to examine whether each HEXACO domain maps onto a theoretically relevant outcome domain. These authors coded all studies assessing at least one of the HEXACO domains irrespective of the examined outcome but did not systematically examine relations with health outcomes in their meta-analysis. Zettler et al. (2020) conducted their literature search in September and October 2017 and searched for all studies—described in English-written published articles, conference proceedings, and dissertations or theses—assessing HEXACO domains. We updated their literature search on July 1, 2020, following the same procedures to include all relevant articles and to guarantee consistency in the search process. For all search results detailed below, we therefore focused on documents published in or after 2017.

Using the search terms "*HEXACO OR 'Big Six' OR 'Honesty-humility'*", we searched EBSCOhost/PsycINFO (397 hits; in the keywords) and Scopus (264 hits; in the title, abstract, and keywords). We also conducted three independent searches on Google Scholar: One searching for "HEXACO personality" (3760 hits), one for "Honesty-humility" (2980 hits), and one for "Big Six" (1390 hits). For these three searches, we extracted the first 1000 search results.[2]

These search strategies resulted in 2326 combined results after removing duplicates. Of these, 48 documents were already coded by Zettler et al. (2020). Of the remaining results, 502 documents were deemed potentially relevant for the current meta-analysis based on an examination of the title, abstract, and keywords by the first author. The full-texts of these 502 documents were then examined with regard to the inclusion criteria outlined below. Whenever we did not have access to the full-text, we contacted the corresponding (or first) author and asked for the document or for the relevant statistical information (24 documents remained inaccessible). We also posted calls for unpublished data in January 2021 via the email lists of different personality associations (i.e., Association for Research in Personality, European Association of Personality Psychology, and German Association of Psychology). Figure 1 includes a PRISMA flowchart summarizing the literature search.

Inclusion Criteria

To be included in the current meta-analysis, studies had to:

1. Measure at least one of the HEXACO domains with a version of the HEXACO-PI-R.[3]
2. Measure at least one health outcome that a) is either beneficial or detrimental for overall health (i.e., has valence) and b) contributes to overall health in a linear manner. For example, we excluded physical

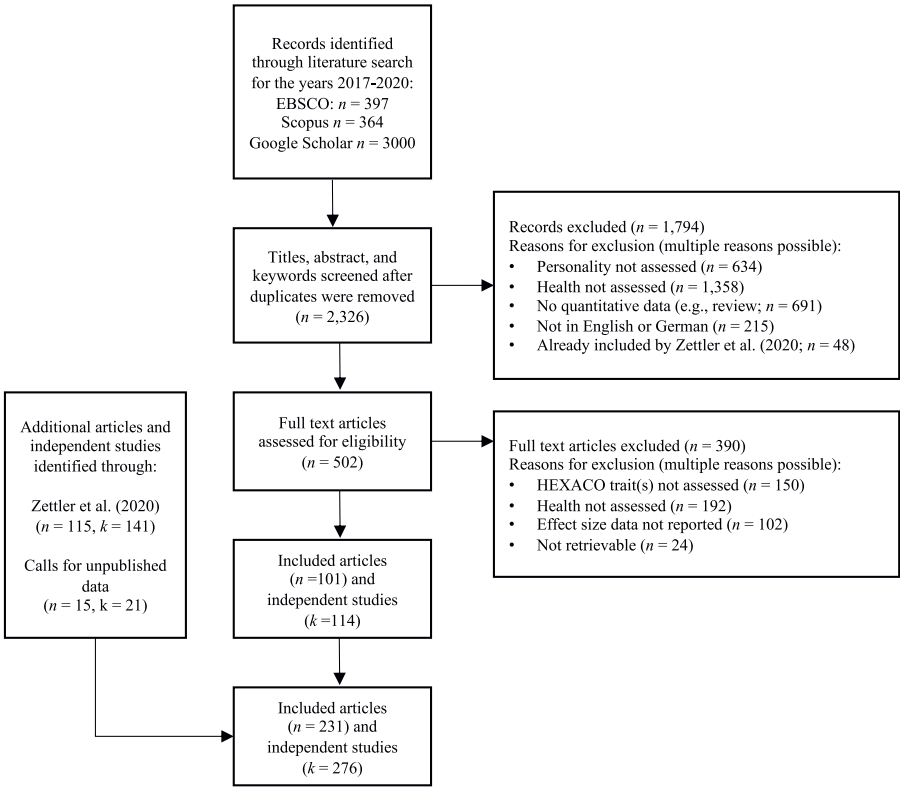

Figure 1. Flowchart depicting the literature search process.

measures, such as the 2D:4D ratio or genetic information, for which it is unclear whether and how they contribute to overall health, or outcomes such as perfectionism, which is beneficial for health at moderate levels but can be detrimental for health at high levels (Molnar et al., 2012).

3. Report the correlation coefficient *r* and the sample size *N* for the relation of interest, or statistics that allow for the calculation of *r* (e.g., standardized regression coefficients, Cohen's *d*).
4. Report results in English, German, or Dutch.

Relying on these inclusion criteria, we first examined all codings by Zettler et al. (2020) and included 115 documents reporting results from 141 studies from their codings. Of the 502 references examined in full from the current literature search, we included 101 documents reporting results from 114 studies. If a document fulfilled all inclusion criteria, but effect size information was missing for a relation of interest, we contacted the authors and requested correlations and internal consistency estimates for all study variables. In total, we requested data from 62 documents and received it for 25 documents. We also included 21 studies that we received in response to our calls for unpublished data.[4] Taken together, we included 231 documents comprising 276 independent studies (see Figure 1). Table 2 provides an overview of descriptive statistics of the dataset.

Coding of Study Variables

The second and third author coded all data extracted from Zettler et al. (2020). Their coding scheme and all coded data is available via this link. It should be noted that the current meta-analysis includes some effect sizes that were already analyzed by Zettler et al. (e.g., life satisfaction and exercising), but mostly includes effect sizes that have not been analyzed yet, although they were initially coded (e.g., alcohol consumption). The first author of the current manuscript coded all documents included from the current literature search (55.1% of all included effect sizes), and checked approximately half of the codings included from Zettler et al. (2020). Inconsistencies were resolved through discussions among the authors.

To assign criteria to a health category (i.e., mental health, health behavior, or physical health), the first author provided an initial categorization of all included outcomes and discussed it with the second author until agreement was reached. When in doubt, we revisited the operationalization and measurement of the outcome in the included study. The third author then checked these categorizations until agreement was reached among all three authors.[5] A few criteria (e.g., perceived health and health-related quality of life) could not be classified into one of the categories because they tapped into multiple categories. For example, when participants were asked to rate their overall health, it is not clear whether they considered their mental or physical health, or both. We assigned these criteria to an additional category labeled "various."

We also created sub-categories, sub-groups, and criterion classes for the three overarching health categories to yield meaningful analyses across criteria. To create and further categorize criteria, we followed a similar procedure as described above for assigning criteria to one of the three main categories: The first author formed initial

Table 2. Overview of the Meta-Analytic Dataset.

Statistic	Value
Included publications	231
Types of publications	
Journal articles	171
Dissertations	44
Conference proceedings/pre-prints	12
Other/not applicable	4
Included studies	276
From Zettler et al. (2020)	141
From the current literature search	114
From calls for data	21
Included effect sizes	4,463
Number of participants in total	92,319
Country of study[a]	
Canada	34
Germany	15
Iran	14
Italy	12
Netherlands	15
Poland	6
Russia	6
Serbia	8
South Africa	5
Switzerland	5
United States	81
Unknown	32
HEXACO-PI-R version	
HEXACO-60	175
HEXACO-100	72
HEXACO-200	19
Unknown HEXACO version	10
HEXACO-PI-R rating type	
Self-report	272
Observer report	1
Both	1
Unknown	2

[a]Only countries with at least 5 included studies are mentioned here. Other countries include Australia, Belgium, Brunei, China, Croatia, Fiji, Georgia, Great Britain, Hong Kong, India, Israel, Japan, Kosovo/Serbia, Malaysia, New Zealand, Pakistan, Philippines, Portugal, Romania, South Korea, Spain, Sweden, and Turkey.

sub-categories, sub-groups, and criterion classes after consulting relevant prior meta-analysis (e.g., Davis et al., 2015; Emmer et al., 2020; White et al., 2017) and based on data availability to allow meaningful analyses, which were then discussed with the second and third author until agreement was reached. Figures 2 (mental health) and 3 (health behavior) depict an overview of all categories, sub-categories, sub-groups, criterion classes, and example outcomes. We did not include a figure for physical health because we only meta-analyzed one sub-category (i.e., physical fitness) for this category.

Analytic Procedures

Main analyses. We report meta-analytic effect sizes for mental health, health behavior, and physical health, as well as for all health sub-categories, sub-groups, criterion classes, and for individual health outcomes when at least three independent effect sizes were coded for the relation of a HEXACO domain with that outcome. For the three primary health categories (and for some (sub-)categories), we reverse-coded effects if needed such that positive correlations always indicate higher levels of health (e.g., correlations of the HEXACO domains with depression were reversed before the overall correlations between the HEXACO domains and mental health were calculated). This was not done for sub-groups, criterion classes, and individual outcomes because this would hinder interpretability of effect sizes for readers primarily interested in relations with specific health outcomes.

All analyses are based on Pearson's product-moment correlation coefficient *r*. If a study reported other effect sizes (e.g., standardized regression coefficients, Cohen's *d*), we transformed those to *r* using appropriate formulas (Borenstein et al., 2009). We analyzed the data in a random-effects model weighted by sample size according to the Hunter and Schmidt (2004) meta-analytic approach as implemented in the *R* package *metafor* (Viechtbauer, 2010). We corrected effect size estimates for unreliability in both the predictor and the criterion using local internal consistency estimates (i.e., Cronbach's alpha values from the

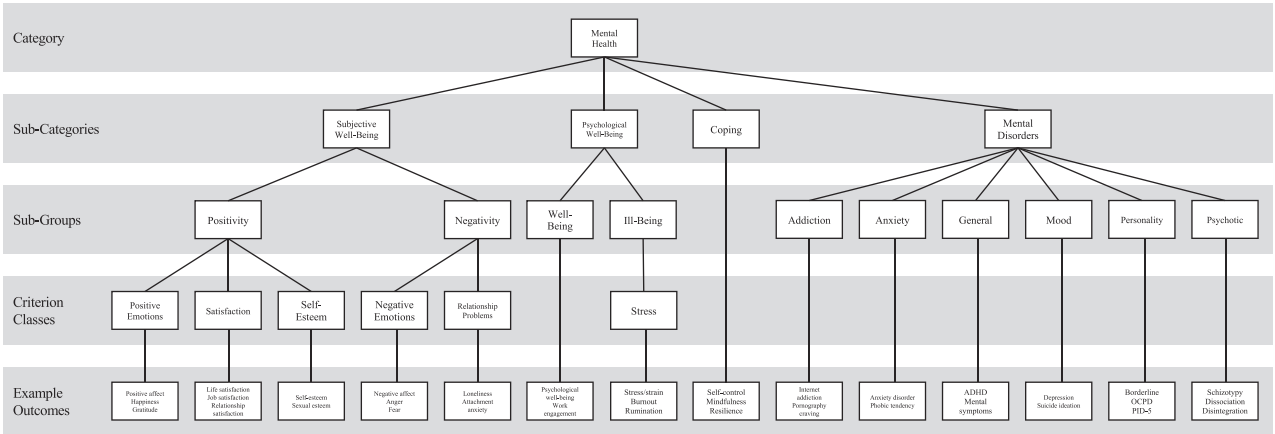

Figure 2. Category overview for mental health. *Note.* Example outcomes include the most commonly studied outcomes.

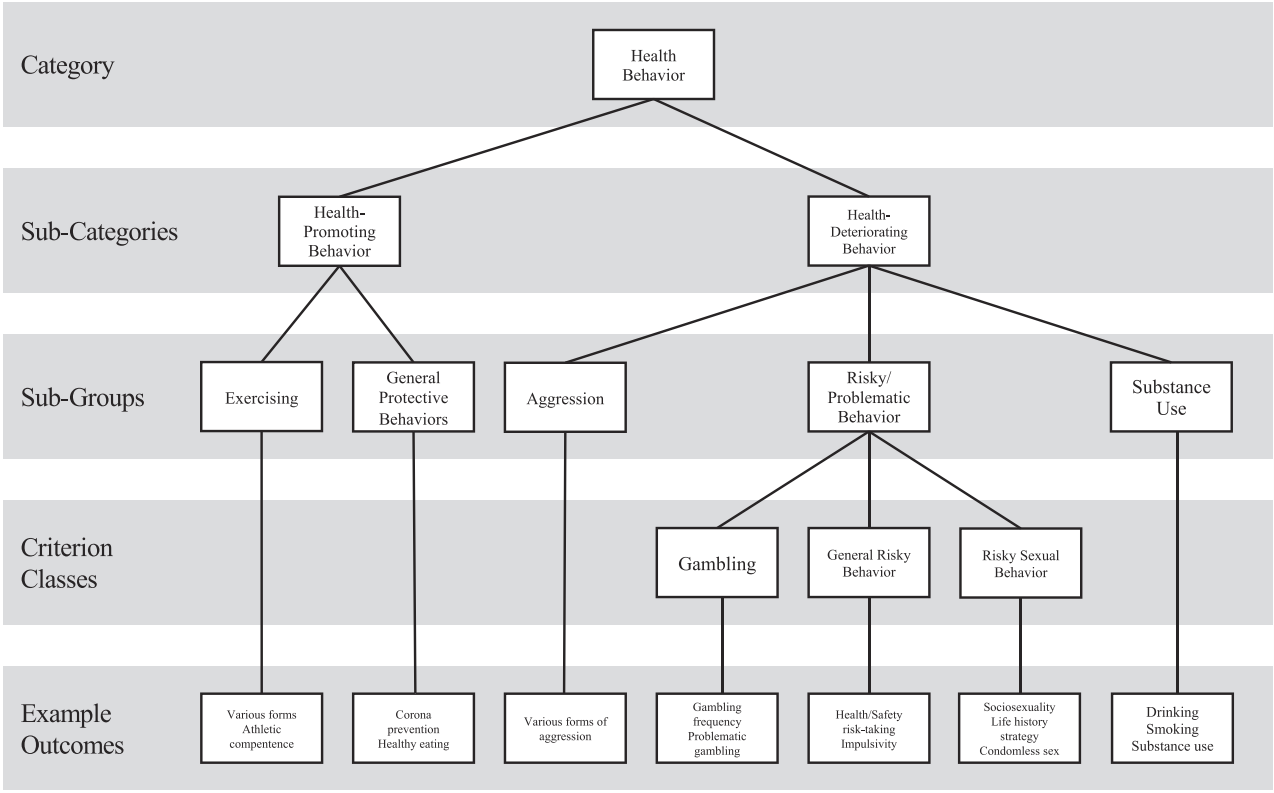

Figure 3. Category overview for health behavior. *Note.* Example outcomes include the most commonly studied outcomes.

included studies). When the internal consistency estimate of a measure was not reported in a document, we conservatively assumed perfect reliability (i.e., $\alpha = 1$). When a range of alphas was reported, we conservatively coded the highest value.[6]

To guarantee the independence of effect sizes, we aggregated effect sizes to the higher-order health category if a study contributed multiple effect sizes based on the same sample, accounting for the intercorrelation of the criteria (Hunter & Schmidt, 2004). If the intercorrelation was not available, we assumed perfect redundancy ($r = 1$). We corrected aggregate effect sizes with the average internal consistency estimate across aggregated criteria. When a study reported effect sizes for both self- and other-ratings of a given variable (e.g., Ashton et al., 2008), we also aggregated these effect sizes following the same procedure.

We report the number of included independent samples (k), the associated sample size (N), the corrected meta-analytic effect size estimate ($\overline{\rho}$), the standard error for $\overline{\rho}$, the 95% confidence interval (CI), and the 80% prediction interval. Sample size-weighted results not corrected for unreliability can be found in the supplementary materials. Heterogeneity in effect sizes was assessed with the Q statistic. A significant value indicates that the effect is not just due to random fluctuations. We also report an I^2 value, which indicates the percentage of observed variance that is due to true effect size variance.

Studies with statistically significant results are more likely to be published (Borenstein et al., 2009), which can inflate meta-analytic effect size estimates. Thus, we intended to include as much data as possible from unpublished sources. However, publication bias might nevertheless be present in our data. To detect publication bias, we conducted Egger et al.'s (1997) regression intercept test. Significant results indicate publication bias.

Explained variance analyses. To estimate how much variance in health can be explained by personality, we constructed a correlation matrix with all correlations between the HEXACO domains, the Big Five domains, and the relevant health outcome. We relied on results from the current meta-analysis for the correlations of the HEXACO domains with health. The intercorrelations between the HEXACO domains ($86 > k > 94$; $46{,}868 > N > 49{,}992$), the Big Five domains ($138 > k > 142$; $69{,}726 > N > 70{,}669$), and the correlations of the HEXACO domains with the Big Five domains ($87 > k > 142$, $36{,}810 > N > 69{,}905$) were taken from Thielmann et al. (2022; see Supplementary Table 13). We then searched for meta-analyses examining the relations of the Big Five domains with those health outcomes for which we calculated meta-analytic effect sizes for all six HEXACO domains and included these meta-analytic correlations in the correlation matrix (see Supplementary Tables 14 and 15 for Big Five correlations and associated references). Based on this correlation matrix, we conducted linear regression analyses using the *lavaan* package in *R* (Rosseel, 2012) with the harmonic mean N across all analyzed cells as the sample size (Viswesvaran & Ones, 1995) to estimate how much variance the HEXACO domains explain in the different health categories, how much variance both the Big Five and the HEXACO domains explain in specific health outcomes, and to test whether Honesty-Humility explains incremental variance over the Big Five domains in these specific health outcomes. Overall, there was sufficient data to examine the explained variance of the HEXACO domains for 31 mental health outcomes, for 14 health behavior outcomes, and for 2 physical health outcomes. The amount of explained variance by the Big Five and the incremental validity of

Honesty-Humility could be examined for 25 mental health and for 6 health behavior outcomes.

Results

In total, we included 205 different health outcomes (133 mental health, 64 health behavior, and 8 physical health outcomes). We meta-analyzed relations of all HEXACO domains with (i) mental health, health behavior, and physical health; (ii) seven health sub-categories (four mental health, two health behavior, and one physical health); (iii) sixteen sub-groups (ten mental health, five health behavior, and one physical health); and (iv) nine criterion classes (six mental health and three health behavior). At the level of individual health outcomes, we further provide meta-analytic effect size estimates for at least one of the HEXACO domains with 59 outcomes (39 mental health, 18 health behavior, and 2 physical health outcomes). Overall, the meta-analytic correlations are based on data from 231 documents including 276 independent studies, 4462 effect sizes, and 92,319 participants (see Table 2 for details). The majority of included documents were journal articles (k = 171), but we also included dissertations (k = 44) and conference proceedings or pre-prints/unpublished data (k = 12). Studies came from 34 different countries with most of them being conducted in the United States (k = 81) or Canada (k = 34). The vast majority of included studies relied on self-reports rather than observer reports to assess the HEXACO domains (272 out of 276) and used the 60-item HEXACO measure (k = 175), followed by the 100-item (k = 72) and the 200-item HEXACO-PI-R (k = 19).

Relations of the HEXACO Domains with Health Categories

As expected, relations of the HEXACO domains were strongest for mental health, somewhat weaker for health behaviors, and weakest for physical health (see Table 3 and Figure 4). All HEXACO domains correlated significantly with mental health, with Extraversion ($\overline{\rho}$ = .48) exhibiting the strongest correlation. Correlations for Conscientiousness ($\overline{\rho}$ = .28), Agreeableness ($\overline{\rho}$ = .23), Honesty-Humility ($\overline{\rho}$ = .19), and Openness to Experience ($\overline{\rho}$ = .11) were positive, whereas the correlation for Emotionality ($\overline{\rho}$ = −.18) was negative. For the most part, these findings confirm our expectations, except that we did not expect a significant (positive) correlation between Openness to Experience and mental health. This was, however, the weakest correlation out of all HEXACO domains.

Correlations of the HEXACO domains with health behaviors were generally weaker. Honesty-Humility ($\overline{\rho}$ = .31), Conscientiousness ($\overline{\rho}$ = .31), and Agreeableness ($\overline{\rho}$ = .25) exhibited the strongest (medium-sized) correlations, which is in line with our expectations. For Emotionality, for which we had no a priori expectations regarding its relation with health behavior, we found a small positive correlation ($\overline{\rho}$ = .10), which is in the opposite direction as the correlation of Emotionality with mental health. Extraversion ($\overline{\rho}$ = .09) and Openness to Experience ($\overline{\rho}$ = .08) also exhibited statistically significant correlations with health behaviors, which we did not expect either; but these correlations are rather small.

Surprisingly, for physical health, only Emotionality ($\overline{\rho}$ = −.14) and Conscientiousness ($\overline{\rho}$ = .10) exhibited a

Table 3. Meta-Analytic Results for the Relations of the HEXACO Domains with Mental, Behavioral, and Physical Health.

	k	N	$\overline{\rho}$	SE $\overline{\rho}$	95% CI	80% PI	Q	I^2	Egger p
Mental health									
H	196	62,970	.19	.01	.16, .21	−.02, .40	1495.33	86.82	.021
E	183	59,760	−.18	.02	−.21, −.15	−.42, .06	1770.12	89.61	.281
X	173	56,642	.48	.02	.45, .52	.19, .77	4112.47	95.75	<.001
A	177	58,135	.23	.01	.21, .26	.03, .44	1360.38	86.92	.004
C	180	58,313	.28	.02	.24, .33	−.10, .67	5058.38	96.42	.036
O	175	58,515	.11	.01	.09, .13	−.07, .29	1033.64	82.98	.456
Health behavior									
H	65	29,469	.31	.03	.26, .35	.07, .54	823.17	91.87	.021
E	60	27,873	.10	.02	.06, .15	−.11, .31	548.03	88.69	.242
X	54	26,609	.09	.03	.04, .14	−.14, .32	676.02	91.70	.392
A	58	27,792	.25	.03	.19, .31	−.05, .54	1095.95	94.53	.014
C	59	27,476	.31	.03	.26, .35	.08, .54	735.49	91.68	.306
O	54	26,601	.08	.02	.05, .11	−.03, .20	190.37	70.82	.504
Physical health									
H	15	3,009	−.02	.03	−.08, .05	−.14, .11	33.91	55.14	.896
E	16	3,221	−.14	.03	−.20, −.07	−.26, −.01	38.95	58.38	.052
X	15	3,009	.08	.05	−.01, .17	−.14, .30	86.46	82.33	.003
A	15	3,009	−.00	.03	−.06, .05	−.11, .10	28.38	46.55	.044
C	15	3,009	.10	.03	.05, .16	.00, .20	28.10	46.03	.992
O	15	3,009	.01	.03	−.05, .06	−.08, .09	24.41	37.94	.372

Note. Results are based on correlations corrected for unreliability in the predictor and in the outcome. H = Honesty-Humility, E = Emotionality, X = Extraversion, A = Agreeableness, C = Conscientiousness, O = Openness to Experience. k = cumulative number of studies; N = cumulative sample size; $\overline{\rho}$ = correlation corrected for unreliability; SE $\overline{\rho}$ = standard error for $\overline{\rho}$; 95% CI = 95% confidence interval for $\overline{\rho}$; 80% CrI = 80% credibility interval for $\overline{\rho}$; Q and I^2 = indices of heterogeneity based on $\overline{\rho}$; Egger p = p-value for the regression test of funnel plot asymmetry based on $\overline{\rho}$.

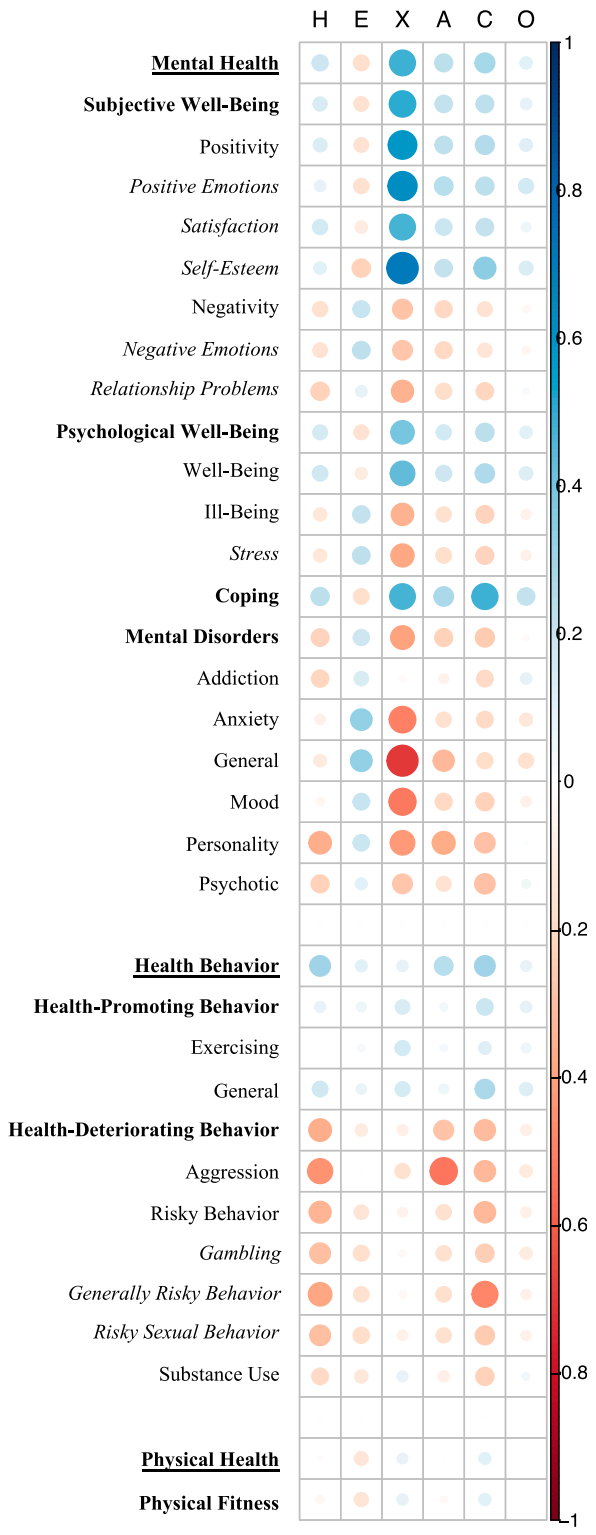

Figure 4. Graphical overview of the correlations of all HEXACO traits with the health categories, sub-categories, sub-groups, and criterion classes. *Note.* Categories are printed in **bold and underlined**, sub-categories in **bold**, sub-groups in regular font, and criterion classes in *italics*. Circle size and color indicate the strength and direction, respectively, of the correlations. The axis on the right shows the color coding: Blue indicates a positive correlation, red a negative correlation. Refer to the supplementary materials for detailed results.

significant (small) correlation. The correlations of physical health with Extraversion ($\overline{\rho}$ = .08), Honesty-Humility ($\overline{\rho}$ = −.02), Openness to Experience ($\overline{\rho}$ = .01), and Agreeableness ($\overline{\rho}$ = −.00) were all non-significant and negligible, which largely confirmed our expectations.

Several notes of caution need to be mentioned when interpreting these results. First, correlations with physical health are all based on a relatively small number of studies ($15 \leq k \leq 16$). Second, not all meta-analytic correlations exhibited validity generalization (i.e., 80% prediction intervals that exclude zero), demonstrating that there was high variability in the effect size distributions. Specifically, for mental health, only the correlations for Extraversion and Agreeableness exhibited validity generalization (i.e., 80% prediction intervals that excluded zero); for health behaviors, only the correlations of Honesty-Humility and Conscientiousness; and for physical health, only the correlations of Emotionality and Conscientiousness. Correspondingly, the Q and I^2 values of all analyses were high, indicating that moderators might be at play and that some of the correlations might even be reversed under certain circumstances. This likely happened because the specific health outcomes that we subsumed in the three overarching health categories showed differential relations with the same HEXACO domain. For example, Honesty-Humility correlated only weakly with the mental health outcome *happiness* ($\overline{\rho}$ = .07), but more strongly with the mental health outcome *PID-5: Antagonism* ($\overline{\rho}$ = −.66). This ultimately resulted in a heterogeneous effect size distribution when aggregating effect sizes to the higher-order mental health category. Third, we aggregated effect sizes from all available specific health outcomes to the respective mental health, health behavior, or physical health category. This is problematic because effect sizes from more prevalent health outcomes, such as life satisfaction or positive/negative affect, have a stronger influence on the overall mental health effect sizes than effect sizes from less prevalent health outcomes, such as burnout or mindfulness. As such, the effect sizes for these three categories are biased toward specific health outcomes that were studied more frequently. Fourth, Egger's regression coefficient, which tests for the presence of publication bias, was significant for 8 of the 18 tested relations. Correlations of some domains (i.e., Emotionality and Openness to Experience) with the three health categories were not affected, but all other domains showed at least one statistically significant result.

Relations with Mental Health Outcomes

Extraversion exhibited consistently strong relations with the four mental health sub-categories subjective well-being ($\overline{\rho}$ = .50), psychological well-being ($\overline{\rho}$ = .40), coping ($\overline{\rho}$ = .47), and mental disorders ($\overline{\rho}$ = −.40; see Figure 4 and Supplementary Table 2). Conscientiousness exhibited, on average, the second strongest correlations with these mental health sub-categories, and correlated most strongly with coping ($\overline{\rho}$ = .49), whereas correlations with subjective well-being ($\overline{\rho}$ = .22), psychological well-being ($\overline{\rho}$ = .24), and mental disorders were all of similar magnitude ($\overline{\rho}$ = −.23). The correlations of all other HEXACO domains, except for Openness to Experience, with these four mental health sub-categories were smaller and generally comparable in size (Honesty-Humility: $.14 \leq |\overline{\rho}| \leq .24$; Emotionality: $.16 \leq |\overline{\rho}| \leq .19$; Agreeableness: $.17 \leq |\overline{\rho}| \leq .27$). Correlations for

Openness to Experience were even weaker ($.02 \leq |\overline{\rho}| \leq .22$), and the correlation of Openness to Experience with mental disorders was essentially zero ($\overline{\rho} = -.02$).

Correlations of the HEXACO domains with the subjective well-being sub-groups positivity and negativity (see Supplementary Table 3) were, as expected, in opposite directions and generally of similar magnitude, with one notable exception: Extraversion correlated more strongly with positivity ($\overline{\rho} = .59$) than with negativity ($\overline{\rho} = -.28$). We created three further criterion classes for positivity (i.e., positive emotions, satisfaction, and self-esteem) and negativity (i.e., negative emotions, relationship problems, and stress; see Supplementary Table 4). For both positivity and negativity, meta-analytic effect size estimates were in the same direction for a given trait and generally did not vary meaningfully across these three criterion classes (see Figure 4).

Correlations of the HEXACO domains with the psychological well-being sub-groups well-being and ill-being were also in opposite directions and of similar magnitude, although the difference in correlations for Extraversion was less notable ($\overline{\rho} = .44$ vs. $\overline{\rho} = -.36$, respectively) compared to the difference in effect sizes between positivity and negativity mentioned above.

There were no further sub-groups for the coping sub-category, but we separately examined six different mental disorder sub-groups (i.e., addiction, anxiety, general, mood, personality, and psychotic disorders; see Supplementary Table 3). Honesty-Humility exhibited the strongest negative correlations with personality disorders ($\overline{\rho} = -.36$), psychotic disorders ($\overline{\rho} = -.23$), and addiction ($\overline{\rho} = -.21$), and correlated significantly with general mental disorders ($\overline{\rho} = -.11$) but not with anxiety or mood disorders. Emotionality correlated positively with all six mental disorder sub-groups, showing the strongest correlations with the general mental disorder sub-group ($\overline{\rho} = .34$) and anxiety disorders ($\overline{\rho} = .33$). Extraversion correlated strongly with general mental disorders ($\overline{\rho} = -.69$), mood disorders ($\overline{\rho} = -.53$), anxiety disorders ($\overline{\rho} = -.51$), and with personality disorders ($\overline{\rho} = -.43$), but only exhibited a moderate correlation with psychotic disorders ($\overline{\rho} = -.28$) and no significant correlation with addiction disorders. Agreeableness also did not significantly correlate with addiction disorders but correlated negatively with the remaining four mental disorder sub-groups ($-.16 \leq \overline{\rho} \leq -.38$). Conscientiousness exhibited similar, small- to medium-sized negative correlations with all six mental disorder sub-groups ($-.19 \leq \overline{\rho} \leq -.30$). Openness to Experience generally showed the weakest correlations out of all HEXACO traits with these six mental disorders sub-groups: It only correlated significantly with anxiety disorders ($\overline{\rho} = -.12$) and general mental health disorders ($\overline{\rho} = -.16$). Detailed meta-analytic results for the 39 specific mental health outcomes can be found in Supplementary Table 9.

Relations with Health Behavior Outcomes

For health behavior, we created the two sub-categories health-promoting behavior and health-deteriorating behavior. Correlations of the HEXACO domains were generally stronger for health-deteriorating than for health-promoting behavior. All HEXACO domains correlated negatively with health-deteriorating behavior, with Honesty-Humility ($\overline{\rho} = -.37$), Conscientiousness ($\overline{\rho} = -.32$), and Agreeableness ($\overline{\rho} = -.28$) exhibiting the strongest correlations. Emotionality ($\overline{\rho} = -.11$), Openness to Experience ($\overline{\rho} = -.08$), and Extraversion ($\overline{\rho} = -.08$) showed only weak relations. For health-promoting behavior, the strongest (positive) correlations occurred for Conscientiousness ($\overline{\rho} = .20$) and Extraversion ($\overline{\rho} = .15$), whereas correlations with Openness to Experience ($\overline{\rho} = .09$), Honesty-Humility ($\overline{\rho} = .09$), and Agreeableness ($\overline{\rho} = .04$) were (very) small, albeit statistically significant. Emotionality did not correlate significantly with health-promoting behavior ($\overline{\rho} = .07$).

We created three sub-groups (i.e., aggression, risky/problematic behavior, and substance use) for the health-deteriorating sub-category. Honesty-Humility ($-.20 \leq \overline{\rho} \leq -.45$) and Conscientiousness ($-.24 \leq \overline{\rho} \leq -.33$) exhibited, on average, the strongest, negative correlations with the three sub-groups. Emotionality correlated negatively with risky/problematic behavior ($\overline{\rho} = -.15$) and with substance use ($\overline{\rho} = -.13$), but not significantly with aggression ($\overline{\rho} = -.01$). Extraversion correlated positively with substance use ($\overline{\rho} = .08$), negatively with aggression ($\overline{\rho} = -.16$), and not significantly with risky/problematic behavior ($\overline{\rho} = -.07$). Agreeableness correlated strongly with aggression ($\overline{\rho} = -.53$) and weaker with risky/problematic behavior ($\overline{\rho} = -.17$) and substance use ($\overline{\rho} = -.09$). Finally, Openness to Experience exhibited weak negative correlations with aggression ($\overline{\rho} = -.11$) and risky/problematic behavior ($\overline{\rho} = -.08$), but did not correlate significantly with substance use ($\overline{\rho} = .04$).

The health-promoting sub-category was further divided into two sub-groups (i.e., exercising and general protective behaviors). Results were highly similar to those for the broader health-promoting sub-category: Conscientiousness ($\overline{\rho} = .12$ and $\overline{\rho} = .27$) and Extraversion ($\overline{\rho} = .16$ and $\overline{\rho} = .16$) exhibited the strongest positive correlations with exercising and general protective behaviors, respectively. Honesty-Humility only correlated positively with general protective behaviors ($\overline{\rho} = .18$), but not with exercising ($\overline{\rho} = -.01$). Emotionality did not correlate significantly with either outcome sub-group ($\overline{\rho} = .08$ and $\overline{\rho} = .04$, respectively). Agreeableness exhibited weak positive, but statistically significant correlations with both exercising ($\overline{\rho} = .04$) and general protective behaviors ($\overline{\rho} = .07$), and Openness to Experience only correlated significantly with general protective behaviors ($\overline{\rho} = .12$), but not with exercising ($\overline{\rho} = .07$).

Finally, we examined three further criterion classes for risky/problematic behavior: Gambling, general risky behavior, and sexually risky behavior. We generally observed relatively little variance in the effect size distribution across these three criterion classes. Honesty-Humility ($-.31 \leq \overline{\rho} \leq -.40$) and Conscientiousness ($-.24 \leq \overline{\rho} \leq -.48$) exhibited the strongest negative correlations, but Emotionality ($-.17 \leq \overline{\rho} \leq -.19$), Agreeableness ($-.17 \leq \overline{\rho} \leq -.17$), and Openness to Experience ($-.07 \leq \overline{\rho} \leq -.11$) also correlated significantly (and negatively) with all three criterion classes. Extraversion did not correlate significantly with any of these three criterion classes ($-.04 \leq \overline{\rho} \leq -.08$).

Table 4. Explained Variance by the HEXACO Traits in Health Categories, Sub-Categories, and Criterion Classes.

	N	R^2
Mental Health	49,981	.225
Subjective well-being	42,363	.215
Positivity	40,339	.283
Positive emotions	30,159	.292
Satisfaction	30,619	.202
Self-esteem	24,074	.421
Negativity	26,175	.111
Negative emotions	22,855	.109
Relationship problems	8,198	.159
Psychological well-being	21,878	.156
Well-being	16,605	.182
Ill-being	11,964	.141
Stress	11,438	.158
Coping	30,276	.307
Mental disorders	32,792	.196
Addiction	5,707	.099
Anxiety disorders	6,832	.267
General disorders	3,156	.377
Mood disorders	9,521	.249
Personality disorders	20,713	.312
Psychotic disorders	10,448	.144
Health Behavior	19,193	.126
Health-promoting behavior	13,536	.049
Exercising	10,457	.032
General protective behaviors	5,419	.085
Health-deteriorating behavior	37,546	.155
Aggression	19,825	.273
Risky/problematic behavior	32,646	.138
Gambling	1,837	.137
General	16,013	.214
Risky sexual behavior	24,135	.120
Substance use	8,838	.075
Physical Health	9,168	.027
Physical fitness	5,989	.033

Note. Names in **bold** are health categories, names in regular font are sub-categories, and names in *italics* are criterion classes; *N* = harmonic mean sample size across all analyzed effect sizes; R^2 = explained variance by all HEXACO traits; all results are based on sample size-weighted correlations *not* corrected for unreliability.

Relations with Physical Health Outcomes

For physical health, we only created one sub-category which is called physical fitness and which included variables such as physical health and physical strength. Only the meta-analytic correlations of Emotionality ($\overline{\rho} = -.14$) and Conscientiousness ($\overline{\rho} = .11$) were statistically significant, whereas correlations for the other HEXACO domains were non-significant and weak ($-.04 \leq \overline{\rho} \leq .09$).

Explained Variance in Health

First, we examined the amount of explained variance in the health categories, sub-categories, sub-groups, and criterion classes by the six HEXACO domains (see Table 4). Second, we compared the criterion-related validity of the HEXACO and the Big Five domains for specific health outcomes and tested if Honesty-Humility has incremental validity for these outcomes over the Big Five domains (see Table 5).

Mental Health. All HEXACO domains together explained 22.5% of the variance in mental health. The HEXACO domains explained most variance in coping ($R^2 = .307$) and slightly less variance in subjective well-being ($R^2 = .225$), mental disorders ($R^2 = .196$), and psychological well-being ($R^2 = .156$). For subjective well-being, the HEXACO domains explained more variance in the positivity ($R^2 = .283$) than in the negativity sub-group ($R^2 = .111$), and they were particularly predictive of the self-esteem criterion class ($R^2 = .421$). Among the mental disorder sub-categories, the HEXACO domains were particularly predictive of general disorders ($R^2 = .377$), personality disorders ($R^2 = .312$), anxiety disorders ($R^2 = .267$), and mood disorders ($R^2 = .249$), but less predictive of psychotic disorders ($R^2 = .144$) and addiction ($R^2 = .099$). For psychological well-being, we formed the two sub-categories well-being and ill-being; the HEXACO domains explained relatively similar amounts of variance in both ($R^2 = .182$ and $R^2 = .141$, respectively).

Health Behavior. The amount of explained variance was generally lower for health behaviors (12.6%) than for mental health (22.5%). The HEXACO domains explained more variance in health-deteriorating behaviors ($R^2 = .155$) than in health-promoting behaviors ($R^2 = .049$). This effect was largely driven by the relatively high criterion-related validity of the HEXACO domains for aggression ($R^2 = .273$), but the HEXACO domains were also predictive of other types of risky or problematic behavior ($R^2 = .138$) and of substance use ($R^2 = .075$). Among the health-promoting sub-categories, the HEXACO domains were more predictive of general protective behaviors ($R^2 = .085$) than of exercising ($R^2 = .032$).

Physical Health. The HEXACO domains explained only 2.7% of the variance in physical health. Here, we only included one category, which was physical fitness ($R^2 = .033$).

Specific Health Outcomes. We also compared the criterion-related validity of the HEXACO domains with that of the Big Five domains for specific health outcomes, and tested whether Honesty-Humility has incremental validity over the Big Five domains (see Table 5 for detailed results). Of the 24 mental health outcomes for which we could compare the amount of explained variance across the two personality models, the HEXACO domains explained more variance in 5 outcomes, whereas the Big Five domains explained more variance in 10 outcomes. For nine outcomes, the amount of explained variance was similar across models.

The HEXACO domains explained more variance than the Big Five traits in borderline personality disorder ($R^2 = .627$ vs. $R^2 = .351$), happiness ($R^2 = .317$ vs. $R^2 = .116$), mindfulness ($R^2 = .377$ vs. $R^2 = .264$), self-esteem ($R^2 = .421$ vs. $R^2 = .310$), and social anxiety ($R^2 = .484$ vs. $R^2 = .361$). The Big Five domains explained more variance compared to the HEXACO domains in anger ($R^2 = .030$ vs. $R^2 = .330$), loneliness ($R^2 = .143$ vs. $R^2 = .217$), negative affect ($R^2 = .208$ vs. $R^2 = .333$), psychological well-being—environmental mastery ($R^2 = .339$ vs. $R^2 = .448$)/personal growth ($R^2 = .277$ vs. $R^2 = .372$)/positive relations

Table 5. Explained Variance in Specific Health Outcomes.

	HEXACO R^2	Big Five R^2	Big Five + HH R^2	ΔR^2
Mental health outcomes				
Anger	.030	.330	.337	.007
Anxiety disorder	.190	.197	.210	.013
Anxiety (non-clinical)	.090	—	—	—
Borderline	.627	.351	.353	.002
Burnout	.208	.185	.206	.021
Depression	.253	.293	.293	.000
Fear	—	.488	.497	.009
Happiness	.317	.116	.116	.000
Job satisfaction	—	.089	.100	.011
Life satisfaction	.232	.214	.218	.004
Loneliness	.143	.217	.227	.010
Mindfulness	.377	.264	.269	.005
Negative affect	.208	.333	.336	.003
PID-5: Antagonism	.357	—	—	—
PID-5: Detachment	.389	—	—	—
PID-5: Disinhibition	.325	—	—	—
PID-5: Negative Affectivity	.400	—	—	—
PID-5: Psychoticism	.204	—	—	—
Positive affect	.269	.296	.297	.001
PWB: Autonomy	.267	.279	.295	.016
PWB: Environmental Mastery	.339	.488	.496	.008
PWB: Personal growth	.277	.372	.374	.002
PWB: Positive relations	.306	.383	.384	.001
PWB: Purpose in life	.249	.405	.407	.002
PWB: Self-acceptance	.374	.483	.485	.002
Relationship satisfaction	.061	.115	.120	.005
Resilience	.300	.421	.421	.000
Schizotypy	.132	.118	.136	.018
Self-control	.453	—	—	—
Self-efficacy	.296	.308	.309	.001
Self-esteem	.421	.310	.313	.003
Social anxiety	.484	.361	.375	.014
Stress	.175	.133	.142	.009
Health behavior outcomes				
Aggression	.280	.129	.192	.063
Aggression—Hostility	.348	—	—	—
(Proactive) Aggression	.250	—	—	—
(Reactive) Aggression	.259	—	—	—
Alcohol consumption	.087	.074	.081	.007
Exercising	.093	.020	.028	.008
Fast life history strategy	.189	—	—	—
Gambling	.137	.164	.195	.031
Health/safety risk-taking	.232	—	—	—
Long-term mating orientation	.107	—	—	—
Short-term mating orientation	.159	—	—	—
Smoking	.022	.054	.056	.002
Sociosexuality	.188	—	—	—
Substance use	.078	.267	.267	.000
Physical health outcomes				
Physical health	.036	—	—	—
Physical strength	.060	—	—	—

Note. HH = Honesty-Humility; R^2 = explained variance; ΔR^2 = incremental validity in the respective outcome of Honesty-Humility over and above the Big Five traits; we were not able to locate or calculate meta-analytic effect size estimates for all analyzed traits when cells are marked with "-"; all results are based on sample size-weighted correlations *not* corrected for unreliability.

(R^2 = .306 vs. R^2 = .383)/purpose in life (R^2 = .249 vs. R^2 = .405)/self-acceptance (R^2 = .374 vs. R^2 = .483), relationship satisfaction (R^2 = .061 vs. R^2 = .115), and resilience (R^2 = .300 vs. R^2 = .421). The domains from both models explained similar amounts of variance for the following mental health outcomes: anxiety disorders, burnout, depression, life satisfaction, positive affect, psychological well-being—autonomy, schizotypy, self-efficacy, and stress.

Honesty-Humility showed only weak incremental validity over the Big Five for specific mental health outcomes, ranging from 0.0% to 2.1%. Specifically, incremental variance was equal to or larger than 1% for burnout (2.1%), schizotypy (1.8%), psychological well-being—autonomy (1.6%), social anxiety (1.4%), anxiety disorders (1.3%), job satisfaction (1.1%), and loneliness (1.0%).

For specific health behaviors, the HEXACO domains explained more variance than the Big Five domains in aggression (R^2 = .280 vs. R^2 = .129) and exercising (R^2 = .093 vs. R^2 = .020), and less variance in substance use (R^2 = .078 vs. R^2 = .267). The HEXACO and Big Five domains explained similar amounts of variance in alcohol consumption, gambling, and smoking. Honesty-Humility had relatively high incremental validity over the Big Five domains for aggression (6.3%) and gambling (3.1%), only little incremental validity for exercising (0.8%), alcohol consumption (0.7%), and smoking (0.2%), and none for substance use.

We did not locate any Big Five meta-analyses for the two specific physical health outcomes that we included and so could not compare the corresponding amounts of variance explained.

Discussion

For decades, researchers have investigated which personality characteristics are associated with health. To summarize and extend prior research on this topic, we conducted a comprehensive meta-analysis of the health-related nomological net of the HEXACO personality domains, focusing specifically on criteria related to mental health, health behavior, and physical health. We also compared results for the HEXACO domains with those for the Big Five domains as observed in previous meta-analyses. By doing so, we add evidence on how basic personality domains relate to a broad array of health indicators, overcoming the predominant focus on the Big Five domains in past health research.

Based on data from 276 studies, we found that the HEXACO domains relate most strongly to mental health outcomes, such as borderline personality disorder or self-esteem, followed by health behavior outcomes, such as aggression or risk-taking. Relations with physical health outcomes (e.g., physical strength) were generally weak, but significant for Emotionality (negatively) and Conscientiousness (positively). Many findings for the HEXACO domains converged with those for the Big Five domains, but important differences also occurred, especially for those HEXACO domains that conceptually differ from the Big Five domains. Specifically, Honesty-Humility showed meaningful relations with many indicators of mental health and health behavior. However, it explained relatively little incremental variance over the Big Five domains in mental health outcomes, whereas it had noteworthy incremental validity for some indicators of health behavior (e.g., aggression and gambling). Both models had incremental validity over the other for certain health outcomes, which was, however, more often the case for the Big Five domains. By implication, the choice of which model to use when predicting health could be outcome-dependent.

How Well Do the HEXACO Domains Predict Health?

The current meta-analysis contributes to the literature in several ways. First, on the most general level, our findings add to the growing literature demonstrating that personality traits are related to health (Strickhouser et al., 2017). Referring to the HEXACO model in particular, our results show that consideration of the HEXACO domains can be useful when examining personality correlates of specific health outcomes. Specifically, relations of all HEXACO domains with mental health and health behavior were significant (and some even exhibited validity generalization), and Emotionality and Conscientiousness were even associated with physical health.

Second, and related to that, we found the HEXACO domains to predict mental health (R^2 = .225) moderately, whereas the amount of explained variance in health behavior (R^2 = .126) and especially in physical health (R^2 = .027) was lower. These findings align well with findings for the Big Five domains (Luo et al., 2022; Strickhouser et al., 2017), and therefore seem to be largely independent of the utilized personality framework. One interpretation of these findings is that personality domains affect the appraisal of events (Lazarus, 1999), which likely matters more for mental health than for health behavior and physical health. This is in line with the idea that the relatively high conceptual correspondence between personality traits as psychological constructs and mental health can likely explain why personality traits relate more strongly to psychological health-related processes than to actual health-related behaviors or physical health outcomes. Further evidence for this idea comes from some of the outcome-specific findings in the current meta-analysis. For example, Extraversion—an indicator of being enthusiastic and gregarious—correlated more strongly with outcomes of the same valence as combined in the positivity sub-category than with outcomes of opposite valence as combined in the negativity sub-category. Similarly, Emotionality correlated more strongly with negative than with positive affect.

Importantly, a more critical interpretation suggests that the large amount of variance explained in mental health can be attributed to conceptual overlap, which might explain the strong relation between personality and mental health. One reason for this conceptual overlap is common method variance (Podsakoff et al., 2012) as both personality domains and mental health outcomes are usually assessed via self-reports. Another reason is item overlap between personality and (mental) health measures. For example, some items assessing Extraversion (e.g., "On most days, I feel cheerful and optimistic") closely resemble items assessing

mental health outcomes, such as life satisfaction (e.g., "I am satisfied with my life") or positive affect (e.g., being "excited" or "enthusiastic"). Further, some HEXACO facets, such as the anxiety facet of Emotionality or the social self-esteem facet of Extraversion, overlap strongly with some of the included outcomes (e.g., anxiety disorder and self-esteem). To reduce the influence of common method variance and item overlap, future research should rely on other-reports of personality or use more objective assessments of health, such as observations or biomarkers (Pratt & Hall, 2018).

Nevertheless, it is unlikely that the difference in the amount of explained variance between mental health and health behavior/physical health can be fully attributed to common method variance or item overlap. After all, even seemingly small effect sizes for physical health can have non-trivial, practical relevance for important outcomes such as the onset of diseases or mortality (Graham et al., 2017; Turiano et al., 2015). In addition, (small) effects can be amplified or counteracted by different mechanisms (Anvari et al., 2022). For example, professional medical help or social support can likely buffer the negative relations of Emotionality with mental and physical health, whereas interventions specifically designed for individuals with certain personality traits might promote health behaviors among those individuals (Chapman et al., 2014; Conrod, 2016).

Which HEXACO Domains Are the Best Predictors of Health?

Taken together, Conscientiousness was the only HEXACO domain that significantly predicted all three health categories, and it also significantly predicted most of the specific mental health (32 out of 37), health behavior (12 out of 14), and physical health outcomes (1 out of 2). Conscientiousness can therefore be considered one of the most important personality characteristics when it comes to a healthy life, which aligns well with findings highlighting the relevance of Conscientiousness in a wide variety of other important domains of life, such as at school or university (Poropat, 2009), at work (Wilmot & Ones, 2019), or in interpersonal relationships (Malouff et al., 2010). Zooming in on specific mental health outcomes, it becomes apparent that Conscientiousness correlates to a similar extent with most mental health outcomes, the only exception being a somewhat stronger positive correlation with coping. This finding corresponds with Big Five meta-analyses that generally found similar relations of Conscientiousness with most mental health outcomes (e.g., Buecker et al., 2020; Giluk, 2009; Kotov et al., 2010), but slightly stronger correlations with coping-related outcomes, such as resilience or self-efficacy (Barańczuk, 2021; Oshio et al., 2018). HEXACO Conscientiousness also correlated similarly with most health behaviors, which largely converges with past meta-analytic findings for Big Five Conscientiousness (e.g., Dudfield et al., 2022; Jones et al., 2011).

Extraversion emerged as the overall strongest predictor of mental health, but it predicted health behavior only weakly and failed to predict physical health. The particularly strong relation with mental health is one of the most notable findings of the current meta-analysis. Arguably, one reason for this finding is that we defined mental health very broadly, including several outcomes that are conceptually strongly related to Extraversion (e.g., positive affect and optimism). Then again, Extraversion exhibited similar correlations with almost *all* mental health outcomes, including more distant outcomes, such as borderline disorder, mindfulness, or self-efficacy.[7] This general pattern has likewise been observed for Big Five Extraversion, although corresponding meta-analytic correlations (e.g., Alarcon et al., 2009; Barańczuk, 2021; Giluk, 2009) are generally weaker than those for HEXACO Extraversion observed here. Interestingly, HEXACO Extraversion also had incremental validity over and above the Big Five domains for several specific (mental) health outcomes (see Table 15 in the supplementary materials). This is surprising given that HEXACO and Big Five Extraversion strongly converge on the domain level (Thielmann et al., 2022), but converges with findings by Anglim et al. (2020) who also found stronger relations for HEXACO Extraversion, compared to its Big Five counterpart, with subjective and psychological well-being. One explanation can be based on findings by Watson and Clark (2020), who showed that the social self-esteem facet of HEXACO Extraversion correlates particularly strongly with the depression facet of Neuroticism in some Big Five models, suggesting potential differences between Big Five and HEXACO Extraversion. This facet can be an important predictor of various mental health outcomes. It is therefore also not surprising that HEXACO Extraversion exhibits relatively strong correlations with mental health outcomes such as anxiety disorders ($\overline{\rho} = -.40$) or depression ($\overline{\rho} = -.53$). Examining HEXACO facet- or item-level relations with (mental) health can help to further shed light on this.

The relatively weak correlation of Extraversion with health behavior can be explained by the fact that Extraversion correlated positively with both health-deteriorating (e.g., alcohol consumption and substance use) and health-promoting behaviors (e.g., exercising), likely because extraverted individuals are more inclined to engage in social activities which can take a healthy (e.g., exercising together) or an unhealthy form (e.g., drinking together). These behaviors might cancel each other out, resulting in an overall weaker relation with health behavior. Assuming that health behaviors drive physical health, these cancellation effects with specific health behaviors might also explain the non-significant relation of Extraversion with physical health.

Honesty-Humility predicted mental health and health behavior significantly, but failed to predict physical health. Relations of Honesty-Humility with specific mental health categories and outcomes were relatively weak and similar in magnitude. Interestingly, Honesty-Humility did not correlate significantly with mood disorders, but showed a relatively strong correlation with personality disorders. This finding aligns with research highlighting the role of personality disorders in predicting higher levels of dishonest and criminal behavior (R. C. Howard et al., 2008; Menon & Sharland, 2011) and lower levels of prosocial behavior (Thielmann et al., 2014), of which Honesty-Humility is among the strongest trait-based predictors (Pletzer et al.,

2019; Thielmann et al., 2020). This might occur because both overlap substantially with aversive (dark) personality traits (Hodson et al., 2018; M. C. Howard & Van Zandt, 2020; Moshagen et al., 2018; Scholz et al., 2022). In turn, the relation of Honesty-Humility with health behavior was stronger than the one with mental health. This can be explained based on the nature of some of the included behavioral outcomes, such as aggression, gambling, or sexual risk-taking, which all contain a negative moral connotation and sometimes even involve deviant and/or norm-violating behavior. Honesty-Humility is a particularly strong predictor of such deviating behaviors (Pletzer et al., 2019; Zettler et al., 2020). Other health behavior outcomes that might have less of a moral connotation, such as eating healthy or regular visits to a physician, were not represented well in the current meta-analysis, and most of the included mental health outcomes also do not have a strong negative moral connotation. These differences in criteria might explain why Honesty-Humility correlated more strongly with health behavior than with mental health, and it might also explain the non-significant relation of Honesty-Humility with physical health.

Relations of Emotionality with the three health categories even differed in direction: Emotionality correlated negatively with mental and physical health, but positively with health behavior. The negative relation with mental health is in line with the central role of negative emotions, such as fearfulness and anxiety, for both high levels of Emotionality and mental health. These findings also generally align with prior results for Big Five Neuroticism (Strickhouser et al., 2017), suggesting that it is the shared personality variance of these two domains (e.g., anxiety and fearfulness) that can explain relations with mental health. The positive relation of Emotionality with health behavior, in turn, was largely driven by a *negative* relation with risky, health-deteriorating behaviors. For example, individuals scoring high on Emotionality were less likely to consume alcohol, gamble, or engage in risky, short-term sexual practices. Thus, the over-representation of risky behaviors in the studies included in our meta-analysis might explain why Emotionality correlated positively with health behavior. Of note, Big Five Neuroticism has been shown to correlate *positively* (rather than negatively) with risky health behaviors, such as gambling and substance use (Dudfield et al., 2022; Kotov et al., 2010). This can arguably be attributed to Neuroticism capturing anger- and sadness-related personality variance that is not captured by Emotionality in the HEXACO framework. Past research shows that both sadness/depression and anger exhibit high levels of comorbidity with problematic gambling and substance use (Boden & Fergusson, 2011; Korman et al., 2008; Quigley et al., 2015), which may explain why Emotionality and Neuroticism correlate in opposite directions with health behavior. It should also be mentioned that Emotionality was the only other domain, next to Conscientiousness, that was significantly associated with physical health (negatively). Apparently, the health behaviors under investigation in the current meta-analysis do not translate into benefits for physical health, again indicating that either the included physical health measures were insufficient to capture the true extent of participants' physical health or that the included health behavior measures were biased towards those that are strongly predicted by Emotionality.

Agreeableness correlated similarly with mental health and health behavior (yielding small to medium-sized effects), but not significantly with physical health. This domain generally exhibited relatively similar, moderate correlations with most of the specific mental health outcomes included in our meta-analysis, which converges with findings for Big Five Agreeableness (Strickhouser et al., 2017). Correlations with specific health behavior outcomes, by contrast, varied more: Agreeableness was particularly predictive of health-deteriorating behavior, a relation that was especially driven by the strong negative correlation with aggression-related behaviors, but less predictive of health-promoting behaviors, such as exercising and general protective behaviors. These relations of different magnitude mask or cancel each other out when being combined to overall health behavior. Again, these findings resemble those for Big Five Agreeableness, which has been shown to correlate negatively with health-deteriorating behaviors such as aggression (Jones et al., 2011) and substance use (Kotov et al., 2010), but less so with health-promoting behaviors such as exercising (Wilson & Dishman, 2015) or walking speed (Stephan et al., 2018).[8] Together, these findings demonstrate that it is most likely the shared variance among Big Five and HEXACO Agreeableness (i.e., forgiveness and gentleness) that can explain relations with mental health and health behavior. Finally, HEXACO Agreeableness seems to be unrelated to physical health, but this finding is limited to the physical health outcomes included in the current meta-analysis, and relations with other markers of physical health should be examined in the future. For example, past research has found that Big Five Agreeableness predicts adherence to medication (Axelsson et al., 2011), which likely has direct consequences for physical health.

Openness to Experience was the weakest predictor of health. It only exhibited weak correlations with mental health and health behavior, and it did not significantly correlate with physical health. Apparently, being creative, open-minded, and unconventional is not particularly relevant for being healthy. Zooming in on the different mental health categories and outcomes, it is apparent that only two exceptions to this general pattern of findings occurred: Openness to Experience was more strongly related to coping outcomes, such as resilience and self-control, and to psychological well-being. Both findings mirror previous evidence for Big Five and HEXACO Openness to Experience (Anglim et al., 2020; Oshio et al., 2018). Relations of Openness to Experience with health behavior all hovered around zero, which is also in line with prior evidence for the Big Five (e.g., Lui et al., 2022; Wilson & Dishman, 2015). The same holds for relations with physical health outcomes (Strickhouser et al., 2017).

Should One Use the HEXACO or the Big Five in Health Research?

When comparing the criterion-related validity of the HEXACO domains with that of the Big Five domains for specific health outcomes, the question whether to prefer the HEXACO or Big Five domains for the prediction of health cannot be clearly answered. For some mental health outcomes—borderline personality disorder, happiness, mindfulness, stress, and self-esteem—the HEXACO domains outperformed the Big Five domains in predictive power. For other mental health outcomes, such as anger, negative affect, and resilience, the Big Five domains outperformed the HEXACO domains in predictive power. And for yet other mental health outcomes, such as anxiety disorder, burnout, and schizotypy, both personality models explained similar amounts of variance. A similar pattern was apparent for health behaviors: For some criteria, the HEXACO domains were more predictive (e.g., aggression and exercising), for other criteria, the Big Five domains were more predictive (e.g., substance use), and for even others, both models performed equally well (e.g., alcohol consumption, gambling, and smoking).[9] These results can thus guide researchers and practitioners when deciding which personality model to rely on in their work. If the aim is to predict outcomes particularly well, the choice should be outcome-dependent as each model exhibited superior criterion-related validity for some outcomes. However, the Big Five model more often showed higher criterion-related validity for specific health outcomes than the HEXACO model. One possible reason for this is that the HEXACO model may not capture personality variance associated with sadness/depressiveness, which seems relevant for many health outcomes, as well as the Big Five model. Another possibility is that item overlap, as discussed above, is more pronounced for the Big Five than for the HEXACO model. For example, items used to capture the sadness/depressiveness content of Big Five Neuroticism (e.g., "often feels sad" from the BFI-2; Soto & John, 2017) may strongly overlap with items commonly used to assess mental health outcomes such as burnout or depression.

We also examined whether Honesty-Humility has incremental validity for health over the Big Five domains. Past research has shown that Honesty-Humility has incremental validity for certain outcomes, such as counterproductive work behavior, but not for others, such as task performance (Y. Lee et al., 2019). This is also mirrored in the current results: Honesty-Humility had incremental validity for a few health behavior outcomes, but not for many mental or physical health outcomes. Among the 25 specific mental health outcomes for which the incremental validity of Honesty-Humility could be examined, Honesty-Humility never explained more than 1.8% of additional variance over the Big Five. By contrast, Honesty-Humility explained 6.3% of incremental variance over the Big Five in aggression and 3.1% of incremental variance in gambling, which are both health behaviors. For other health behaviors (e.g., alcohol consumption, exercising, and smoking), Honesty-Humility explained only little to no incremental variance. These findings suggest that the usefulness of Honesty-Humility in the health arena is largely confined to health-deteriorating behaviors. It is also worth noting that HEXACO Extraversion had incremental validity over and above the Big Five for many specific mental health (e.g., depression, mindfulness, and self-esteem) and health behavior outcomes (e.g., exercising and substance use), which might be due to facet-level differences between HEXACO and Big Five Extraversion (see above; Watson & Clark, 2020). Emotionality, Agreeableness, and Conscientiousness also explained incremental variance over and above the Big Five in some specific health outcomes (see Table 15 in the supplementary materials), suggesting that the differential partitioning of personality trait variance across the HEXACO and Big Five model affects relations with health. Researchers and practitioners can use these findings to optimize prediction of specific health outcomes.

Limitations and Directions for Future Research

The current findings should be viewed in light of the following limitations. First, we included an unequal number of effect sizes for specific health outcomes in the overall mental health, health behavior, and physical health analyses. For example, we included many studies assessing life satisfaction ($k = 38–40$) and negative affect ($k = 20–25$), but relatively fewer studies assessing anxiety disorders ($k = 3–4$) or burnout ($k = 3–7$). Thus, when combining these effect sizes to higher-order categories (e.g., mental health), relations for life satisfaction and negative affect influence the overall mental health effect sizes more strongly than relations for anxiety disorders or burnout. As a consequence, effect sizes in higher-order categories are biased towards outcomes that are better represented in the current data.

Second, we generally excluded outcomes that do not have a linear relation with health (e.g., perfectionism). That being said, one could argue that some of the outcomes that we included also exhibit a non-linear relation with overall health, although only at extreme levels. For example, although exercising behavior is generally beneficial for overall health, too much of it can result in injuries, thereby (temporarily) harming overall health. Similar arguments can be made for weight: Being overweight is certainly detrimental for overall health, but too little weight can be equally detrimental. Arguably, however, the included outcomes are, for most individuals, linearly related to health. Nonetheless, future research may benefit from a more nuanced examination that takes the non-linearity of certain personality-health relations into account.

Third, the majority of included studies are characterized by an over-reliance on self-reports to assess both the HEXACO domains and health. For example, there were no studies that actually assessed longevity or mortality, which are generally assumed to be the best markers of health (Friedman & Kern, 2014). Similarly, very few studies assessed diagnosed physical diseases. These limitations emphasize the fact that more research is needed that links the HEXACO domains—or personality traits more generally—to objective health measures. Moreover, future research may also examine whether the current findings can be corroborated with other HEXACO measures, such as the

Brief HEXACO Inventory (De Vries, 2013) or the Honesty-Humility scale of the (Mini-)IPIP6 (Milojev et al., 2013).

Fourth, we initially intended to compare the criterion-related validity of the Big Five domains with that of the HEXACO domains for the categories mental health, health behavior, and physical health using the results from Strickhouser et al. (2017). However, we refrained from conducting these analyses because Strickhouser et al. (2017) included certain outcomes that could not be included in our meta-analysis due to insufficient data (e.g., accidents, all-cause mortality), and we, in turn, included outcomes that were not included in their meta-analysis (e.g., burnout, gambling, and psychological well-being). In addition, Strickhouser et al. (2017) report average correlations whereas we report sample size-weighted meta-analytic correlations, highlighting important differences in the chosen analytic approach. These differences would essentially render comparisons on the category-level invalid.

Finally, a methodological limitation arises from the fact that we corrected effect sizes using Cronbach's alpha, which constitutes a lower-bound estimate of reliability (Sijtsma, 2009). Effect sizes corrected for unreliability using Cronbach's alpha might therefore overestimate true effects. We nevertheless relied on this practice because Cronbach's alpha is commonly reported (as opposed to, for example, test-retest reliabilities) and also consistently used to correct for unreliability in other meta-analyses. Of note, the main conclusions of the current meta-analysis are the same when correcting effect sizes based on test-retest reliabilities of the HEXACO domains as reported by Henry et al. (2022) (detailed results can be found in the supplementary materials). Whenever possible, however, future meta-analyses should correct effect sizes using test-retest reliabilities. This is especially important for shorter measures, such as those for personality facets, that are usually characterized by lower Cronbach's alpha values.

Besides that, other issues are worthy of investigation in the future. First, given that the vast majority of included studies relied on cross-sectional study designs, it is difficult, if not impossible, to distinguish between personality traits as risk or beneficial factors for health or as derivations or even as consequences of health. One might argue that personality is generally considered to be exogenous, and several causal links between personality traits and health have indeed been suggested and tested (Ferguson, 2013; Kern & Friedman, 2011). For example, personality might affect the situations and environments individuals enter or the relationships they maintain, which can ultimately affect overall health. However, major life events, such as the experience of an injury or the onset of a life-threatening disease, may indeed change personality traits (Bleidorn et al., 2018; Haehner et al., 2021), offering an alternative interpretation of our findings. Personality traits might also shape the appraisal of and reaction to major life events (Connor-Smith & Flachsbart, 2007), which could then impact overall health. Moreover, it is conceivable that our findings may be confounded by age and sex/gender: Age-related development of and sex/gender differences in HEXACO domains are well-documented (Ashton & Lee, 2016; K. Lee & Ashton, 2020; Moshagen et al., 2019; Pletzer, 2021), and both age and sex/gender relate to overall health (Afifi, 2007; Gordon et al., 2017; World Health Organization, 2015). However, previous meta-analyses (e.g., Buecker et al., 2020; Chew, 2022; Marengo et al., 2020) have generally found inconsistent evidence for the moderating roles of age and sex/gender on personality-health relations. In addition, correlations of age and sex/gender with personality traits are generally smaller in magnitude than personality-health correlations, suggesting that age and gender cannot fully explain the personality-health relations. Yet, more research adopting a lifespan perspective is needed to disentangle the complex interplay between personality traits and health, and how this might be affected by age and sex/gender.

Second, the current meta-analysis focused exclusively on individual health outcomes, while health can also be considered a social or societal phenomenon. Future research should examine how personality traits of (groups of) individuals can affect group-level or societal health outcomes, such as adherence to health-protecting measures that prevent the spread of diseases (e.g., wearing facemasks during the COVID-19 pandemic; e.g., Zettler et al., 2022). Third, although substantial theoretical and empirical work has investigated the different pathways that can explain the relations of personality with different health outcomes (Ferguson, 2013; Friedman & Kern, 2014), this has not been examined for the HEXACO domains. Here, it might be especially worthy to investigate how and why Honesty-Humility shapes health-related processes, and to examine the (reciprocal) relations between personality, mental health, health behavior, and physical health. At last, it is important to examine cancellation and masking effects (Pletzer et al., 2020, 2021), which occur if different facets of one domain exhibit differential, opposing relations with an outcome. For instance, we found that Emotionality correlates negatively with mental health but positively with health behavior, which is indicative of a cancellation effect if we were to aggregate effect sizes to overall health. Similar findings may emerge when examining facet-level relations with other health outcomes (Anglim et al., 2020). For example, it is conceivable that the fearfulness and anxiety facets of Emotionality are particularly predictive of anxiety or mood disorders, whereas the dependence facet may be less predictive thereof. Such effects should be investigated in future research.

Conclusion

Personality relates to health. The HEXACO domains generally related most strongly to mental health outcomes but also exhibited many significant relations with health behavior outcomes. Relations with physical health were either weak or non-significant. Honesty-Humility explained relatively little incremental variance over and above the Big Five domains in mental and physical health outcomes, but showed substantial incremental validity for certain health behaviors. No clear pattern emerged as to whether the Big Five or HEXACO domains were better predictors of specific health outcomes.

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Data Accessibility Statement

This meta-analysis was not pre-registered. The coding scheme, data, all analysis scripts and outputs, and supplementary materials can be found under https://osf.io/pwhqs/.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. Note that these definitions imply that addictions are categorized as indicators of mental health, whereas substance use is categorized as a health behavior.
2. Note that Zettler et al. (2020) also examined all references listed on www.hexaco.org, scanned all abstracts from articles in press at relevant journals, and searched documents citing the most influential articles about the HEXACO personality model. We did not conduct these searches again because substantial overlap was to be expected and because Zettler et al. (2020) reported that these searches yielded almost no new results beyond those from their systematic literature search.
3. We initially also considered including studies that used the (Mini-)IPIP6 (Milojev et al., 2013) or the Brief HEXACO Inventory (De Vries, 2013) to measure the HEXACO domains, but ultimately decided to exclude these studies to guarantee the consistency of our literature search with the one by Zettler et al. (2020). Also note that the (Mini-)IPIP6 is essentially a Big Five measure to which a scale for Honesty-Humility is added (whereas the remaining five domains remain unaltered, thus representing the Big Five). The Brief HEXACO Inventory measures the HEXACO domains with low reliability given its brevity (Zettler et al., 2022). Not including studies that used these measures reduces the possibility of bias attributable to outliers.
4. We thank all authors who responded to our calls for unpublished data and shared their data.
5. Note that we slightly deviated from Strickhouser et al.'s (2017) categorizations of health outcomes. First, Strickhouser et al. (2017) included interpersonal deviance as a mental health outcome, whereas we excluded this outcome (because we consider it a workplace behavior that does not directly represent health; see Pletzer et al., 2019). Second, after careful consideration of the definitions and item content, we categorized aggression as a health behavior, whereas Strickhouser et al. (2017) categorized it as an indicator of mental health.
6. Note that this approach differs from the approach taken by Zettler et al. (2020), who corrected effect sizes using the lowest value of Cronbach's alpha if a range of values was reported. For the current meta-analysis, we therefore coded all internal reliabilities for codings taken from Zettler et al. (2020) again to be aligned with our analytic approach.
7. The few exceptions include addictions, such as internet addiction or pornography craving, and the negative emotions anger and fear, for which we found stronger links with Agreeableness and Emotionality, respectively.
8. However, some research (Mõttus et al., 2013) indicates that Big Five Agreeableness is associated with a health-aware diet.
9. Based on the data, it was not possible to compare the criterion-related validity of the HEXACO domains with that of the Big Five domains for any of the included physical health outcomes.

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