Five-Factor Model Personality Disorder Traits, Health Behaviors, Health Perceptions, and Insomnia Symptoms in Older Adults

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Abstract

Personality traits predict physical health outcomes including health behaviors, health perceptions, disease, and mortality. Maladaptive traits of personality disorders may predict even more variance in physical health indicators. Dimensional models of maladaptive personality traits are replacing categorical models of personality disorder, and the five-factor model of personality disorder (FFMPD) is a useful dimensional model of maladaptive traits. However, there has been little work investigating the criterion validity of the FFMPD. The present study serves as a broad initial overview of the FFMPD scales in the prediction of health behaviors, heath perceptions, and insomnia symptoms across two timepoints in a representative community sample of older adults (N = 1,060). Findings indicate that the FFMPD scales explain a significant amount of variance in the physical health variables across time. Exploratory analyses indicate that the FFMPD traits have incremental validity over covariates, normal-range personality traits, and personality disorder criteria.

Keywords: personality traits, physical health, aging, five-factor model, personality disorder, maladaptive personality

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Over 50% of Americans suffer from chronic health conditions (Kung, Hoyert, Xu, & Murphy, 2008). A well-established base of research demonstrates that personality is an important predictor of health outcomes, including physical disease, health functioning, and longevity (Ozer & Benet-Martinez, 2006). Maladaptive personality traits that define personality disorders may have an even larger connection with health outcomes than traits within the more normal ranges of personality (Gleason, Weinstein, Balsis, & Oltmanns, 2014). Indeed, personality disorders as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) have been associated with chronic health conditions, pain, obesity, and sleep problems (Dixon-Gordon, Whalen, Layden, & Chapman, 2015). Older adulthood is an especially important time period to study the relations between personality and health because physical health problems become more prominent in older adults.

Personality disorder classification, however, is undergoing a significant change from a the traditional DSM categorical personality disorder types to a dimensional model consisting of five maladaptive personality trait domains (American Psychiatric Association, 2013). The five trait domains included in Section III of DSM-5 for emerging measures and models include negative affectivity, detachment, psychoticism, antagonism, and disinhibition. As stated in DSM-5, “these five broad domains are maladaptive variants of the five domains of the extensively validated and replicated personality model known as the 'Big Five' or Five Factor Model of personality” (APA 2013, p. 773).

The Five Factor Model (FFM) is a compelling framework through which to understand both normative personality and maladaptive personality/personality disorders. It consists of the five broad domains of neuroticism, extraversion, openness, agreeableness, and

conscientiousness. Originally based on the representation of personality terms in language, the FFM is an integrative framework that accommodates scales from alternative dimensional models of personality and provides a cohesive nomenclature for research. The five factors have well documented childhood antecedents , empirical support across eastern and western cultures and a demonstrated temporal stability across the lifespan (John, Naumann, & Soto, 2008). The domains of the FFM have also demonstrated predictive validity for a variety of consequential life outcomes such as career success, criminal activity, happiness, psychopathology, marital failure and success, and longevity (Ozer & Benet-Martinez, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

The FFM is also a useful framework for the study of personality disorder, in addition to its utility for understanding normal ranges of personality. The FFM's derivation from natural language provides it with a strong scientific base that the DSM-IV PD categories do not share. Meta-analyses have supported the ability of certain FFM facets to represent DSM-IV PD categories (Miller, 2012; Samuel & Widiger, 2008), as have qualitative reviews of this research (e.g., Clark, 2007). In order to extend this research, new measures of personality disorder were developed to assess maladaptive variants of respective FFM facets that align with each respective personality disorder (Bagby & Widiger, 2018). Each was constructed by first identifying which facets of the FFM (included in the revised NEO Personality Inventory [NEO PI-R]; Costa & McCrae, 1992) appeared to be most relevant for each respective personality disorder. It was useful to construct the FFMPD scales on the basis of respective DSM–IV personality disorders to ensure that the ultimate collection would fully cover traits included within the existing diagnostic nomenclature. The facet selections were based on researchers' FFM descriptions of each personality disorder (i.e., Lynam & Widiger, 2001), clinicians'

descriptions (i.e., Samuel & Widiger, 2004), and FFM personality disorder research (i.e., Samuel & Widiger, 2008). "FFMPD" scales were then constructed to assess the maladaptive variants of each facet that were specific to each personality disorder. These FFMPD measures are thus assessing maladaptive variants of normal range personality traits, which is an advantage because they are grounded in an already extensive amount of empirical support that has been gathered regarding the normal-range FFM. It is important to note that the FFMPD scales are not a translation of the DSM-IV personality disorder categories into dimensions, but dimensional scales based on the FFM that also can represent the DSM-IV personality disorder categories. The FFM has also served as a framework for the development of the DSM-5 Criterion B maladaptive personality trait model and the dimensional personality trait model of the *International Classification of Diseases-11th Edition* (ICD-11) (APA, 2013; Mulder, Horwood, Tyrer, Carter, & Joyce, 2016).

Personality, Health Behaviors, and Health Perceptions

FFM personality traits have been associated with two frequently used measures of health behaviors that are employed in the present study: the Health Behavior Checklist (HBCL) (Vickers, Conway, & Hervig, 1990) and the Health Status Inventory (HSI) (Hays & Morales, 2001). The HBCL contains four subscales: Wellness Maintenance, Accident Control, Traffic Risk, and Substance Risk. Across several studies, conscientiousness has emerged as a robust predictor of these scales, and extraversion and agreeableness often display relationships with the HBCL subscales (Takahashi, Edmonds, Jackson, & Roberts, 2013). In a longitudinal study of 477 middle-aged adults across three years, increases in the conscientiousness domain across time were associated with increases in positive health behaviors on the HBCL (Takahashi et al., 2013).

General health perceptions are an important component of physical health because they are associated with mortality above and beyond more objective measures of physical health (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006). Neuroticism has been associated, in particular, with worse perceptions of physical functioning (King, Jackson, Morrow-Howell, & Oltmanns, 2015), and extraversion, agreeableness, conscientiousness, and openness have been associated with the HSI total score (including emotional functioning scales) (Powers & Oltmanns, 2013). In a community sample of 698 older adults on Medicare currently facing physical health problems and actively receiving treatment for health conditions, there were no significant associations between the FFM domains and general physical health perceptions (Löckenhoff, Sutin, Ferrucci, & Costa, 2008). However, in a second sample of 393 slightly younger and healthier community older adults, the same study found that neuroticism and conscientiousness were associated with general health perceptions (neuroticism negatively and conscientiousness positively). Longitudinally, Takahashi et al. (2013) also found that conscientiousness predicted more positive general health perception scores as well as increases in general health perceptions across a period of three years.

DSM personality disorders have also been associated with physical health problems. For example, personality disorders have been associated with higher rates of obesity, cardiovascular disease, and arthritis (Dixon-Gordon et al., 2015; Powers & Oltmanns, 2012). DSM personality disorders have predicted HSI Physical Functioning, Role Limitations due to Physical Problems, Pain, Energy/Fatigue, and General Health Perceptions over and above covariates, including major depressive disorder, across six months (Powers & Oltmanns, 2012). In a sample of 16,884 older adults, five DSM personality disorders predicted physical health-related quality of life

(PHRQoL): Three of them (obsessive-compulsive, dependent, and paranoid) over and above psychosocial covariates (Holzer & Huang, 2019).

Personality and Insomnia

All FFM domains have been associated with insomnia symptoms, but neuroticism and conscientiousness show the most robust associations (neuroticism with more insomnia symptoms and conscientiousness with fewer) (Blanken et al., 2019; Stephan, Sutin, Bayard, Krizan, & Terracciano, 2018). Borderline personality disorder features have consistently been associated with self-reported insomnia symptoms in large samples at moderate effect sizes (J. R. Oltmanns, 2019). Other personality disorders have less frequent and less consistent relationships with insomnia, including avoidant, obsessive-compulsive, dependent, schizotypal, and schizoid personality features (J. R. Oltmanns, 2019; Petrov, Emert, & Lichstein, 2019).

The Present Study

The current study examines and compares three sets of personality-personality disorder measures with respect to longitudinal relationships with health behaviors and health perceptions. The three sets of measures include (a) normal range FFM traits (assessed by the NEO PI-R; Costa & McCrae, 1992), (b) DSM personality disorders (assessed by the Multi-Source Assessment of Personality Pathology; (T. F. Oltmanns & Turkheimer, 2006), and (c) maladaptive variants of the FFM traits for the same personality disorders (assessed by the Five Factor Borderline Inventory, the Five Factor Obsessive-Compulsive Inventory, and the Five-Factor Avoidant Assessment; Bagby & Widiger, 2018). The FFMPD measures have not yet been examined longitudinally or with respect to the prediction of health outcomes. It is therefore important to examine the connection between FFMPD measures and physical health outcomes. It is especially important to establish the incremental validity of FFMPD traits over FFM traits and

DSM measures in the prediction of the health criteria. Physical health behaviors and perceptions are measured in the present study using subjective assessments (the HBCL and HSI), and are also assessed via informant-reports. Results from the present study will improve knowledge of how personality relates to physical health and could inform clinical interventions for targeting and treating maladaptive personality traits.

Method

Procedure

FFMPD questionnaires were implemented into the St. Louis Personality and Aging Network (SPAN), an ongoing longitudinal study of older adults in the St. Louis area (T. F. Oltmanns, Rodrigues, Weinstein, & Gleason, 2014). At the third in-person assessment wave for SPAN (roughly five-to-six years into the study), participants completed the FFMPD measures along with a battery of other self-report questionnaires about their personality, health, and relationships. At the following wave, two years later, they completed the questionnaires again. Participants also nominated an "informant" (i.e., someone who "knows them best"), to complete brief questionnaires about the target participant's health.

Participants

Wave 1 was completed by N = 1,060 participants (M_{age} = 65.9 years, SD = 2.9 years). Wave 2 was completed by n = 937 participants. Participants were 55% female, 66% white, 32% black, and 2% other. Health questionnaire data were collected from N = 849 informants at Wave 1 and from n = 562 informants at Wave 2. Informants were 51% romantic partners, 26% other family members, 21% friends, and 2% other. On average, informants had known the target participants for 38 years.

Measures

NEO-Personality Inventory-Revised (NEO-PI-R). The NEO-Personality Inventory-Revised (Costa & McCrae, 1992) is a widely validated 240-item self-report measure that provides an assessment of the five domains of the FFM, as well as six lower-order facets of each domain. Items are answered on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Multi-Source Assessment of Personality Pathology (MAPP). The Multi-Source Assessment of Personality Pathology (T. F. Oltmanns & Turkheimer, 2006) is an 80-item self-report measure of the diagnostic criteria of the ten DSM personality disorder types. Criteria are translated into lay language and participants rate themselves on each criterion from 0 *(I am never like this*) to 5 (*I am always like this*).

Five-Factor Model Personality Disorder Scales (FFMPD). Three FFMPD measures used in the current study were chosen based on personality pathology prevalence rates in the SPAN sample at baseline. The present study included the Five Factor Borderline Inventory (FFBI; Mullins-Sweatt et al., 2012), the Five-Factor Obsessive-Compulsive Inventory (FFOCI; Samuel, Riddell, Lynam, Miller, & Widiger, 2012), and the Five-Factor Avoidant Assessment (FFAvA; Lynam, Loehr, Miller, & Widiger, 2012). Abbreviated versions of these instruments were used, for which there is published validation evidence (e.g., DeShong, Mullins-Sweatt, Miller, Widiger, & Lynam, 2016; Griffin et al., 2018). These studies have documented that the abbreviated versions (with four-item scales) replicate closely the results obtained for the original versions. FFMPD items are rated on a Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Table S1 of the supplemental materials lists the FFMPD scales arranged by their assessment of maladaptive neuroticism, extraversion, and conscientiousness. The FFBI-SF is a 48-item self-report measure assessing twelve maladaptive variant scales of FFM facets, with

seven from neuroticism, three from antagonism, and one from low conscientiousness. The FFOCI-SF is a 48-item self-report measure assessing twelve maladaptive variant scales of FFM facets with six from conscientiousness, two from introversion, three from low openness, and one from neuroticism. The FFAvA-SF is a 40-item measure assessing ten maladaptive variant scales of FFM facets, with four from introversion, four from neuroticism, one from low openness, and one from agreeableness.

RAND-36 Health Status Inventory (HSI). The HSI (Hays & Morales, 2001) is a self-report measure of health functioning that includes eight subscales, five of which describe physical functioning used in the present study: Physical Functioning (e.g., how much participants were limited in activities like exercise, household chores, and walking), Role Limitations due to Physical Problems (e.g., was limited in/accomplished less due to physical health problems), Pain (e.g., "How much bodily pain have you had during the past 4 weeks?"), General Health Perceptions (e.g., "My health is excellent"), and Energy/Fatigue (e.g., "Did you feel worn out?"). The lower-order subscales can be combined to create composite general, physical, and emotional health scores. The physical health composite (PHC) is used in the present study. The measure has validation support for the assessment of health perceptions (Moorer, Suurmeijer, Foets, & Molenaar, 2001). Informants completed a 10-item general short version of the HSI.

Health Behavior Checklist (HBCL). Health behaviors were assessed using the HBCL (Vickers et al., 1990), a 40-item questionnaire that assesses health behaviors with subscales: Wellness Maintenance (e.g., "I exercise to stay healthy"), Traffic Risk (e.g., "I speed while driving"), Accident Control (e.g., "I destroy old and unused medicines"), and Substance Risk (e.g., "I do not drink alcohol"). Items are rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

The HBCL has shown longitudinal associations with physical health in large samples (Takahashi et al., 2013).

Insomnia Severity Index (ISI). The ISI (Bastien, Vallières, & Morin, 2001) is a 7-item questionnaire about insomnia symptoms over the past two weeks. Items are rated from 0 (*no distress*) to 4 (*significant distress*). Difficulties with sleep onset latency, wake after sleep onset, early waking, and associated distress are assessed. The ISI has extensive validation support showing internal consistency, sensitivity, and specificity in the identification of insomnia disorder (Morin, Belleville, Belanger, & Ivers, 2011).

Statistical Analyses

A data-driven analytic plan was developed using correlation and regression to examine the associations between FFMPD facets and the indicators of health behaviors and health perceptions. The incremental validity of FFMPD facets over DSM and FFM personality scales was also tested. The plan was preregistered (link: http://osf.io/8ystq) as part of a broader investigation and is described in sequence in the Results section.

The expectation maximization (EM) procedure was used to impute missing data for all personality and outcome measures with no more than 20% data missing. EM has been shown to create estimates of population parameters that are more accurate than substitution of mean values (Enders, 2006). Exceptions for which scoring was not appropriate for EM procedure were the self-report HSI (because scoring is based on *t*-scores) and self-report ISI (because questions implied “no symptoms” if they were left blank). For the self-report HSI, scores were scaled if no more than 2 responses were missing. For the self-report ISI, total scores were used.

Significant covariates (i.e., age, gender, race) were included as controls in initial steps of the hierarchical regression analyses. Boxplots of personality variables did not indicate problems

with significant outliers. Analyses with non-normally distributed variables were completed both with and without log transformations of the non-normal variables. Results were nearly identical, with no differences in standardized estimates of more than .02. Results using non-transformed variables are presented here for ease of interpretability.

Results

Analyses were carried out according to the preregistration. Descriptive statistics of study variables are provided in Tables S2-S5 and correlations of the FFMPD scales with the self- and informant-report health variables are provided in Tables S6-S8. Correlations for the FFBI-SF with the self- and informant-report health variables ranged from r = -.40 to r = .33, with a median absolute value effect size of r = .17. Correlations for the FFOCI-SF ranged from r = -.32 to r = .32, with a median absolute value effect size of r = .09. Correlations for the FFAvA-SF ranged from r = -.44 to r = .40, with a median absolute value effect size of r = .13.

FFMPD facets, NEO facets, and MAPP scales that were correlated with health variables at $p < .001$ were carried forward into multiple regression models predicting each health dependent variable scale separately. Each dependent variable was modeled in two different ways: Once being predicted by significant FFMPD correlates and once being predicted by significant NEO facet correlates, completed separately for borderline, obsessive-compulsive, and avoidant personality pathologies. FFMPD and NEO facets significant in those multiple regression models were then carried forward to hierarchical regressions—one for each type of personality pathology. Hierarchical regressions were completed including the NEO facets in the first step, the corresponding MAPP scale in the second step (if it was significantly correlated with the outcome), and the FFMPD facets in the last step.

Results from the FFOCI and FFAvA models are presented in Tables S9 and S10, respectively. Six FFOCI scales (Excessive Worry, Workaholism, Doggedness, Dogmatism, Risk Aversion, and Detached Coldness) showed nine different significant incremental effects on insomnia symptoms, informant-reported health status, wellness maintenance behaviors, accident control behaviors, traffic risk, HBC and HSI general health perceptions, pain, and the HSI physical health composite variables over and above the NEO and the MAPP Obsessive-Compulsive personality disorder. Absolute value effect sizes ranged from β = .13 to β = .23, with a median of β= .16. Four FFAvA scales (Despair, Risk Aversion, Joylessness, Social Dread) showed fourteen different significant incremental effects on insomnia symptoms, informant-reported health behaviors, informant-reported health status, accident control behaviors, traffic risk, HBC and HSI general health perceptions, pain, energy/fatigue, and the HSI physical health composite variables over and above the NEO and the MAPP. Absolute value effect sizes ranged from β = .17 to β = .41, with a median of β= .21. In the borderline pathology models, the FFBI facets did not predict the physical health indicators at $p < .001$ in the last steps of the models, with the exception of FFBI Despondence, which predicted HSI Energy/Fatigue over and above other significant NEO facets and MAPP borderline personality disorder, β = -.22, $p < .001$.

To further examine incremental validity, the physical health indicator variables at Wave 1 were added to the models in a new first step. In these models, only FFAvA Joylessness, FFAvA Risk Aversion, and FFAvA Despair remained significant individual predictors in the last steps of their respective models (predicting informant-rated health status inventory; β = .13, Traffic Risk; β = .12, and HSI Pain; β = -.12, respectively).

The previously described preregistered regression models included several facets from each form of pathology in each step. The large number of predictors likely reduced the power of

the analyses. Further, there was multicollinearity among the predictors (e.g., the FFBI scales' median intercorrelation was $r = .51$), which can affect the estimates of individual predictors in the models. In some preregistered analyses, single FFMPD scales were tested against multiple NEO scales. Further, most models included NEO and FFMPD facets that assess different components of personality. To escape these issues and test incremental validity of the FFMPD scales in a more straightforward way, exploratory regression analyses were completed examining the predictive validity of the FFMPD facets one by one. These analyses also included covariates: The physical health indicators at Wave 1 and demographic variables that were significantly correlated with the Wave 2 physical health indicators (e.g., age, gender, race). Controlling for the physical health indicator variables at Wave 1 represents a tough test of the personality variables, as significant results would now indicate that the personality variables predict change in the physical health indicator variables across time. The significant predictors in these models are presented in Tables 1 (FFBI) and 2 (FFAvA). None of the FFOCI facets were significantly predictive of change in the physical health indicators in these models.

In a further set of exploratory analyses, incremental validity of the FFMPD scales over their direct corresponding NEO-PI-R facets was tested. For example, in one model, NEO-PI-R Anxiety was controlled before FFAvA Evaluation Apprehension (a maladaptive variant of the facet of NEO-PI-R Anxiety) was included in the next step. In these analyses, 46 of 61 FFMPD facets remained significant predictors of the variance in the outcomes at $p < .05$. Twenty-nine were still significant at $p < .01$. Fifteen had incremental validity at $p < .001$. The 15 FFMPD facets and their directly corresponding NEO-PI-R facets over which they showed incremental validity at $p < .001$ are presented in Table 3.

Discussion

Personality has well-documented effects on important outcomes in life, including physical health (Ozer & Benet-Martinez, 2006; Roberts et al., 2007). However, less research has examined how maladaptive personality traits relate to physical health. The present study provides initial work examining the criterion validity of facet scales from the FFMPD, a dimensional model of personality disorder with a growing body of research support (Bagby & Widiger, 2018), for predicting physical health indicators.

The present study indicates that maladaptive FFMPD facets have significant associations with health behaviors and health perceptions across time in older adults. Associations remained in many instances while controlling for demographic control variables, outcome variables at Wave 1, as well as normal range personality traits and DSM personality disorder syndromes. For example, while higher levels of the adaptive FFM scale NEO-PI-R Anxiousness predict general perceptions of physical health, higher levels of a maladaptive variant of FFM anxiousness, FFAvA Evaluation Apprehension, predict even more variance in general perceptions of physical health (Table 3). Likewise, while higher levels of the adaptive FFM scale NEO-PI-R Fantasy predict insomnia symptoms, higher levels of its maladaptive variant, FFBI Dissociative Tendencies, predict even more variance in insomnia symptoms (Table 3). Results signal that the maladaptive variants of FFM traits have implications for physical health behaviors and perceptions because they predict outcomes over and above the adaptive variants of the same traits.

The DSM personality disorder scales correlated with the physical health outcomes, but regression analyses indicated that the DSM personality disorders did not predict unique variance in health apart from the FFMPD maladaptive trait scales and NEO PI-R adaptive trait scales. There are several reasons why the DSM personality disorders may not be as successful for

predicting physical health outcomes as the FFMPD, which relate to some of the core problems of the DSM approach to the classification and assessment of personality disorders. First, the FFMPD provides a more comprehensive model of personality functioning because it traces its roots to the Big Five, a trait model derived from factor analysis of virtually every trait term within the English and other languages (De Raad & Mlacic, 2017). To the extent that the Big Five includes every maladaptive trait term, it naturally follows that the FFM, aligned with the Big Five, accounts for virtually every maladaptive personality trait (Widiger & Crego, 2019). Second, the DSM system may be less adequate for predicting health outcomes because of the heterogeneity within any particular DSM personality disorder. Individuals may be diagnosed with the same personality disorder—for example borderline personality disorder—with almost entirely different symptoms. Thus, a score for borderline personality disorder is composed of heterogeneous content, which can undermine criterion validity. Finally, DSM personality disorder assessments often assess each symptom with only one item. The FFMPD framework conceptualizes each trait (i.e., symptom) as a homogeneous construct for which multiple items are used for their assessment. This focus on construct homogeneity improves criterion validity because the FFMPD scales provide more distinct and reliable assessments of specific predictors (Strauss & Smith, 2009). The improvements in criterion validity for physical health indicators in the present study appear to reflect in part the improvements of a dimensional model of personality disorder over a categorical one (Clark, 2007).

Several specific findings emerge from the present study as most notable. First, the FFAvA Despair facet predicted many outcomes including a demonstration of incremental validity over the NEO PI-R normal FFM traits and DSM personality disorder syndrome scales. Correlations between Wave 1 Despair and Wave 2 general health perceptions, energy/fatigue,

insomnia symptoms, and physical functioning reached moderate effect sizes (i.e., between .30-.50; Cohen, 1992). In the preregistered analyses, the scale showed incremental validity over NEO PI-R facet scales and the MAPP DSM syndromal scales in predicting insomnia symptoms, physical functioning, pain, general health perceptions, energy/fatigue, and the physical health composite score. This was in addition to outperforming all other FFAvA scales that also significantly predicted these outcomes and were included in the same regression analyses. In the exploratory analyses, the scale itself predicted eight self-report health behavior and perception scales over and above demographic covariates *and* levels of the health behavior and perception scales at Wave 1. These findings indicate that the four-item Despair scale may be useful for predicting physical health behaviors and perceptions across time in older adults, and predicting increases in problems in these areas across time. This is perhaps not particularly surprising. Traits of the broad domain of neuroticism have long been known to be predictive of health problems, but the current results suggest that it may be the particular affect of despair that is especially explanatory.

FFAvA Joylessness likewise showed moderate effect sizes in correlations with informant-reported health status, general health perceptions, energy/fatigue, and the physical health composite score, and showed incremental validity over the NEO PI-R FFM trait scales and MAPP DSM syndromal scales in predicting these variables, as well as incremental validity over covariates. This more robust result indicates that trait-level joylessness may contribute to multiple areas of physical health-related outcomes; and predict increases in perceptions of physical health-related problems from both self- and informant-perspectives. Joylessness, like despair, represents the negative affect-related predictors of health problems and concerns.

Multiple other FFMPD scales showed strong relationships with health behaviors and perceptions but did not sustain when considering covariates. FFOCI Excessive Worry showed incremental validity over the NEO PI-R FFM trait scales and the MAPP DSM syndromal scales in predicting insomnia symptoms and pain, and FFOCI Detached Coldness likewise demonstrated incremental validity over the NEO PI-R trait scales and MAPP syndromal scales in predicting general health perceptions and the physical health composite score. However, these relationships did not remain significant when controlling for covariates.

Other FFMPD scales that did predict multiple outcomes with incremental validity over covariates and/or NEO PI-R and MAPP assessments included FFBI Self-Disturbance, FFBI Despondence, FFBI Behavioral Dysregulation, FFBI Rashness, FFAvA Social Dread, FFAvA Evaluation Apprehension, FFAvA Mortified, and FFAvA Shrinking. Some FFMPD scales displayed broader relationships with health behaviors and perceptions (e.g., Despondence, Despair, Joylessness), while others had more specific connections (e.g., Social Dread predicted lower accident control and more fatigue). The performance of the FFMPD scales generally provides support for the hypothesis that a dimensional framework for studying personality disorder improves criterion validity for physical health outcomes through homogeneous scales and specific constructs.

While FFAvA Risk Averse showed a significant positive effect for fewer traffic accidents at a moderate effect size, it also correlated negatively with physical functioning, indicating that while a maladaptive conscientiousness trait will be predictably maladaptive in some contexts (e.g., physical functioning) it can also in fact be adaptive in other contexts (e.g., inhibition of behavior thereby avoiding risks). This finding of a positive relationship with traffic safety—but negative health perceptions—was replicated by the FFOCI Risk Averse scale. Risk aversion may

motivate safer driving behaviors, but also drive negative perceptions of physical health (in this case, physical functioning). That is, people who avoid risk at a maladaptive level may evaluate their health more negatively. This unique pattern underscores the importance of adopting a dimensional framework at the *facet*-level to examine more nuanced relationships between maladaptive personality traits and health.

The present study benefitted from the inclusion of informant-report measures of health behaviors and general health perceptions in addition to self-reports. Targets who scored higher on FFOCI Workaholism and FFAvA Joylessness were perceived by informants as being less healthy, over and above NEO PI-R and MAPP scores. The results indicate that informants perceive people higher on joylessness as less physically healthy; and perhaps people higher on joylessness are less physically healthy. Results also indicate that more risk averse target participants are perceived as engaging in more positive health behaviors by informants. These findings are important because they provide multi-method validation of FFMPD scales[1]. Future work including informant-reports of the FFMPD scales will be especially useful to cross-validate findings of the associations between FFMPD scales and health behaviors and perceptions.

More research is needed on maladaptive personality and physical health, especially because maladaptive personality traits may have even stronger relationships with physical health outcomes than do adaptive-range personality traits and personality disorder syndromes, as evidenced in the present study. Correlations suggested in some cases there are moderate-sized effects—that FFMPD traits predict around 10% of the variance in a respective physical health indicator. This is a significant amount of information about future health markers, and there are

[1] While this is a "positive" relationship, and Risk Averse is a maladaptive trait, this finding still provides construct validity evidence for the Risk Averse facet scale. It makes sense that people high on Risk Averse would display more positive health behaviors (but high levels of the trait may cause problems in other areas of their lives—for example, in the present study, lower self-reported perceptions of physical functioning).

few other predictors of future physical health outcomes that explain more than 10% of the variance in a given health outcome. Modal effects of personality predictors are similar in size to those found in medicine and in social psychology, and "can have important effects on individuals' lives depending on the outcomes with which they are associated and depending on whether those effects gets cumulated across a person's life" (Roberts et al., 2007, pp. 314). This indicates that personality is one (of many) important predictors of physical health. Facet-level associations are even more useful because of their improved discriminant validity.

The present findings provide further evidence that personality should be considered in medical settings. The field of personality disorder is shifting from the broad and heterogeneous personality disorders to the more specific maladaptive personality traits (Krueger et al., 2012). The results of the current study provide further support for this shift. Personality assessments in medical care could indeed provide useful information about future medical risk, more so than is being provided by the DSM syndromes or even FFM personality traits. In addition to gathering more data to answer questions about the specific associations between FFMPD and health, this raises further questions: for example, how best could measures of personality be integrated into healthcare settings, and how best could they be used? While studies have begun to consider these issues, there are more gains to be made and issues to consider in order to make use of the research indicating that personality predicts health (e.g., assessment choices, length of assessments, cutoff scores, feedback to patients, treatment strategies, destigmatization of maladaptive traits).

Limitations

The present study had strengths including employing a large representative community sample of older adults, including two assessment points across time, and multiple assessment

methods. However, the study had limitations. In the future, it will be important to study relationships between informant-reports of the FFMPD traits and health outcomes. It is sometimes the case that informant-reports of personality predict important health outcomes that self-reports do not (Smith et al., 2007), making it even more important to examine how informant-reports of FFMPD traits predict physical health indicators. The present study also used only three of eight existing FFMPD measures (Widiger, Lynam, Miller, & Oltmanns, 2012). While this was useful for the present study, the full range of FFM domains and FFMPD traits should be tested to examine connections with physical health.

A few of the self-report personality and health scales had low internal consistency, which could have affected the results. For example, Substance Risk had a coefficient alpha of ~.30. This might reflect the fact that the scale only had 3 items, with each assessing a different substance—there was one for alcohol, one for smoking, and one for other drugs. Additionally, the FFOCI Punctiliousness and FFAvA Rigidity scales had low alphas at both waves. This indicates that perhaps these short-form scale items should be revised or at least re-evaluated. These scales also had perhaps the least frequent correlations with the outcomes (Substance Risk, another scale with low internal consistency, also had few significant correlations with the personality variables), which may have been a result of attenuation due to low reliability.

Conclusions

Research indicates that personality is an important predictor of physical health. The present study is a staging point for continued research on dimensional models of maladaptive personality traits and physical health. Results from the present study indicate that FFMPD traits predict health behaviors and health perceptions, with incremental validity over demographic covariates, measures of general FFM personality traits, and measures of DSM personality

disorder syndromes for predicting health behaviors and health perceptions, providing further support for the shift from a categorical model of personality disorder to a more specific and nuanced dimensional model of maladaptive personality traits. Continued research in this area will further illuminate associations between maladaptive personality and health, and can lead to ideas about how to implement personality assessment in healthcare settings. Capitalizing on the connections between personality and health may be an important way to eventually maximize healthcare providers' ability to help patients avoid long-term physical health problems.

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Table 1. *FFBI-SF Scales Predicting Physical Health Indicators Over Covariates*

Wave 2 Outcome	Wave 1 Predictor Scale	*b*	95% lower	95% upper	β
ISI	FFBI Anxious Uncertainty	0.16	0.09	0.24	.11
	FFBI Dysregulated Anger	0.14	0.06	0.22	.09
	FFBI Despondence	0.19	0.10	0.29	.11
	FFBI Self-Disturbance	0.20	0.10	0.30	.11
	FFBI Behavioral Dysregulation	0.19	0.09	0.28	.10
	FFBI Dissociative Tendencies	0.30	0.16	0.45	.11
	FFBI Distrustfulness	0.20	0.11	0.28	.12
	FFBI Rashness	0.20	0.11	0.29	.12
WELLNESS	FFBI Despondence	-0.24	-0.35	-0.13	-.11
	FFBI Self-Disturbance	-0.23	-0.35	-0.12	-.10
	FFBI Fragility	-0.40	-0.58	-0.22	-.11
	FFBI Distrustfulness	-0.17	-0.28	-0.07	-.09
	FFBI Rashness	-0.19	-0.30	-0.08	-.09
HBC GHP	FFBI Despondence	-0.32	-0.46	-0.19	-.11
	FFBI Self-Disturbance	-0.33	-0.47	-0.19	-.11
	FFBI Behavioral Dysregulation	-0.29	-0.43	-0.15	-.09
	FFBI Fragility	-0.57	-0.79	-0.35	-.12
	FFBI Dissociative Tendencies	-0.45	-0.66	-0.23	-.09
	FFBI Distrustfulness	-0.24	-0.36	-0.11	-.09
	FFBI Rashness	-0.29	-0.42	-0.15	-.10
HSI PF	FFBI Self-Disturbance	-3.13	-4.72	-1.54	-.09
HSI PA	FFBI Despondence	-1.72	-2.55	-0.89	-.13
HSI GHP	FFBI Despondence	-2.66	-4.16	-1.15	-.09
HSI EF	FFBI Despondence	-2.74	-4.28	-1.20	-.10
	FFBI Self-Disturbance	-3.22	-4.81	-1.62	-.11
	FFBI Behavioral Dysregulation	-2.65	-4.17	-1.14	-.09
	FFBI Distrustfulness	-2.44	-3.80	-1.08	-.10
PHC	FFBI Despondence	-0.24	-0.36	-0.12	-.12
	FFBI Distrustfulness	-0.20	-0.31	-0.09	-.10
	FFBI Rashness	-0.21	-0.32	-0.09	-.10

Note. All significant at $p < .001$. ISI = Insomnia Severity Index, I-HSI = informant-reported heath status inventory, HBC = health behavior checklist, GHP = general health perceptions, HSI = health status inventory, PF = physical functioning, PA = pain, EF = energy/fatigue, PHC = physical health composite.

Table 2. *FFAvA-SF Scales Predicting Physical Health Indicators Over Covariates*

Wave 2 Outcome	Wave 1 Predictor Scale	*b*	95% lower	95% upper	β
ISI	FAVA Despair	0.21	0.13	0.30	.13
	FAVA Shrinking	0.13	0.06	0.21	.09
	FAVA Joylessness	0.14	0.07	0.22	.09
I-HSI	FAVA Joylessness	0.03	0.01	0.04	.13
WELLNESS	FAVA Despair	-0.18	-0.29	-0.08	-.09
	FAVA Shrinking	-0.18	-0.28	-0.08	-.09
ACCIDENT	FAVA Social Dread	-0.12	-0.17	-0.06	-.11
	FAVA Risk Averse	0.11	0.05	0.18	.09
HBC GHP	FAVA Evaluation Apprehension	-0.22	-0.35	-0.09	-.08
	FAVA Despair	-0.26	-0.38	-0.13	-.10
	FAVA Mortified	-0.23	-0.35	-0.10	-.08
	FAVA Overcome	-0.23	-0.36	-0.10	-.08
HSI PF	FAVA Evaluation Apprehension	-2.65	-4.10	-1.21	-.08
	FAVA Despair	-2.68	-4.09	-1.28	-.09
	FAVA Mortified	-3.14	-4.53	-1.75	-.10
	FAVA Overcome	-2.47	-3.93	-1.00	-.08
	FAVA Joylessness	-2.80	-4.15	-1.45	-.10
HSI GHP	FAVA Despair	-2.46	-3.87	-1.05	-.09
	FAVA Joylessness	-2.42	-3.74	-1.09	-.10
HSI PA	FAVA Despair	-1.55	-2.31	-0.78	-.13
HSI EF	FAVA Evaluation Apprehension	-2.88	-4.26	-1.50	-.11
	FAVA Despair	-3.39	-4.80	-1.99	-.14
	FAVA Social Dread	-2.10	-3.20	-1.00	-.10
	FAVA Joylessness	-3.14	-4.47	-1.82	-.13
PHC	FAVA Evaluation Apprehension	-0.29	-0.40	-0.18	-.14
	FAVA Despair	-0.28	-0.39	-0.16	-.14
	FAVA Mortified	-0.23	-0.35	-0.12	-.12
	FAVA Overcome	-0.25	-0.37	-0.13	-.12
	FAVA Social Dread	-0.17	-0.26	-0.07	-.10
	FAVA Joylessness	-0.26	-0.36	-0.15	-.14

Note. All significant at $p < .001$. ISI = Insomnia Severity Index, I-HSI = informant-reported heath status inventory, HBC = health behavior checklist, GHP = general health perceptions, HSI = health status inventory, PF = physical functioning, PA = pain, EF = energy/fatigue, PHC = physical health composite.

Table 3. *FFMPD Incremental Validity Over Covariates and Corresponding NEO Facets*

Wave 2 Outcome	Wave 1 Predictor	β	*p*	Adj R^2	ΔR^2	ΔF	*df*
ISI	NEO O1	.00	.970	.48	.011	17.22	807
	FFBI DT	.11	.000				
ISI	NEO C6	.00	.926	.48	.010	16.06	807
	FFBI R	.12	.000				
Wellness	NEO N4	-.01	.610	.51	.007	10.95	776
	FFBI SD	-.09	.001				
Wellness	NEO N6	-.02	.486	.51	.008	12.55	776
	FFBI F	-.10	.000				
HSI G	NEO N4	-.01	.680	.59	.008	15.37	775
	FFBI SD	-.10	.000				
HSI G	NEO N5	.00	.905	.59	.007	14.23	775
	FFBI BD	-.10	.000				
HSI G	NEO N6	-.01	.638	.60	.010	19.26	775
	FFBI F	-.11	.000				
HSI G	NEO O1	.00	.920	.59	.009	16.63	775
	FFBI DT	-.09	.000				
HSI G	NEO C6	.03	.271	.59	.006	11.50	775
	FFBI R	-.09	.001				
PF	NEO E6	-.03	.352	.63	.007	12.87	689
	FAVA J	-.12	.000				
PF	NEO E6	-.04	.248	.63	.006	12.49	708
	FAVA J	-.12	.000				
EF	NEO N3	-.03	.355	.54	.007	11.11	708
	FAVA D	-.12	.001				
EF	NEO E6	-.03	.394	.54	.011	16.38	708
	FAVA J	-.15	.000				
PHC	NEO N1	-.05	.109	.46	.011	13.64	686
	FAVA EA	-.12	.000				

Note. ISI = Insomnia Severity Index, Wellness = Wellness Maintenance, HSI G = Health Status Inventory General Health Perceptions, PF = Physical Functioning, EF = Energy/Fatigue, PHC = Physical Health Composite, NEO = NEO-PI-R, FB = Five-Factor Borderline Inventory, FAVA = Five-Factor Avoidant Inventory, O1 = Fantasy, C6 = Deliberation, N1 = Anxiety, N3 = Depression, N4 = Self-Consciousness, N5 = Impulsiveness, N6 = Vulnerability, E6 = Positive Emotions, DT = Dissociative Tendencies, R = Rashness, SD = Self-Disturbance, F = Fragility, BD = Behavioral Dysregulation, J = Joylessness, D = Despair, EA = Evaluation Apprehension.