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Five-factor Personality Dimensions and 3 Health-related Personality Constructs as Predictors of Health

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Aim To examine how 5-factor personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) and 3 higher-order health-related personality constructs (negative experience, optimistic control, and passivity) are related to self-reports of subjective health outcomes (positive and negative mood, physical symptoms, and general health concern) and objective health conditions (chronic illnesses, serious illnesses, and physical injuries).

Methods The study was carried out on a sample of 822 healthy volunteers (438 women and 384 men, from 18 to 84 years). Data were analyzed by hierarchical regression analyses for measures of subjective health outcomes used as criterion variables and binary logistic regression analyses for objective health conditions used as criterion variables.

Results Three health-related personality constructs significantly predicted all subjective health measures above and beyond 5-factor personality dimensions. Out of the 5-factor personality dimensions, neuroticism was most consistently related to worse subjective health outcomes, while out of 3 health-related personality constructs, negative experience was related to worse and optimistic control to better subjective health outcomes. When objective health conditions were taken into account as criterion variables, both sets of variables were relatively weak predictors. Only 5-factor personality traits as a group of variables significantly predicted chronic illnesses ($\chi^2_5 = 15.06$; $P = 0.012$; Nagelkerke $R^2 = 0.032$). Only neuroticism significantly predicted the presence of chronic illnesses (odds ratio [OR], 1.091; 95.0% confidence interval [CI], 1.040-1.144), whereas only optimistic control was related to more frequent physical injuries caused by accidents (OR, 1.285; 95.0% CI, 1.002-1.648).

Conclusion Five-factor personality traits and 3 health-related personality constructs may be useful factors in a multidisciplinary approach to understanding personality-health relationship.

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To explain why certain people are healthier than others, a wide variety of personality concepts and their relationships to health outcomes have been studied (1,2). However, the studies examining personality-health relationship are constrained by several problems. First, they frequently analyze only a single or a few narrow personality traits at a time (3). Also, most of them use apparently similar personality traits judging by their item contents (eg, hope and optimism, generalized self-efficacy, and generalized expectancy for success), although they are supposed to represent unique health-related personality concepts (2). However, the majority of studies often do not take into account possible relations between them, which puts the usefulness of these measures in question (4). Also, because many studies confirm that some health-related personality traits conceptually overlap (2), it is difficult to determine whether they independently or interactively exert effects on health outcomes (5,6).

There are some suggestions that the 5-factor model of personality has the advantage over narrower personality traits in studying the relationships between individual differences and health (7). The 5-factor model includes broad personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness. Extraversion encompasses more specific traits such as talkativeness, energy, and assertiveness; agreeableness includes sympathy, kindness, and affection; conscientiousness includes organization, thoroughness, and ability to make plans; neuroticism includes tension, moodiness, and anxiety; while openness consists of traits like having wide interests and being imaginative and insightful. Since each of the 5-factor personality traits are considered as an adaptive set of traits (8), they are supposed to be related to health outcomes. Also, one of the main arguments for this position is that the use of fewer but broader personality dimensions is both convenient and economical (9), and that 5-factor model could bring order to many constructs and scales, as well as to help in identifying smaller number of traits that influence health individually or in interactive combinations (10). Research confirms that each of the 5 personality traits has an impact on various health-related outcomes (1,11-15). The main mechanisms underlying their connections to health outcomes include their influence on health-related behaviors, symptoms reporting, exposure and reactivity to stressful situations, seeking social support, etc (1,13).

However, because broad personality traits and health-related outcomes are typically weakly related, the excessive use of the hierarchically higher personality dimensions in the studies examining personality and health is sometimes questioned (16,17).

Also, research focused upon personality-health relationship has a long tradition apart from the use of 5-factor personality traits. The 5-factor model of personality at a broad level of abstraction captures the commonalities among most of the existing systems of personality traits, thus providing an integrative descriptive model for research (18). As already mentioned, numerous more narrowly defined personality traits were examined as predictors of various health outcomes. However, the origin of these traits is different than of those found in the 5-factor model, ie, they are constructed specifically for studying personality under stress and its relations to various health outcomes.

Having in mind some problems of the frequently used narrower health-related personality traits, several studies used a sample of various health-specific personality scales in order to derive broader dimensions that would not overlap with 5-factor personality dimensions (2,19).

The study analyzing a representative set of health-related personality scales drawn from research reviews of personality constructs implicated in physical health and well-being shows that health-related personality scales are moderately related with the 5-factor personality traits and also that they form 3 higher-order factors named optimistic control (eg, hopelessness, self-esteem, and optimism), anger expression (eg, anger, anger out, anger control), and inhibition (eg, anger in and introspection) (2). Most health-relevant personality dimensions appear to be complex mixtures of broad personality dimensions, especially extraversion, agreeableness, and neuroticism, while they are much less related to conscientiousness and openness.

A study on a somewhat different sample of health-specific personality dimensions (20) found 3 similar higher-order factors named negative experience (comprising narrower traits of, eg, hostility, type A behavior, anxiety), optimistic control (eg, self-efficacy, hardiness-control, optimism), and passivity (eg, locus of control – powerful others and chance). To our knowledge, there is no research which compared broad 5-factor personality traits and higher-order health-related personality constructs derived from narrower personality traits relevant to health.

Therefore, the aim of this study was to compare the predictive value of 5-factor personality traits and 3 health-related higher-order personality constructs – nega-

tive experience, optimistic control, and passivity to health outcomes. According to the multidimensional conceptualization of health, 2 components of health status were used as criterion variables: self-reports of mental and physical health (positive and negative mood, physical symptoms, and general health concerns) and the presence of objective health conditions (presence of chronic illness, serious illness, or injuries caused by accidents).

METHODS

Participants

The study was conducted in the fall of 2006 on a sample of 822 participants from 2 Croatian cities, Zagreb and Rijeka, who were randomly selected from their households. The households were selected randomly within the streets that were also randomly selected within each local district. The participants were selected in order to obtain a representative sample of people regarding their age and sex. There were 438 (53.3%) women and 384 (46.7%) men. The age of participants ranged from 18 to 84 years (mean ± standard deviation 38.58 ± 12.45). The majority had high school diploma (62.7%) and 24.6% had university diploma. Most of the participants were employed (66.4%) and married (62.8%). Out of the total sample, 92 participants refused to respond, with most frequent reasons for non-responding being lack of time and old age (above 80).

Procedure

Participants were interviewed by psychology students in their homes. Participation was voluntary, no incentives were offered, and questionnaires were anonymous with as much time as possible offered to complete the questionnaires. The informed consent document was designed to provide to potential participants information about the study so that they could make informed decision about their participation.

Personality measures

Big Five Inventory (BFI) (21) was used for measuring the 5-factor personality dimensions. The BFI uses short phrases to assess the most prototypical traits associated with each of the Big Five dimensions. It consists of 44 items and was constructed to allow quick and efficient assessment of the 5 personality dimensions – extraversion (eg, "I see myself as someone who is outgoing, sociable"), agreeableness (eg, "I see myself as someone who is helpful and unselfish with others"), conscientiousness (eg, "I see myself as someone who is a reliable worker"), neuroticism (eg, "I see myself as someone who worries a lot"), and openness (eg, "I see myself as someone who is curious about many different things"). Self-report ratings for each item were made on a scale from 1 – disagree strongly to 5 – agree strongly. Despite its brevity, the BFI has good psychometric properties. In US and Canadian samples, the α reliabilities of the BFI scales typically range from 0.75 to 0.90 and average above 0.80; 3-month test-retest reliabilities range from 0.80 to 0.90, with a mean of 0.85 (20). Additionally, previous studies have shown that this instrument was useful for cross-language and cross-cultural research (21), and also, it has been proven to be appropriate for measuring the 5-factor model of personality in the Croatian language (22). On the sample of participants in the present study, the coefficients of internal reliability (Cronbach α) ranged from 0.69 for agreeableness to 0.80 for neuroticism. Correlations between 5 personality dimensions ranged from -0.40 ($P < 0.001$; between neuroticism and conscientiousness) to 0.46 ($P < 0.001$; between extraversion and openness).

Health-related higher-order personality constructs were taken from a recent study (20). Eight frequently used health-related personality measures were used: Life Orientation Test (23); General Self-Efficacy Scale (24); MMPI-2 Type-A Scale (25); State-Trait Anxiety Inventory (26); Hardiness Scale (27); Multidimensional Health Locus of Control (28); MMPI-based Cook-Medley Hostility Scale – short form (10 items) (29); and Sense of Coherence Scale (30). Their common structure was analyzed using principle factor analyses. Three broad independent health-related personality factors were obtained and named negative experience, optimistic control, and passivity. Negative experience was positively saturated by Hostility Scale, Type-A Scale, State-Trait Anxiety Inventory, and Pessimism, and negatively by all 3 subscales of Sense of Coherence Scale. Optimistic control was positively saturated by General Self-efficacy Scale, 2 Hardiness subscales – Control and Commitment, Optimism, and Multidimensional Health Locus of Control subscale named Internal Locus of Control, while passivity was saturated positively by Multidimensional Health Locus of Control subscales named Locus of Control – Powerful Others and Chance and negatively by one subscale of Hardiness Scale – Challenge. Correlations between these factors and Big Five personality traits range from -0.32 ($P < 0.001$ between negative experience and agreeableness) to 0.55 ($P < 0.001$ between negative experience and neuroticism).

Subjective health outcomes

Mood Scale (31) is an adjective-type, 40-item scale composed of 2 higher-order mood factors (positive and negative mood). The positive mood factor consists of 3 components reflecting positive emotional states of happiness, acceptance, and activation, while the negative mood factor comprises specific components of negative emotional states of sadness, anger, fear, and rejection. The coefficients of internal reliability (Cronbach α) are 0.90 for positive and 0.91 for negative mood.

Pennebaker Inventory of Limbic Languidness (32) was used in order to measure physical symptoms and complaints. It consists of 54 items (eg, racing heart, chest pain, indigestion, diarrhea). This inventory was translated and adapted for the Croatian language in one of our previous studies (33). Participant responded to each of 54 symptoms on a 5-point intensity scale, with 0 – not at all, 1 – slightly, 2 – moderately, 3 – strongly, and 4 – extremely. A total score is obtained by summing the responses across items. In the present study, it was used as a unidimensional measure of physical symptoms, and the coefficient of internal reliability (Cronbach α) was 0.94.

General Health Concerns is one of 3 Health Concerns subscales, taken from Content Component Scales of MMPI-2 (25). It consists of 6 items and measures general perception of one's own physical state. The other 2 Health Concern Subscales measure gastrointestinal and neurological symptoms. Because in the present study physical symptoms were assessed by Pennebaker Inventory of Limbic Languidness, only this short subscale was used. Higher results on this scale indicate more frequent sense of exhaustion, more frequent concern about one's own health, and worse physical condition. The coefficient of internal reliability (Cronbach α) for this scale is 0.62.

All correlations between subjective health outcomes are significant. Positive mood is related to negative mood (-0.47; $P<0.001$), physical symptoms (-0.24; $P<0.001$), and general health concern (-0.29; $P<0.001$), negative mood to physical symptoms (0.49; $P<0.001$) and general health concern (0.34; $P<0.001$), while physical symptoms correlate with general health concern 0.39 ($P<0.001$).

Objective health conditions

The presence of objective health conditions was assessed by 3 open-ended questions asking participants to name any chronic illness, serious illness, or injuries caused by an accidents that they had experienced. In the present study, 126 (15.3%) of participants reported having chronic illnesses, 85 (10.3%) serious illnesses, and 115 (14.0%) injuries caused by accidents.

Statistical analysis

Correlations of 5-factor personality traits and 3 health-related personality constructs with subjective health outcomes were calculated using Pearson correlation coefficients. Hierarchical regression analyses were used to assess the predictive value of 5-factor personality traits and health-related personality constructs on subjective health outcomes. Independent sample ***t***-test was used in order to compute the differences in 5-factor personality traits and health-related personality constructs between the participants with or without chronic illnesses, serious illnesses, and physical injuries. In order to predict membership in one of the 2 categories (with or without illness or injury), a sequential binary logistic regression analyses were performed.

RESULTS

Five-factor personality traits and 3 health-related personality constructs were significantly related to subjective health-outcomes, with the exception of the correlation between agreeableness and general health concerns, and the correlation between openness to experience and physical symptoms. The correlations ranged from -0.48 between neuroticism and positive mood to 0.64 between neuroticism and negative mood.

Table 1 shows the correlations of 5-factor personality traits and health-related personality constructs with subjective health outcomes.

In order to examine the predictive value of broad 5-factor personality dimensions and 3 higher-order health-related personality constructs on subjective health outcomes (positive mood, negative mood, physical symptoms, and general health concern) as criterion variables, several hierarchical regression analyses were performed. In the first group of regression analyses, as predictors in the first step 5-factor personality traits were entered, while in the second group of the regression analyses, 3 health-related constructs were entered.

Five-factor personality dimensions as a group of variables significantly predicted all criterion variables,

and especially positive and negative mood. Health-related personality constructs as a group significantly predicted all 4 subjective health indices, even after controlling for 5 factor personality dimensions in the first step of the analyses. They explained additionally 11% variance of positive mood, 10% of negative mood, 9% of physical symptoms, and 6% of general health concerns.

Table 2 presents the results of regression analyses in which 5-factor personality dimensions were entered as predictors in the first step and 3 health-related constructs in the second step.

TABLE 1. Correlations of 5-factor personality dimensions and health-related personality constructs with subjective health outcomes

	Subjective health outcomes			
Personality measures	positive mood	negative mood	physical symptoms	health concerns
Extraversion	0.51*	-0.40*	-0.13*	-0.20*
Agreeableness	0.29*	-0.31*	-0.11†	-0.07
Conscientiousness	0.32*	-0.34*	-0.17*	-0.17*
Neuroticism	-0.48*	0.64*	0.33*	0.32*
Openness	0.39*	-0.17*	-0.04	-0.17*
Negative experience	-0.39*	0.58*	0.39*	0.22*
Optimistic control	0.52*	-0.34*	-0.15*	-0.31*
Passivity	-0.12*	0.10†	0.10†	0.14*

*$P<0.001$.
†$P<0.01$.

When predictor variables were entered in the reverse order in hierarchical regression analyses, health-related personality constructs as a group explained 44% variance of positive mood, 47% variance of negative mood, 19% variance of physical symptoms, and 17% variance of general health concern, while 5-factor personality dimensions explained additional 6% variance of positive mood, 9% variance of negative mood, and 2% variance of physical symptoms and general health concerns.

Objective health conditions

Differences in the 5-factor personality dimensions and 3 health-related personality constructs between the participants with or without chronic illnesses, serious illnesses, and physical injuries were computed by using independent samples ***t***-tests.

When participants with chronic illnesses were taken into analysis, a significant difference was found only for neuroticism ($t=2.76$; $P=0.006$; Cohen d = 0.19), and individuals with chronic illnesses reported higher scores on this dimension (22.28 ± 5.69) than those without them (20.78 ± 5.56).

The participants who had serious illnesses achieved higher scores on openness to experience (36.71 ± 5.48) than those without them (35.43 ± 5.87), but this difference was not significant ($t=1.91$; $P=0.057$; Cohen d = 0.13). The same was true for agreeableness (t = 1.94; $P=0.052$; Cohen d = 0.14),

TABLE 2. The results of hierarchical regression analyses with subjective health outcomes as criterion variables

Predictor variables	Criterion variables			
	positive mood	negative mood	physical symptoms	health concerns
1. step – personality traits:				
extraversion	0.31*	-0.22*	-0.02	-0.05
agreeableness	0.11*	-0.06†	0.04	0.09†
conscientiousness	0.01	-0.05	-0.06	-0.04
neuroticism	-0.29*	0.54*	0.33*	0.30*
openness	0.17*	0.07†	0.05	-0.08†
R^2 (coefficient of multiple determination)‡	0.40	0.46	0.12	0.12
2. step – health-related measures:				
negative experience	-0.25*	0.37*	0.36*	0.16*
optimistic control	0.38*	-0.23*	-0.18*	-0.28*
passivity	-0.06†	0.08§	0.12*	0.13*
R^2 (coefficient of multiple determination)‡	0.51	0.56	0.21	0.18
$\Delta R^{2\text{II}}$	0.11*	0.10*	0.09*	0.06*

*$P<0.001$.
†$P<0.050$.
‡Proportion of variance in the criterion variable explained by predictor variables.
§$P<0.010$.
IIDifference in R^2 between the second and first step of the analyses.

with higher agreeableness scores reported by participants having no injuries (33.46 ± 4.81) than by those with injuries (32.52 ± 4.68). On the basis of these results, it can be concluded that the effects of 5-factor personality dimensions and health-related personality constructs on the objective health conditions were small.

In order to predict membership in 1 of the 2 categories (with or without illness or injury) of 3 outcome variables (chronic illnesses, serious illnesses, and injuries caused by accidents), a series of sequential binary logistic regression analyses were performed. In the first step of the first 3 analyses, 5-factor personality dimensions were entered as predictor variables and in the second step 3 health-related personality constructs. In the next 3 analyses, the order of predictor variables was reversed.

The results of the analysis with chronic illnesses as a criterion variable showed that there was a good model fit when 5-factor personality dimensions were included in the first step ($\chi^2_5 = 15.06$; $P = 0.012$; Nagelkerke $R^2 = 0.032$). After health-related personality constructs were entered in the second step, there was no significant improvement in prediction ($\chi^2_3 = 4.73$; $P = 0.193$; Nagelkerke $R^2 = 0.041$). The only significant individual predictor of group membership was neuroticism (odds ratio [OR], 1.091; 95% confidence interval [CI], 1.040-1.144).

Five-factor personality traits as a group did not significantly predict the presence of serious illnesses ($\chi^2_5 = 7.87$; $P = 0.163$; Nagelkerke $R^2 = 0.020$), with openness as the only significant predictor of group membership (OR, 1.053; 95% CI, 1.008-1.101). This means that people with greater openness were more prone to serious illnesses. In the second step of the analysis, health-related personality constructs did not significantly improve prediction of serious illnesses ($\chi^2_3 = 1.46$; $P = 0.694$; Nagelkerke $R^2 = 0.023$), and in the full model none of the individual variables appeared as significant predictors of group membership.

Five-factor personality traits as a group did not significantly predict physical injuries caused by accidents ($\chi^2_5 = 4.62$; $P = 0.466$; Nagelkerke $R^2 = 0.010$). Health-related personality constructs in the second step of the analysis did not significantly improve the prediction ($\chi^2_3 = 6.85$; $P = 0.082$; Nagelkerke $R^2 = 0.025$), with optimistic control as the only significant predictor of group membership (OR, 1.285; 95% CI, 1.002-1.648). This means that persons with greater optimistic control were more prone to physical injuries.

The same results were obtained when the order of entering the predictors was reversed and health-related personality dimensions were included in the first step and 5-factor personality constructs in the second step of the analysis.

DISCUSSION

The main hypothesis of this study was that 3 health-related personality constructs would independently predict health outcomes, above and beyond 5-factor personality dimensions. Furthermore, in accord to the principle of the compatibility between predictors and criteria, it is expected that 5-factor personality traits and 3 health-related personality constructs would better predict multiple-determined criteria such as moods than narrower criteria such as physical symptoms and general health concerns. Having in mind different nature of 2 groups of criterion variables, as well as the fact that we measured predictor variables and subjective health outcomes by self report, it is expected that both groups of independent variables will better predict subjective health outcomes than objective health conditions. On the basis of previous research, it is expected that out of the 5-factor personality traits, neuroticism and extraversion will be the strongest predictors of health outcomes, while negative experience and optimistic control will be most important predictors out of the 3 health-related personality constructs.

The results of our study demonstrated the importance of hierarchically higher health-related personality constructs in predicting subjective health outcomes. As expected, 3 health-related personality constructs significantly predicted all subjective health measures, above and beyond 5-factor personality dimensions. Moreover, after controlling for 5-factor personality traits, 3 health-related personality constructs better predicted subjective health measures than 5-factor personality traits after controlling for 3 health-related personality constructs. Also, as expected, both sets of predictor variables better predicted measures of mood than physical symptoms and general health concerns. Namely, the later 2 outcomes are more specific measures of subjective health than mood. On the other hand, mood informs us about the general state of our organism, ie, it reflects not only information concerning our physical state but also concerning perceived social support from others, perceived self-efficacy, etc (34).

Regarding 5-factor personality dimensions, neuroticism was most consistently related to worse subjective health, openness and agreeableness were sig-

nificantly but weakly related mainly to better subjective health outcomes, extraversion was mainly related to higher positive and lower negative mood, while conscientiousness did not predict any measure of subjective health.

Concerning health-related personality constructs, it could be seen that all 3 of them were significant predictors of all 4 measures of subjective health. Negative experience and, to a lesser degree, passivity were related to worse, while optimistic control was related to better subjective health outcomes.

Correlation between negative experience and neuroticism in this study indicated that they were partially overlapping. However, neuroticism measured by BFI mainly includes negative affect, while negative experience is more broadly defined and apart from negative affect it also includes some behavioral (eg, hostility and A-type behavior) and cognitive components (eg, pessimism). Hence, the differences in the width of the operationalization of these 2 constructs may be the reason why negative experience predicted health outcomes above and beyond 5-factor personality traits, and neuroticism in particular. Namely, it is well known that constructs such as hostility, A-type behavior, and pessimism are related to various negative health outcomes (35).

Optimistic control seems to be most similar to openness to experience and extraversion. However, optimistic control includes some components that are not present in extraversion and openness measured by BFI, such as internal locus of control, and control as a subscale of hardiness. Numerous studies confirm that having control in general has a significant positive impact on various health indicators such as hormonal activity (36), cardiovascular functioning (37), and chronic illnesses (38).

Passivity seems to be weakly represented in the 5-factor model of personality. It was related mostly to lower openness to experience and lower extraversion. In some aspects, such as a tendency to passively accept one's own fate, passivity appears to be similar to type-C personality, which proved to be related to negative health outcomes such as cancer (39). Also, there is ample evidence that external locus of control has negative impact on some health indicators such as mortality and immune functioning (40,41). Therefore, these results suggest that broad personality dimensions such as 5-factor personality traits and 3 health-related personality constructs have partly unique effects on different measures of subjective health outcomes. Because neither of them is necessarily more meaningful than the other, they both should be included into future studies.

Regarding objective health conditions, neuroticism was only related to the presence of chronic illnesses and optimistic control to physical injuries caused by accidents. However, openness to experience appeared as a single variable related to the presence of serious illnesses, but only when 3 health-related personality constructs were not included into analyses. As a group of predictor variables, only 5-factor personality traits significantly predicted chronic illnesses, but generally, both sets of variables appeared to be relatively weak in predicting objective health conditions. Therefore, the results clearly show that both groups of variables better predicted subjective health outcomes than the presence of objective health conditions. These results were expected and are in accord with many studies (42,35), because objective health conditions such as chronic and serious illnesses develop during longer time and are determined by numerous other factors such as genetics or life-style that may not be highly related to personality. Furthermore, the number of participants with chronic and serious illnesses and physical injuries is much smaller than the number of participants without these conditions, which might have also led to the weaker prediction of objective health conditions.

The present data have some implications for research on personality and health. First, it is evident that reporting somatic symptoms constitutes part of a personality disposition and health/illness that goes beyond the usual narrow view of physical illness and traditional conceptions of treating disease, built around a pathology model. Second, researchers still need to clarify the nature of the relationship between personality and health and the prerequisite for research progress in this domain is to ensure better construct measurement. The results of this study should be considered in this context.

Also, better understanding of personality may improve dealing with patients such as assessing their health status and making decisions about the service provisions. For example, patients with high neuroticism and patients with high scores on optimistic control should be treated differently because they perceive their health status differently. Therefore, formal information on personality traits given by psychologist could be helpful to medical stuff, especially in hospital settings, where little opportunity exists for getting to know the personality of a patient.

When interpreting the results, methodological limitations of this study should be mentioned. The most important limitation of the present study was its cross-sectional design, which precludes causal interpretations. We do not know whether personality traits are the cause or the consequence of the health outcomes measured, ie, whether psychosomatic or somatopsychic mechanism is involved. Although psychosomatic process is frequently implicated, the results of this study may indicate the presence of somatopsychic process. Specifically, openness to experience was related to the lower age of participants who had chronic illnesses, as well as to the longer duration of chronic illnesses when participants' age was controlled for. Together, these results may suggest that longer duration of chronic illness leads to higher openness to experience. For instance, persons with chronic illnesses may become more interested in their illness or health in general, as well as more prone to changing their life-style and existential beliefs.

One more limitation of this study is that the majority of health outcomes were measured by self-reports and not by objective assessment, and hence the results obtained may be prone to self-report bias, and the influence of neuroticism in particular. Consequently, replications with objective assessment of physical health are needed.

Because the effects of health-related personality constructs on various health outcomes may depend on the initial choice of the narrower personality measures forming higher-order health-related constructs, future studies should describe higher-order personality constructs more thoroughly, by sampling broader and more representative measures and concepts of specific health-related personality traits. Regarding 5-factor model of personality, more comprehensive measures such as NEO-PI should be used in future studies (9). Namely, the narrower definition of the 5-factor personality traits measured by BFI could be the reason for relatively weak effects of some traits such as conscientiousness on health outcomes. Also, some of the predictors (eg, agreeableness), as well as criterion variables (eg, general health concern), have relatively low reliability which could also have negative implications on the predictive validity.

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