



Relationships between five-factor personality traits and specific health-related personality dimensions

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ABSTRACT. The relationships between 15 personality traits relevant for personality-health research were examined as well as their relationships with five-factor personality traits and two higher order alpha and beta factors. Factor analysis of the 15 health-related personality concepts yielded three broad components: *Negative affectivity*, *Optimistic control* and *Passivity*. Results indicate that three health-related components obtained and the majority of their measures could be moderately explained by the combination of five-factor personality traits. *Extraversion*, *Neuroticism* and *Openness* are represented in the health-related concepts much more than *Agreeableness* and *Conscientiousness*. Health locus of control and passivity showed the highest degree of independence from five-factor personality traits. Also, alpha factor is primarily related to low negative affectivity and beta factor to high optimistic control. The results suggest that five-factor and higher order alpha and beta factors are useful as a general framework for personality-health research, although there is also a need for using specific health-related personality measures.

KEYWORDS. Five-factor personality traits. Health-related personality traits. Health. Negative affectivity. Survey descriptive study.

RESUMEN. Se examinan las relaciones entre 15 rasgos de personalidad relevantes para la investigación en salud, así como sus relaciones con los cinco grandes factores de la personalidad y dos factores de orden superior alfa y beta. El análisis factorial de 15 rasgos de la personalidad relacionados con la salud dio lugar a tres amplios componentes: *Afectividad negativa*, *Control optimista* y *Pasividad*. Los resultados obtenidos

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indican que los tres componentes relacionados con la salud, y la mayoría de sus medidas, podrían explicarse por la combinación de los cinco factores de la personalidad. *Extraversión*, *Neuroticismo* y *Apertura* están representados en los conceptos relacionados con la salud mucho más que *Amabilidad* y *Responsabilidad*. Locus de control de la salud y pasividad mostraron el mayor grado de independencia de los cinco grandes factores de la personalidad. El factor alfa se relaciona principalmente con la baja afectividad negativa, mientras que el factor beta lo hace con un alto control optimista. Los resultados sugieren que los cinco grandes factores, y los factores alfa y beta de orden superior, son útiles como marco general para la investigación en salud y personalidad, aunque también existe la necesidad de utilizar medidas específicas.

PALABRAS CLAVE. Cinco factores de los rasgos de la personalidad. Rasgos de la personalidad relacionados con la salud. Salud. Afectividad negativa. Estudio descriptivo mediante encuestas.

Research dealing with personality and health is relevant because of the potential impact in health maintenance, illness onset and its progression (Uchino, Vaughn, and Matwin, 2008). Hence, many health-related personality constructs have been proposed and their relationship with various health behaviors and health outcomes examined (*e.g.*, Borda Mas *et al.*, 2011; Burgos-Garrido, Gurpegui, and Jurado, 2011; Gale, Batty, and Deary, 2008; Mizuno, Kakuta, and Inoue, 2009; Rasmussen, Scheier, and Greenhouse, 2009; Shen *et al.*, 2008). However, there are several problems concerning personality-health research, one of which being the existence of many health-related personality instruments measuring very similar narrower health-related concepts. Another problem concerns many seemingly different concepts measured by similar item content (Marshall, Wortman, Vickers, Kusulas, and Hervig, 1994). Further, these measures often overlap with broader and frequently examined higher-order personality traits. Therefore, there is a need for more detailed studies related to the construct validity of health-related personality constructs. Furthermore, the increasing number of health-related personality measures are rarely examined under common conceptual framework. Consequently, similarities and differences among measures have not been established, which makes the integration of empirical evidence more complicated. In this context, five-factor personality model that at least at the descriptive level adequately represents the most important personality domains might be useful. Namely, the logic of construct validity is in placing the construct and its measures within the framework defined by theory or structural system that gives meaning to it.

However, many studies explore the relationships between only one or two health-related personality constructs and five-factor personality traits. For example, several studies reported strong and consistent negative relations between sense of coherence and neuroticism and positive relations between sense of coherence and conscientiousness (*e.g.*, Feldt, Metsäpelto, Kinnunen, and Pulkkinen, 2007). Furthermore, three components of hardiness, as well as total hardiness score were in moderate negative correlations with neuroticism, positive correlations with extraversion and openness, and somewhat lower positive correlations with agreeableness and conscientiousness (Maddi *et al.*, 2002).

Friedman, Tucker and Reise (1995) found moderately high positive correlation between Cook Medley Hostility Scale and neuroticism, negative correlation between hostility and agreeableness, and to a lesser extent openness. Other studies also showed that hostility and similar constructs such as cynical cognition, anger-in and anger-out were primarily associated with neuroticism and agreeableness (Barefoot and Boyle, 2009). Morrison (1997) reported Type A behavior to be negatively correlated with agreeableness and positively with extraversion, and negatively with conscientiousness. Similarly, Smith and Williams (1992) noted that Type A pattern is a complex mixture of conscientiousness, neuroticism, extraversion and low agreeableness.

Regarding optimism measured by Life Orientation Test (LOT), many studies confirmed that it strongly overlaps with measures of neuroticism and is actually its inverse measure (*e.g.*, Sharpe, Martin, and Roth, 2011). Further, optimism was moderately positively correlated with all other five-factor personality traits, especially with extraversion (Friedman *et al.*, 1995). Internal locus of control had low positive correlations with neuroticism, openness and agreeableness (Lemos-Giraldez and Fidalgo-Aliste, 1997), while external locus of control was related to neuroticism, low conscientiousness and low agreeableness (Friedman *et al.*, 1995; Morrison, 1997). Population correlation of .40 has been found between internal locus of control and emotional stability, while weighted average correlations between internal locus of control and other four five-factor traits across seven studies ranged from .19 to .31 (Judge, Erez, Bono, and Thoresen, 2002). The same meta-analysis found that population correlation between generalized self-efficacy and emotional stability was .44. Weighted average correlations between self efficacy and other four five-factor traits across seven studies ranged from .23 to .43.

Regarding anxiety, the majority of taxonomies consider it as a component of higher-order dimension of neuroticism. For example, anxiety is one of the six facet of neuroticism (N1) measured by NEO-PI (Costa and McCrae, 1992) and one of two facets of neuroticism measured by Big Five Inventory (Soto and John, 2009).

In one of a few studies analyzing relationships between five-factor personality traits and a set of specific health-related personality measures, Marshall *et al.* (1994) concluded that most health-relevant personality dimensions seem to be complex mixtures of broad personality traits, especially extraversion, agreeableness, and neuroticism, while they are much less connected to conscientiousness and openness.

Also, there is some evidence that health-related personality measures are in moderate to high correlations (Judge *et al.*, 2002), indicating that one or only a few factors explain their common variance. For example, analyzing several health-related personality scales together, Marshall *et al.* (1994) found that they formed three higher-order factors named optimistic control, anger expression, and inhibition.

Because of the lack of integrative research investigating a representative set of health-relevant personality constructs within unified descriptive personality framework, the aim of this study was to examine the relationship between various specific health-related personality measures and their common structure. Furthermore, the relations between specific and higher-order health-related personality traits and five-factor personality traits as well as higher-order alpha and beta factors were examined.

In addition to a few previous studies that try to articulate the empirical relationships among various specific health-relevant personality dimensions and their relations with well-established general domains of personality, the present study makes several contributions. The study was performed on the large and representative sample including relevant and large set of specific health-related traits, and along with the five-factor personality traits, alpha and beta factors were also used as a unified personality framework. Namely, the studies exploring the role of these superfactors, sometimes also named as stability and plasticity or general approach and avoidance tendencies, suggest that they may reflect individual differences in the functioning of dopaminergic and serotonergic systems, which are important for the relationship between stress and health outcomes (Larsen and Augustine, 2008; van der Linden, Nijenhuis, and Bakker, 2011).

In this study we predicted that specific health-related personality traits would be moderately to highly related, and that their common variance could be accounted by small number of factors. Both, specific and higher-order health-related personality traits were expected to be a complex mixture of five-factor personality traits, especially extraversion, neuroticism and agreeableness. Also, we expected that neither specific nor higher order health-related dimensions could be subsumed under five-factor personality traits, although some of them could be in relatively high (*e.g.*, anxiety) or low correlations (*e.g.*, health locus of control) with five-factor personality traits.

Method

Participants

The study was conducted on the sample of 822 participants (53.3% women and 46.7% men) from two large cities, randomly selected from their households. Within two towns, a random selection of streets was made, and within streets a random selection of the households. Within each household only one randomly selected participant over 18 years was interviewed. Overall, 914 households were contacted, out of which 92 participants refused to respond, with most frequent reasons for non-responding being lack of time and old age (above 80). The age of participants ranged from 18 to 84 years ($M = 38.58$; $SD = 12.45$). The majority finished high school (62.7%) and 24.6% finished university. Most of the participants were employed (66.4%) and married (62.8%).

Instruments

- For measuring five-factor personality traits, *Big Five Inventory* (BFI; Benet-Martinez and John, 1998) was used. Participants rated each of 44 items on a scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Previous research showed its appropriateness for measuring five-factor model of personality in Croatian language (Hudek-Knezevic and Kardum, 2009). Correlations between five personality dimensions in the present study ranged from $-.40$ ($p < .001$; between neuroticism and conscientiousness) to $.46$ ($p < .001$; between extraversion and openness). Principal axes factor analysis performed on the correlations

between five personality traits yielded two second order Varimax rotated factors, which could be interpreted as alpha (agreeableness, conscientiousness and low neuroticism) (11.05% of common variance) and beta (extraversion and openness) (33.9% of common variance) factors.

Because of the abundance of health-related personality measures, we tried to select a representative set of health-related personality constructs based on the frequency of appearance in the literature and their previously documented relatedness to five-factor personality traits and health outcomes (*e.g.*, Hampson and Friedman, 2008; Wiebe and Fortenberry, 2006). The selected specific health-relevant measures used are presented hereafter. All of the following measures have already been translated to Croatian and used in various studies.

- Life Orientation Test (LOT; Scheier and Carver, 1985) was used to measure the degree of optimism and pessimism. According to the previous results (*e.g.* Herzberg, Glaesmer, and Hoyer, 2006; Segerstrom, Evans, and Eisenlohr-Moul, 2011) optimism and pessimism were measured as two dimensions.
- General Self-Efficacy Scale (Schwarzer and Jerusalem, 1995) was used to assess generalized self-efficacy defined as optimistic self-beliefs to cope with a variety of difficult demands in life.
- MMPI-2 Type-A Scale (TPA; Hathaway and McKinley, 2007) was used to measure Type-A behavior. Individuals high on this scale are hard-driving, fast-moving, and work-oriented and may frequently become impatient, irritable, and annoyed.
- State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, and Lushene, 1970) was used to measure trait anxiety as relatively stable individual differences in anxiety proneness.
- Short Hardiness Scale (Bartone, 1995) was used for measuring three components of hardiness: challenge in dealing with ambiguous events, control over life's outcomes and commitment to life tasks.
- Multidimensional Health Locus of Control Inventory (MHLC; Wallston, Wallston, and DeVellis, 1978) was used for measuring beliefs that the source of reinforcements for health-related behaviors is primarily internal, a matter of chance, or under the control of powerful others.
- Short form of Cook-Medley Hostility Scale (Cook and Medley, 1954) was used for measuring cynicism and mistrust as the primary components of hostility.
- Sense of Coherence Scale (Antonovsky, 1987) measures three components: comprehensibility (degree to which events are perceived as logical and structured), manageability (degree to which a person feels he/she can cope with stress) and meaningfulness (degree to which person perceives that life makes sense).

Descriptive statistics for personality measures are presented in Table 1.

TABLE 1. Descriptive statistics for personality measures.

<i>Measures</i>	<i>Number of items</i>	<i>M</i>	<i>SD</i>	<i>Alpha</i>
Extraversion	8	27.68	5.02	.73
Agreeableness	9	33.34	4.80	.69
Conscientiousness	9	34.47	5.30	.78
Neuroticism	8	21.01	5.60	.80
Openness	10	35.55	5.84	.78
Hostility	10	27.24	6.56	.80
Type A Behavior	19	53.83	10.68	.81
SOC – Comprehensibility	11	49.32	9.29	.74
SOC – Manageability	10	48.64	8.71	.75
SOC – Meaningfulness	8	41.85	7.56	.78
Anxiety	20	31.33	11.72	.91
Optimism	4	14.76	2.97	.68
Pessimism	4	10.32	3.11	.67
Self-efficacy	10	36.79	5.32	.88
Hardiness – Commitment	5	10.48	2.41	.62
Hardiness – Control	5	10.40	2.09	.64
Hardiness – Challenge	5	8.02	2.65	.60
Locus – Internal	6	20.25	3.85	.69
Locus – Chance	6	15.93	4.00	.65
Locus – Powerful others	6	16.42	4.44	.73

Note. *M*: mean; *SD*: standard deviation; SOC: Sense of coherence.

Procedure

Questionnaires were administered by psychology students in the homes of the participants. Participation was voluntary, no incentives were offered, and questionnaires were anonymous. 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.

Statistical analysis

Statistical analyses were performed with SPSS program. Bivariate associations between the variables were explored by Pearson's correlation coefficients. Principle components factor analysis was used to analyze the structure of health-related personality traits and multiple linear regressions were used to examine the associations of five-factor personality traits and their higher-order alpha and beta factors with health-related personality dimensions.

Results

In Table 2 correlations between health-related personality measures are presented.

TABLE 2. Correlations between health-related personality measures.

Measures	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Hostility	.53***													
2. Type A Behavior	-.34***	-.44***												
3. SOC –	.67***	-.36***	-.54***											
Comprehensibility		.63***	-.62***	.37***										
Manageability			-.53***	.39***	-.40***									
5. SOC –														
Meaningfulness														
6. Anxiety														
7. Optimism														
8. Pessimism														
9. Self-efficacy														
10. Hardiness –														
Commitment														
11. Hardiness –														
Control														
12. Hardiness- Challenge														
13. Locus –														
Internal														
14. Locus –														
Chance														
15. Locus –														
Powerful others														

* $p < .05$; ** $p < .01$; *** $p < .001$; SOC: Sense of coherence

Correlations presented in Table 2 show that the majority of health-related personality measures were significantly correlated. Namely, from 105 correlations computed only 13 (12.38 %) were not statistically significant, which could have been expected considering relatively large sample size. However, 45 of them (42.86%) ranged from .30 to .67, which could be regarded as moderate correlations. Mean correlation is .27 ($SD = .16$). From all personality measures included, those most weakly correlated with others were health locus of control measures, while sense of coherence-manageability, anxiety, pessimism and hardiness-commitment were significantly correlated with all other measures.

The structure of health-related personality measures was further analyzed by factor analysis. The number of factors to be retained was guided by two decision rules: Kaiser's criterion (eigen values above 1) and by the use of Horn's parallel analysis. Both criteria indicated that three factors should be retained. The results of principal components factor analysis with Varimax rotation are presented in Table 3.

TABLE 3. The results of Principal components factor analysis - Varimax rotated factor loadings.

<i>Measures</i>	<i>Negative affectivity</i>	<i>Optimistic control</i>	<i>Passivity</i>	<i>Community</i>
Hostility	.78			.66
Type A Behavior	.74			.57
SOC – Manageability	-.72	.37		.68
SOC – Comprehensibility	-.71	.32		.61
Anxiety	.67	-.43		.69
SOC – Meaningfulness	-.56	.52		.58
Pessimism	.52		.36	.48
Self-efficacy		.78		.64
Hardiness – Control		.65		.51
Hardiness – Commitment	-.36	.63		.53
Locus – Internal		.60		.39
Optimism		.58		.42
Locus – Powerful others			.75	.63
Locus – Chance			.65	.46
Hardiness – Challenge			-.58	.41
Eigen-values	5.14	1.98	1.16	
% of variance	34.26	13.19	7.75	

Note. Factor loadings between -.30 and .30 are not shown; SOC: Sense of coherence.

Three broad health-related personality components were obtained. Hostility, type-A behavior, anxiety, and pessimism were positively, while three subscales of the sense of coherence were negatively saturated by the first component. Self-efficacy, two hardiness subscales – control and commitment, optimism, and internal health locus of control were positively saturated by the second component, while powerful others and chance health

locus of control were positively and hardiness - challenge was negatively saturated by the third component. The first component was named negative affectivity, the second optimistic control and the third passivity.

In Table 4 correlations between five-factor personality traits, alpha and beta factors and health-related personality measures are presented.

TABLE 4. Correlations between five-factor personality traits and their higher-order factors with health-related personality measures.

<i>Measures</i>	<i>E</i>	<i>A</i>	<i>C</i>	<i>N</i>	<i>O</i>	<i>Alpha</i>	<i>Beta</i>
Hostility	-.21***	-.20***	-.09*	.32***	-.14***	-.26***	-.20***
Type A Behavior	-.12**	-.35***	-.18***	.41***	-.00	-.43***	-.08*
SOC – Comprehensibility	.32***	.23***	.37***	-.55***	.16***	.45***	.32***
SOC – Manageability	.33***	.24***	.25***	-.50***	.24***	.39***	.33***
SOC – Meaningfulness	.35***	.26***	.29***	-.39***	.36***	.36***	.37***
Anxiety	-.49***	-.17***	-.36***	.67***	-.29***	-.43***	-.51***
Optimism	.35***	.26***	.29***	-.44***	.29***	.39***	.36***
Pessimism	-.31***	-.10**	-.16***	.40***	-.28***	-.24***	-.34***
Self-efficacy	.39***	.13***	.35***	-.34***	.43***	.28***	.45***
Hardiness – Commitment	.36***	.18***	.26***	-.33***	.38***	.28***	.39***
Hardiness – Control	.27***	.21***	.36***	-.26***	.23***	.31***	.28***
Hardiness – Challenge	.26***	.08*	.01	-.22***	.28***	.11**	.28***
Locus – Internal	.10**	.02	.01	-.09**	.17**	.04	.13***
Locus – Chance	-.10**	.01	-.02	.12**	-.09**	-.03	-.12***
Locus – Powerful others	-.08*	.14***	.12**	.02	-.08*	.13***	-.10**
Median	.26	.13	.12	-.22	.17	.13	.28
Negative affectivity	-.27***	-.32***	-.28***	.55***	-.11**	-.48***	-.24***
Optimistic control	.40***	.14***	.33***	-.32***	.44***	.27***	.45***
Passivity	-.18***	.13***	.11**	.10**	-.22***	.10**	-.22***

* $p < .05$; ** $p < .01$; *** $p < .001$; E: Extraversion; A: Agreeableness; C: Conscientiousness; N: Neuroticism; O: Openness; SOC: Sense of coherence.

The correlations obtained show that *Extraversion*, *Neuroticism* and *Openness* were significantly related to almost all health-related personality measures, while *Agreeableness* and *Conscientiousness* showed somewhat lower correlations. Out of health-related personality measures, health locus of control and passivity had lowest correlations with five-factor personality traits. Alpha factor had highest correlations with measures of negative affectivity, while beta factor was correlated the most with optimistic control. Alpha factor was positively, while beta factor negatively related to passivity.

Furthermore, two sets of regression analyses were performed. In the first set, all five-factor personality traits, while in the second, alpha and beta factors were simultaneously included as predictors, with specific and higher-order health-related personality traits used as criterion variables. In Table 5 multiple correlation coefficients and standardized regression coefficients are presented.

TABLE 5. Multiple correlation coefficients and standardized regression coefficients predicting health-related measures with five-factor personality traits and alpha and beta factors.

Measures	E	A	C	N	O	R _{EACNO}	Alpha	Beta	R _β
Hostility	-.12**	-.11**	.11**	.27***	.10**	.36***	-.23***	-.16***	.30***
Type A Behavior	.10**	-.23***	.17***	.34***	.10**	.47***	-.43***		.43***
SOC – Comprehensibility	.13***	.10**		-.46***	.09**	.58***	.40***	.25***	.51***
SOC – Manageability	.13***	.10**		-.42***	.09**	.54***	.35***	.27***	.48***
SOC – Meaningfulness	-.25***	.14***		-.23***	.23***	.51***	.31***	.32***	.48***
Anxiety	.16***	.09*	-.07*	.60***	.13***	.74***	-.36***	-.46***	.62***
Optimism	-.13***			-.30***	.13***	.51***	.33***	.31***	.49***
Pessimism	.15***		.18***	.36***	-.16***	.46***	-.18***	-.31***	.38***
Self-efficacy	.16***	.07*		-.17***	.28***	.54***	.21***	.41***	.49***
Hardiness – Commitment	.11**		.24***	-.18***	.25***	.48***	.22***	.36***	.45***
Hardiness – Control	.15***		-.18***			.41***	.27***	.24***	.39***
Hardiness – Challenge						.38***	.07*	.27***	.29***
Locus – Internal					.16***	.19***		.12***	.13***
Locus – Chance				.14***		.17***		-.11**	.12**
Locus – Powerful others	-.09*	.14***	.16***	.09*	-.08*	.23***	.15***	-.13***	.18***
Negative affectivity	.16***	-.12***		.46***	.07*	.57***	-.45***	-.17***	.51***
Optimistic control	-.13***	.16***	.14***	-.16***	.30***	.54***	.20***	.42***	.49***
Passivity			.22***	.16***	-.20***	.36***	.14***	-.24***	.26***

* $p < .05$; ** $p < .01$; *** $p < .001$; E: Extraversion; A: Agreeableness; C: Conscientiousness; N: Neuroticism; O: Openness; SOC: Sense of coherence; R_{EACNO}: multiple correlation coefficient for five-factor personality traits; R_{AB}: multiple correlation coefficient for alpha and beta factors; only significant standardized coefficients are presented.

Table 5 shows that *Neuroticism*, *Extraversion* and *Openness* were better predictors of health related personality measures than *Agreeableness* and *Conscientiousness*. Measures of health locus of control and passivity did not prove to be well predicted by five-factor personality traits. Furthermore, alpha and beta factors contributed to the prediction of lower-order health-related measures to somewhat different degree. It should be noted that type-A behavior was predicted only by alpha factor, while internal and chance health locus of control only by beta factor. Regarding higher-order health-related measures, negative affectivity was predicted mainly by alpha factor, while optimistic control by beta factor. Passivity was positively predicted by alpha, and negatively by beta factor.

Discussion

The results obtained show moderate degree of common variance between specific health-related personality measures (see Table 2). Out of specific measures analyzed, some showed greater independence (*e.g.*, health locus of control), while several were more strongly correlated with other measures (SOC-manageability, anxiety, pessimism and hardiness-commitment).

The structure of health-related personality measures used in this study is similar to the structures found in a few previous studies analyzing several specific health-related personality traits (*e.g.* Marshall *et al.*, 1994). It may be noted that the structure obtained by analyzing specific health-related personality traits is conceptually similar to the personality structures found by researchers from various theoretical backgrounds. Namely, two components, negative affectivity and optimistic control are similar to the neuroticism/negative affect and extraversion/positive affect dimensions (Costa and McCrae, 1992; Eysenck, 1998; Tellegen, 1985). Third component, named passivity, is similar to the various personality concepts related to behavioral inhibition. However, it should be noted that its meaning is obviously less clear than the meaning of other two components. Nevertheless, it seems that the structures obtained by analyzing large and representative set of lower-level personality concepts derived from different theories and construed for different purposes tend to converge.

The results regarding relationships between health-related personality constructs and five-factor personality traits allow three general conclusions (see Tables 4 and 5). First, three health-related personality components and the majority of their specific measures may be partially explained by the combination of five-factor personality traits as well as alpha and beta factors (from 3% to 55% variance explained). It should be noted that some specific as well as higher-order health-related personality traits are saturated by only one or two five-factor personality traits, while others show more complex pattern of relationship. For example, self-efficacy seems to be a complex combination of extraversion, conscientiousness, emotional stability and openness, while anxiety only of neuroticism and extraversion. Second, health locus of control and passivity showed the highest degree of independence from five-factor personality traits. Taken together, these results suggest that specific health-related personality measures should be generally used along with five-factor personality traits in the personality-health research, especially when they are weakly related to five-factor personality traits (*e.g.*, health locus of

control). Therefore, future research should explore whether and to what degree health-related personality constructs contribute to the prediction of health outcomes beyond and above five-factor personality traits.

Third, neuroticism and extraversion have the highest overlap with health-related personality concepts, followed by openness, while agreeableness and conscientiousness showed the lowest overlap. The impact of agreeableness and conscientiousness on health is well known, along with the fact that mechanisms through which these two traits exert their effects on health outcomes could be specific and long lasting (Friedman, Kern, and Reynolds, 2010; Hampson and Friedman, 2008; Korotkov, 2008). For example, more conscientious children may form lifelong healthy habits early in their lives resulting in positive health outcomes. Therefore, the results suggest that we should be aware of the possible weak relationships between specific health-related measures and these mechanisms.

Although agreeableness and conscientiousness are often considered to have exclusively beneficial effects on health outcomes, the results of this study suggest possible pathways of their negative influence. Namely, these two dimensions positively predict passivity, and one of its subscales, health locus of control - powerful others. For example, research suggest that locus of control-powerful others in certain circumstances could have deleterious effect on health outcomes (*e.g.* Furnham, 2009; Wallston *et al.*, 1999). These results should be considered having in mind already mentioned limitations of the passivity component, but they are not completely unexpected because conscientiousness includes characteristics such as low impulsivity and spontaneity as well as higher cautiousness.

The strength of the relations found between health-related personality measures and openness in the present study was somewhat unexpected because some previous studies (*e.g.* Marshall *et al.*, 1994), have found relatively weak relations between them. Additional analyses, in which the education as a potential confounding variable was partialled out, indicated that these relations remained almost the same. However, when extraversion was partialled out, the correlations between openness and health-related personality measures became much lower, ranging from $-.02$ to $.30$ (median = $.11$). Therefore, it seems that its overlap with extraversion is the major reason why openness is so highly related with some specific health-related personality measures.

Considering alpha and beta superfactors and their relationship to specific and higher-order health-related personality traits, our results may imply that alpha factor is important for health outcomes primarily because of its relationship to lower negative affectivity, and beta factor because of its relationship to higher optimistic control. However, alpha factor is also a positive predictor of passivity. The results obtained could indicate that both superfactors may exert positive as well as negative effects on health outcomes. Namely, alpha factor may contribute to positive health outcomes by decreasing negative affectivity, and probably risky health behaviors, but it may also lead to negative outcomes by increasing passivity. On the other hand, beta factor leads to a higher optimistic control and positive affectivity, but may be also related to deleterious health outcomes through risky health behaviors. Therefore, future studies should examine optimal trade-off between these two broad behavioral tendencies for various health outcomes.

Future studies should also examine the stability of the structure obtained on different samples as well as its meaning. Namely, the identification of higher-order health-related personality traits is not by itself enough for better understanding the mechanisms underlying relationships between personality and health outcomes. Therefore, there is a need for future studies to examine the mechanisms through which personality exerts its influence on health.

At last, some limitations of the present study should be mentioned. First of all, more precise relationship between health-related personality traits and five-factor personality traits would have been obtained if the lower order facets of five-factor personality traits had been measured. Second, the choice of specific health-related personality measures, especially regarding their representativeness and comprehensiveness should be questioned. Namely, it is possible that some important personality constructs used in personality-health literature were not adequately represented in the measures used in this study (*e.g.*, some components of anger, depression, helplessness etc.), which may have led to the narrowness of passivity factor as well as its low correlations with five-factor personality traits.

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