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Who Looks Forward to Better Health? Personality Factors and Future Self-Rated Health in the Context of Chronic Illness

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Abstract

Background Self-rated health (SRH) is an important predictor of objective health-related outcomes that, according to the Cognitive Process Model of SRH, is influenced by contextual factors (symptoms and personality). Although research indicates that personality contours SRH, less attention has been given to understanding the contributions of personality to future self-rated health (FSRH) or the contextual factors that play a role in shaping these effects.

Purpose The aim of the present study was to the extend theory and research on FSRH by exploring the contributions of personality, current SRH, and fatigue to FSRH in the context of chronic illness, and to test the potential mediating role of optimism for explaining these effects.

Methods Two chronic illness samples (arthritis, $N = 365$, and inflammatory bowel disease, IBD; $N = 290$) completed identical surveys. A hierarchical regression model with age, education, and current health, and fatigue entered in the first two steps, and traits entered in the last step, tested the effects of personality on FSRH. Mediation analyses controlling for contextual variables tested the explanatory role of optimism.

Results Fatigue was a significant contributor to FSRH accounting for 11 % of the variance in the arthritis sample and 17 % in the IBD sample over the demographic variables. Both Agreeableness and Neuroticism accounted for additional significant but modest variance in FSRH (4 %); Agreeableness was associated with higher FSRH whereas Neuroticism was associated with lower FSRH. For both traits, optimism fully explained the associations with FSRH.

Conclusions After accounting for the influence of fatigue and other variables, the contributions of high Agreeableness and low Neuroticism to FSRH are modest in the context of chronic illness, and these associations may be explained by optimism.

Self-rated health (SRH) is increasingly being recognized as an important predictor of objective health and health-related outcomes such as health behaviours, cortisol responses to stress, morbidity, and mortality [1-4]. Indeed, current theory suggests that evaluating one's health is a process that depends in part on the consideration of objective health indicators including current symptoms, functional status and medical diagnoses, and the practice of health-promoting or risky behaviors [1]. Although SRH is often examined as a global rating of current health, emerging evidence suggests that temporal framing of SRH may also be important for understanding health outcomes including mortality in older adult populations [5, 6].

To date there has been little research on the factors and processes associated with FSRH despite its potentially important implications for understanding health practices and outcomes. If we view FSRH as a temporally extended form of SRH, then the factors that contour current ratings of health should also play a role in evaluations and expectations for future health. Understanding how ratings of health are formed and the factors and processes that contribute to these evaluations may be best understood using Jylhä's [1] Cognitive Process Model of SRH (see Figure 1). This model posits that the evaluation of subjective health is a necessarily contextualized multi-stage process that goes beyond the initial assessment of current objective health indicators that may influence future health (e.g., symptoms, behavior, and genetics). Accordingly, SRH is heavily influenced by other contextual factors such as personality and expectations which can contour the appraisals of these objective indicators [1, 7, 8]. Indeed, certain personality factors associated with negative affect, such as Neuroticism, are known to influence the perception and evaluation of symptoms [9]. Personality may also exert an influence on SRH via judgments regarding perceived health-related risks and strengths, including past and current practice of health promoting and risky behaviors which can be viewed as evidence that

one's health is improving or at risk for decline [1].

Research examining how personality is linked to SRH has most often used the five factor model of personality traits [10]. This conceptualization proposes that there are five key higher-order, superordinate dimensions which provide a comprehensive and hierarchically organized overview of personality: Conscientiousness (acting in an organized and disciplined manner), Extraversion (being sociable and experiencing positive emotions), Neuroticism (prone to experiencing negative emotions and being easily overwhelmed by stress), Agreeableness (having a trusting, and cooperative nature), and Openness to Experience (taking a curious, and unconventional approach)[10, 11].

Given that FSRH is a largely understudied aspect of SRH, it is not surprising that there is a dearth of research on FSRH and personality. One study examined a construct similar to FSRH by asking students about the likelihood of being diagnosed with medical problems within the next 10 years compared to other students [12]. They found that high Conscientiousness and Extraversion, and low Neuroticism were linked to better comparative expectations for future health in the bivariate analyses, and in the path analysis through preventive health behaviors, only Conscientiousness and Agreeableness were significant predictors. Results from a large life-span study demonstrated that Conscientiousness, Agreeableness and Neuroticism were not associated with FSRH prospectively, whereas Extraversion and Openness were [7]. Neuroticism was, however, a significant predictor of declines in FSRH over time.

Aside from methodological differences, there may be conceptual explanations for these inconsistent findings. Neither study accounted for the effects of current SRH, physical symptoms or health status when examining how personality is linked to FSRH, despite theory and research indicating that these factors should contour FSRH [1, 6]. Thus, the extent to which personality

traits contribute to FSRH are due to their associations with current SRH, or to other factors such as health states is unknown.

Apart from the five factors of personality, other lower order personality traits known to be associated with future expectations and health have not been investigated with respect to FSRH. For example, optimism is a future-oriented personality trait that involves a generalized expectation of good outcomes across a broad range of domains that is also a consistent predictor of health-related outcomes [13-16]. Having low levels of optimism is conceptualized as reflecting pessimism, a tendency to expect worse outcomes in general. Whereas the big five factors are considered higher order factors in that they provide broad descriptions of human behavior and therefore have greater bandwidth, optimism is considered a mid-level personality trait that combines and reflects specific aspects of the higher order traits and thus has greater fidelity and therefore incremental validity for describing behavior over and above the big five traits [17, 18]. Research has demonstrated that optimism is conceptually distinct from higher order personality factors such as Neuroticism [19], although it is related to Conscientiousness and Agreeableness [20], two personality factors that are associated with health-related outcomes and behaviors [21, 22]. Given this evidence, and that trait optimism reflects a tendency to expect good outcomes across multiple life domains [13], it is possible that the lower order personality factor optimism may explain the associations between higher order personality factors and FSRH.

The aim of the present study was to the extend theory and research on FSRH by exploring the contributions of personality, current SRH, and physical symptoms to FSRH in individuals living with select chronic illnesses. Although both theory and research suggests that the associations between personality and SRH vary as a function of health status [23, 1], past

research has tended to use older adults samples as a proxy for poor objective health status [e.g., 24]. In the current study personality and FSRH were examined in two chronic illness samples to examine how living with an incurable and ongoing health condition would influence the contributions of personality to FSRH, and test whether the findings replicated across these two different illnesses. Arthritis and inflammatory bowel disease (IBD) were chosen as the illness samples as both (with the exception of certain forms of arthritis) share a common inflammatory process which can result in pain, functional limitations, and unpredictable and intermittent periods of active disease or flare-ups [25, 26]. In addition to testing how flare-ups were associated with FSRH, fatigue was chosen as the physical symptom to control for in the analyses as it is a common symptom to both diseases that theory and research suggest can negatively impact SRH [3, 1]. The operational model showing the specific variables with the model that were tested is presented in Figure 2.

To better understand the unique associations of personality traits with FSRH beyond important contextual factors (current SRH and fatigue), the contributions of the five personality factors were first considered individually and then together. In light of the inconsistent findings from previous research on personality and FSRH, previous research on how personality may contribute to SRH and health behaviors was used to guide the hypotheses. Collectively this research indicates that high Conscientiousness and Extraversion, and low Neuroticism are consistently associated with SRH, whereas Agreeableness and Openness have shown less consistent links to SRH (see Löckenhoff et al. for a review [24]). It was expected therefore that a similar pattern of results would be found for FSRH before controlling for contextual factors such as current SRH and fatigue. However, after controlling for these contextual factors, it was expected that personality factors that have clear links to health behaviors would explain unique

variance in FSRH as suggested by Jylhä's [1] Cognitive Process Model of SRH. Both Conscientiousness, with its emphasis on self-discipline and organization, and Agreeableness, which features cooperation with others, reflect a general respect for social convention that is conducive to engaging in health-promoting behaviours [21, 12, 27, 22], and fewer health risky behaviors [28, 29]. In contrast, Neuroticism is associated with engaging in health risky behaviors [21, 28], and with fewer health promoting behaviors [21, 12]. Accordingly, these three traits were expected to make contributions to FSRH beyond that made by current SRH and fatigue. In addition, optimism was tested as a potential mediator of the proposed links between the personality factors and health. It was expected that high levels of optimism would explain the links to FSRH for Conscientiousness and Agreeableness, whereas low levels of optimism (pessimism) would explain the proposed link between Neuroticism and FSRH.

Method

Participants and Procedures

After receiving clearance from the institutional ethical review board, two chronic illness samples, arthritis (N = 365) inflammatory bowel disease (IBD; N = 290), were included in the study. People diagnosed with any form of arthritis (i.e., any major rheumatic disease) or IBD were recruited via notices posted on on-line arthritis or IBD support boards, online classified ads, online psychological research web pages, ads placed in the community, and on the Arthritis Society's online research web page. Informed consent was implied through submission of the online or mail-in survey and participation was anonymous.

The demographic characteristics of the two samples are presented in Table 1. In the arthritis sample, the majority of participants reported having rheumatoid arthritis (40.4%), osteoarthritis (16.5%), or psoriatic arthritis (13.2%). In the IBD sample, most participants reported having Crohn's disease (65.4%), or ulcerative colitis (28.0%).

Measures

Both samples completed demographic questions and the same set of measures. Education level was reported as one of six categories ranging from some high school to completed graduate school. Table 3 presents the means and Cronbach alphas for all the scales.

Five factors of personality. The 44-item Big Five Factor Inventory (BFFI; John & Srivastava, 1999) assessed the Big Five personality factors, openness, agreeableness, neuroticism, extroversion, and conscientiousness. A list of characteristics is presented after the statement "I see myself as someone who …" and respondents rate how much they agree with each characteristic on a 5- point Likert scale ranging from 1 (Disagree strongly) to 5 (Agree strongly). Higher scores reflect greater identification with that particular personality factor. The BFFI has demonstrated good internal consistency, with alpha coefficients ranging from .81 for Conscientiousness to .88 for Extraversion, and has demonstrated good construct validity in comparison with other Big Five measures (John & Srivastava, 1999).

Optimism. The Life Orientation Test – Revised (LOT-R)[19] is a 10-item dichotomous measure of dispositional optimism and pessimism that has demonstrated good construct validity in several health-relevant studies [16]. Respondents rate how much they agree with each of the statements on a 5-point Likert scale ranging from 1 (I agree a lot) to 5 (I disagree a lot). Of the ten items, 4 are fillers that are not included in the score. Three of the remaining items assess optimism, three assess pessimism, and the responses to the six scored items are coded so that higher values reflect optimism. The LOT-R has demonstrated adequate internal consistency in previous studies (alpha = .78)[19].

Current self-rated health. Self-rated current health was assessed with the global health rating item from the Medical Outcomes Survey 36 item short form (SF-36) health questionnaire

[30]. The full SF-36 is a widely used, well-validated, reliable measure of SRH and overall physical well-being, and the single global health item has been extensively used as a valid indicator of SRH [1]. Participants responded to the question "How do you rate your overall current health?" on a 5-point scale ranging from 1 (Excellent) to 5 (Poor); the item was reverse scored so that higher values reflecting better current self-rated health.

Future self-rated health. Subjective evaluations of future health were rated using four items created for this study. Two positive items, "In the future, I expect to have better health than other people I know" and "I expect to have a very healthy life", and two negative items, "I think my health will be worse in the future than it is now" and "I will probably be sick a lot in the future", were rated on a 5-point scale ranging from 1 (definitely true) to 5 (definitely false). These four items were chosen to capture both general and comparative future health evaluations using items that were both positive and negatively framed. Although current research now often uses an adapted version of the global health-rating from the SF-36 [37] to assess FSRH, there were no validated measures of FSRH at the time of this data collection.

Fatigue. Four items measured the frequency that feelings of fatigue were experienced within the past two weeks. Two were from the SF-36 and two from the Fatigue Severity Scale (Krupp, LaRocca, Muir-Nash, & Steinberg, 1989). All items were scored on a 6-point Likert scale ranging from 1 (none of the time) to (all of the time) with higher scores indicating greater fatigue. These items were chosen as a short and direct measure of the core aspects of physical fatigue.

Recent Flares. One question with a dichotomous yes or no response option asked if participants had experienced any recent flare ups of their arthritis or IBD.

Analyses

The influence of having experienced a recent flare-up on SRH and FSRH was examined using t-tests for each sample. The simple associations among the five personality factors and

fatigue and three forms of current self-rated health were first examined with bivariate correlations in each sample. To examine the incremental validity of specific personality traits for explaining FSRH over and above contextual factors (current SRH and fatigue), hierarchical linear regressions were conducted for each sample with age, education level, and current SRH entered in the first step, fatigue in the second step, and individual personality factors entered in the last step. This analysis was first conducted for each trait separately, and then repeated with all five factors entered in the final step to better understand the potential effects of the individual traits while accounting for the effects of the other traits.

To address the issue of why certain personality traits may be associated with FSRH, mediation analyses with optimism as the explanatory variable were conducted with the two samples following the Preacher and Hayes [31] procedure which uses bootstrapping rather than Sobel tests to estimate the significance of indirect effects. This procedure involves drawing bootstrapped samples from the data in order to estimate the indirect effect for each of the resampled data sets [32, 33]. Mediation analyses were conducted using the Preacher and Hayes macro PROCESS [31] using 5000 bootstrapping resamples and bias corrected 95 percent confidence intervals for each of the significant predictors of FSRH from the regression analyses. Age, education level, fatigue, and current SRH were added as covariates to be consistent with the hierarchical regression analyses.

Results

The Influence of Flare-ups on SRH and FSRH

In the both the arthritis sample (87.1%), and the IBD sample (77.0%), the majority of participants had experienced a recent flare-up. As expected, those who experienced a recent flare-up reported significantly higher fatigue levels, and lower SRH and FSRH in both the

arthritis and the IBD sample (see Table 2).

Bivariate Associations of Personality and SRH

Overall, the results from the correlational analyses supported the expected pattern of findings for personality with the SRH and FSRH across the two samples for some personality traits but not for others (see Table 3). The findings for Neuroticism were the most consistent, as this trait was negatively correlated with SRH and FSRH in both samples. Conscientiousness and Agreeableness were positively correlated with FSRH but not SRH in both illness samples. Extraversion was positively associated with both forms of SRH in the arthritis sample, but only associated with FSRH in the IBD sample. Openness was positively associated with both forms of SRH in the arthritis sample, but unrelated to either form in the IBD sample. With respect to fatigue, Neuroticism was associated with higher fatigue in both samples, whereas the remaining four traits were associated with lower fatigue in both samples, with the exception that Agreeableness and Openness were unrelated to fatigue in the arthritis sample. Optimism was negatively associated with fatigue in both samples. As expected, fatigue was significantly and negatively correlated with SRH and FSRH in both samples.

Hierarchical Regression Analyses of Personality and FSRH

The results of the regression analyses were remarkably consistent across the arthritis (see Table 4), and the IBD (see Table 5) samples for both the individual trait analyses and the overall five factor analyses. Although current SRH was a significant predictor of future health in the first step is both the IBD (beta = and arthritis samples, it was no longer significant when fatigue was added in the second step. Fatigue accounted for the most variance in the FSRH in both samples explaining an additional eleven percent of the variance in the arthritis sample, and seventeen percent in the IBD sample when added to the regression model in the second step. In the

individual analyses for each trait, only Agreeableness and Neuroticism explained significant but a very small amount of additional variance in FSRH beyond that explained by age, education, current self-rated health, and fatigue. In both samples Agreeableness was associated with higher FSRH, and Neuroticism was associated with lower FSRH. Both traits explained unique variance in FSRH when all five factor traits were entered into together in the step (see Tables 4 and 5).

Mediation Analysis of the Personality-FSRH Relationship

Because only Neuroticism and Agreeableness made significant contributions to FSRH, mediation analyses were run only for these two traits. Optimism was negatively correlated with Neuroticism and positively correlated with Agreeableness and FSRH, indicating that the mediation analyses were appropriate. In both samples, the mediation analyses revealed that optimism explained the link between Neuroticism and FSRH, and between Agreeableness and FSRH as the indirect effects through optimism were significant and the direct effects of each trait on FSRH were no longer significant once the variance due to optimism was accounted for (see Table 6).

Discussion

The purpose of this study was to extend previous research on SRH and personality by providing the first comprehensive test of how and why five factor personality traits are associated with FSRH in the context of two chronic illnesses, IBD and arthritis. Although the results from bivariate analyses showed some similarities to previous research on personality and FSRH, after the influence of key health-related contextual factors suggested by theory were accounted for [1], personality factors only accounted for a relatively small amount of the variance in FSRH. Consistent with research and theory [7, 1], Neuroticism was modestly associated with worse FSRH after accounting for the substantial contributions of fatigue and

current SRH, and also the other personality factors. Agreeableness was the only other trait linked to FSRH after accounting for these contextual factors, and had a small but significant association with better FSRH. It is therefore important to note that the additional variance accounted for by personality factors was very modest, and that fatigue explained much more variance in FSRH than the two personality factors combined. The lower order personality trait optimism fully mediated the modest associations between Neuroticism and FSRH, and between Agreeableness and FSRH in the hypothesized directions. Contrary to the hypotheses, Conscientiousness did not make a significant contribution to FSRH in the multivariate analysis. All of these findings were robust across both the arthritis and the IBD samples.

Testing the associations of personality traits with FSRH in individuals with chronic illness builds on Jylhä's [1] Cognitive Process Model of SRH by providing new insights into how current objective and subjective health states can contour health evaluations, and by demonstrating the modest but significant contribution of certain personality traits for understanding evaluations of FSRH beyond the experience of ongoing symptoms. The impact of disease-related variables on SRH was demonstrated by the lower ratings of SRH and FSRH among participants who had experienced a recent flare compared to those who had not. Similarly, fatigue was associated with lower ratings of both current and future SRH. Consistent with personality and self-rated health theory and research [1, 11, 14], fatigue had the strongest associations with Neuroticism and optimism relative to other traits. Neuroticism remained a significant, but modest contributor to FSRH, and optimism explained this linkage after accounting for the effects of fatigue. This suggests that Neuroticism may have some influence on expectations for future health through other routes than simply via amplification of symptoms due to high negative affect [9]. As demonstrated by the mediation analyses, holding a general

and pervasive negative view of the future (low optimism), may make some contribution to negative expectations for future health. Whether this generally pessimistic view is an enduring quality or one that arises from an awareness of a tendency to engage in health risky behaviors [21], is a topic for future research.

In contrast, the findings for Agreeableness suggest the enduring optimistic bias that colors appraisals of FSRH may be informed by several factors. Both theory and research suggests that those high on Agreeableness engage in more health promoting behaviors [27, 21], which should figure prominently into subjective assessments of both current and future health [1]. Indeed, Ingledew and Brunning [12] found evidence that Agreeableness was linked to positive expectations for future health via its association with positive health behaviors. Aside from optimism, those who score high on Agreeableness may also, by virtue of their history of positive social relationships [34], arrive at a positive view of their future health despite any ongoing health issues, as social capital and trust in particular, is positively related to SRH [35].

The results with respect to Conscientiousness are intriguing and suggest that the health-related contextual factors, such as fatigue and current SRH, may play a central role in shaping how this trait is linked to SRH. In contrast to a study with healthy community adults which found that Conscientiousness was associated with current SRH but not FSRH [7], Conscientiousness was not associated with current SRH, but was associated with FSRH. One potential explanation is that Conscientiousness influences the self-evaluative processes underlying subjective health assessments differently in the context of ongoing health issues. Research demonstrating that the associations between traits such as Conscientiousness and general self-rated health are stronger in healthy samples compared to medically challenged samples [24], supports this proposition.

Although the links between personality and FSRH were modest in size, the conceptual

and practical implications of these findings are worth mentioning. That only Agreeableness and Neuroticism were linked to FSRH after controlling for fatigue and current SRH points to the possibility that FSRH may be qualitatively distinct from current SRH evaluations. Indeed, the magnitude of the correlation between SRH and FSRH was modest suggesting that they may be related but distinct forms of SRH. In this regard FSRH can be thought of as a form of health-related prospection, as it involves forming representations of future possibilities based on "if-then" contingent simulations grounded in past and current states and practices [36]. The present findings indicate that for individuals scoring high in Agreeableness and low in Neuroticism, this prospective process with respect to health may rely upon more than current health states and involve viewing future health through an optimistic lens. The benefits of taking a positive view of the future for motivating important health behaviors are well documented, especially for those dealing with an ongoing health issue [37]. Accordingly, high Agreeableness and low Neuroticism may indicate who may be more likely to continue health-promoting behaviors key for disease management because they view their future health positively.

Because theory and research indicate that positive expectations for the future can motivate current health-relevant behaviours [36-38], future self-related health (FSRH) may be a particularly important concept to study in individuals living with a chronic illness to better understand their current health-promoting and disease management behaviors. From this perspective, the translational value of the current findings could be optimized by identifying individuals with IBD or arthritis who are low in Agreeableness and high in Neuroticism and may be more likely to view their future health more negatively. Further research examining health behaviours in relation to FSRH would provide the needed support for this proposition.

The current findings and their potential implications should, however, be considered in

the context of several important limitations. The study's cross-sectional design imposes significant limitations in terms of the conclusions that can be drawn regarding the associations among health-related contextual factors, personality, and future self-rated health. Despite the relative temporal stability of the five factor traits [39], and the instability of subjective health evaluations which rely in part on changing health states [1, 7], other research noting significant change in personality during adulthood [40] indicates that the current cross-sectional findings should be interpreted with caution, especially with respect to the possible temporal precedence of personality traits and their influence on FSRH [41]. In addition, the relatively small amount of variance in FSRH explained by personality in the current research after accounting for fatigue is difficult to interpret given this design limitation. It is possible that the cross-sectional design of the current research amplified the influence of fatigue on SRH by only taking a snap shot of this variable's influence which can vary greatly over time. Future work combining the prospective design of previous research with the contextual approach of the current study would provide a clearer picture of the waxing and waning of symptoms and their influence of FSRH, and verify or challenge the proposed associations noted in the current research.

Other methodological limitations and strengths of the present study include the samples and measures used. Both arthritis and IBD are chronic inflammatory diseases which, although distinct in many ways, feature a similar degree of unpredictability in terms of the nature of the "flares" experience during periods of increased inflammation which can be functionally and socially limiting [25, 26]. This commonality may explain the consistency in the findings across both samples. Further work is needed to evaluate whether the current findings would generalize to other types of chronic illness or to individuals with generally poor health. Nonetheless, examining how personality traits are linked to FSRH in two large chronic illness samples is an

improvement of the current study or previous research with general medical samples, especially given that the effects of personality and SRH have not been previously examined in chronic illness samples. In addition, the measures of fatigue and FSRH were unique to this study, and therefore may limit comparisons to previous and future research on personality and FSRH.

One strength of the current research was investigating the associations of personality to FSRH from the lens of SRH theory [1]. Whereas previous research has shown how traits are linked to SRH ratings individually [7], the present research demonstrated the importance of accounting for the role of health-related contextual factors (e.g., fatigue) as well as the contribution of current SRH when assessing the unique contribution of personality to FSRH. This approach helped to clarify the extent to which health-related contextual factors shape FSRH, and provided alternate explanations for some of the inconsistencies in previous research on personality and SRH. Future research on personality and SRH, and FSRH in particular, should assess health-related contextual factors such as fatigue to better understand the extent to which personality is related to SRH.

In addressing the question posed by the title of this article, the findings from this study indicate that to a certain extent those who score high on Agreeableness and low on Neuroticism expect to have better health in the future while currently living with a chronic illness. The suggested reason for this positive health-related prospection – having a prevailing and general optimistic view of the future – warrants further investigation to elucidate how other contextual factors such as engaging in health-promoting behaviors may be linked to these personality traits to contour FSRH.

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Conflict of Interest Statement

I, Fuschia Sirois, declare that I have no conflicts of interest.

Ethical Statement

I, Fuschia Sirois, declare that I conformed to the Helsinki Declaration concerning human rights and informed consent in conducting this research, and that I followed correct procedures concerning treatment of humans in research.

References

1. Jylhä M. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. Soc Sci Med. 2009;69(3):307-16.

2. Tamayo-Fonseca N, Quesada JA, Nolasco A, Melchor I, Moncho J, Pereyra-Zamora P et al. Self-rated health and mortality: a follow-up study of a Spanish population. Pub Health. 2013;127(12):1097-104.

3. Mora PA, Orsak G, DiBonaventura MD, Leventhal EA. Why do comparative assessments predict health? The role of self-assessed health in the formation of comparative health judgments. Health Psychol. 2013;32(11):1175-8.

4. Kristenson M, Olsson A, Kucinskiene Z. Good self- rated health is related to psychosocial resources and a strong cortisol response to acute stress: The LiVicordia study of Middle- Aged Men. Int J Behav Med. 2005;12(3):153-60.

5. Ferraro KF, Wilkinson LR. Alternative measures of self-rated health for predicting mortality among older people: Is past or future orientation more important? Gerontologist. 2013.

6. Wang C, Satariano WA. Self-rated current and future health independently predict subsequent mortality in an aging population. J Gerontol A Biol Sci Med Sci. 2007;62(12):1428-34.

7. Löckenhoff CE, Terracciano A, Ferrucci L, Costa PT. Five-factor personality traits and age trajectories of self-rated health: The role of question framing. J Pers. 2012;80(2):375-401.

8. Ree E, Odeen M, Eriksen H, Indahl A, Ihlebæk C, Hetland J et al. Subjective health complaints and self-rated health: Are expectancies more important than socioeconomic status and workload? IntJ Behav Med. 2013:1-10. doi:10.1007/s12529-013-9329-7.

9. Watson D, Pennebaker JW. Health complaints, stress and distress: Exploring the central role of negative affectivity. Psychol Rev. 1989;96(7):234-54.

10. Digman JM. Personality structure: Emergence of the five-factor model. 1990;41(1):417-40.

11. John OP, Srivastava S. The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In: Pervin LA, John OP, editors. Handbook of Personality: Theory and Research. second ed. New York: The Guilford Press; 1999.

12. Ingledew DK, Brunning S. Personality, preventive health behaviour and comparative optimism about health problems. J Health Psychol. 1999;4(2):193-208.

13. Scheier MF, Carver CS. Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. Health Psychol. 1985;4(3):219-47.

14. Lemola S, Räikkönen K, Gomez V, Allemand M. Optimism and self-esteem are related to sleep. Results from a large community-based sample. IntJ Behav Med. 2013;20(4):567-71.

15. Rasmussen HN, Scheier MF, Greenhouse JB. Optimism and physical health: A Meta-analytic review. Ann Behav Med. 2009;37(3):239-56.

16. Scheier M, Carver C. Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. Cogn Ther Res. 1992;16(2):201-28.

17. Moon H, Hollenbeck JR, Humphrey SE, Maue B. The tripartite model of neuroticism and the suppression of depression and anxiety within an escalation of commitment dilemma. J Pers. 2003;71(3):347-68.

18. Paunonen SV, Ashton MC. Big five factors and facets and the prediction of behavior. J Pers Soc Psychol. 2001;81(3):524-39.

19. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. J Pers Soc Psychol. 1994;67:1063-78.

20. Sharpe JP, Martin NR, Roth KA. Optimism and the Big Five factors of personality: Beyond Neuroticism and Extraversion. Pers Indiv Diff. 2011;51(8):946-51.

21. Booth-Kewley S, Vickers RR. Associations between major domains of personality and health behavior. J Pers. 1994;62(3):281-98.

22. Hampson SE, Goldberg LR, Vogt TM, Dubanoski JP. Mechanisms by which childhood personality traits influence adult health status: Educational attainment and healthy behaviors. Health Psychol. 2007;26(1):121-5.

23. Goodwin R, Engstrom G. Personality and the perception of health in the general population. Psychol Med. 2002;32(2):325-32.

24. Löckenhoff CE, Sutin AR, Ferrucci L, Costa Jr PT. Personality traits and subjective health in the later years: The association between NEO-PI-R and SF-36 in advanced age is influenced by health status. J Res Pers. 2008;42(5):1334-46.

25. Casati J, Toner BB, De Rooy EC, Drossman DA, Maunder RG. Concerns of patients with inflammatory bowel disease: A review of emerging themes. Digest Dis Sci. 2000;45(1):26-31.

26. Katz PP. The stresses of rheumatoid arthritis: Appraisals of perceived impact and coping efficacy. Arthrit Care Res. 1998;11(1):9-22.

27. Lemos-Giraldez S, Fidalgo-Aliste AM. Personality dispositions and health-related habits and attitudes: A cross-sectional study. Eur J Pers. 1997;11(3):197-209.

28. Hong RY, Paunonen SV. Personality traits and health-risk behaviours in university students. Eur J Pers. 2009;23(8):675-96.

29. Hampson SEA, Judy A.; Barckley, Maureen; Lichtenstein, Edward; Lee, Michael E. Conscientiousness, perceived risk, and risk-reduction behaviors: a preliminary study. Health Psychol. 2000;19:496-500.

30. Ware JEJ, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care. 1992;30(6):473-83.

31. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav Res Methods. 2008;40:879-91.

32. Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: New procedures and recommendations. Psychol Meth. 2002;7:422-45.

33. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav Res Methods. 2004;36:717-31.

34. McCrae RR, Costa PTJ. Adding liebe und arbeit: The full five-factor model and well-being. Pers Soc Psychol Bull. 1991;17(2):227-32.

35. Nyqvist F, Nygård M, Steenbeek W. Social capital and self-rated health amongst older people in Western Finland and Northern Sweden: A multi-level analysis. IntJ Behav Med. 2013:1-11.

36. Seligman MEP, Railton P, Baumeister RF, Sripada C. Navigating into the future or driven by the past. Perspect Psychol Sci. 2013;8(2):119-41.

37. Hall P, Fong G, Cheng A. Time perspective and weight management behaviors in newly diagnosed Type 2 diabetes: A mediational analysis. J Behav Med. 2012;35:569-80.

38. McDade TW, Chyu L, Duncan GJ, Hoyt LT, Doane LD, Adam EK. Adolescents' expectations for the future predict health behaviors in early adulthood. Soc Sci Med. 2011;73(3):391-8.

39. Caspi A, Roberts BW, Shiner RL. Personality development: Stability and change. Ann Rev Psychol. 2005;56(1):453-84.

40. Roberts BW, Mroczek D. Personality trait change in adulthood. Curr Dir Psychol Sci. 2008;17(1):31-5.

41. Rosenthal R, Rosnow RL. Essentials of behavioral research: Methods and data analysis. 2nd ed. New York, NY: McGraw-Hill; 1991.

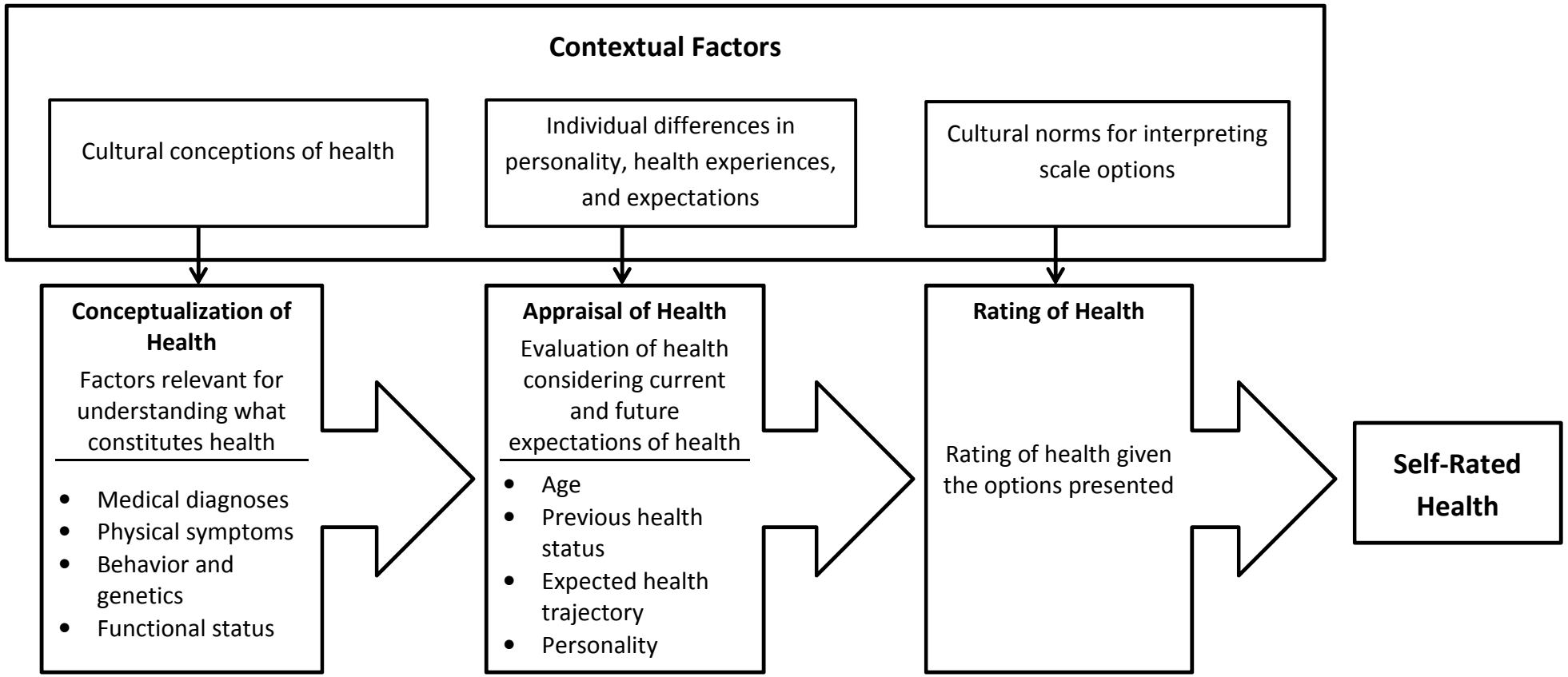

Figure 1. Summary of the Cognitive Process Model of self-rated health [1]. Note that the contextual factors serve as a backdrop to the conceptualization, appraisal, and rating of health. Arrows represent the processes involved rather than causal pathways.

Adapted from: Jylhä M. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. Soc Sci Med. 2009;69(3):307-16.

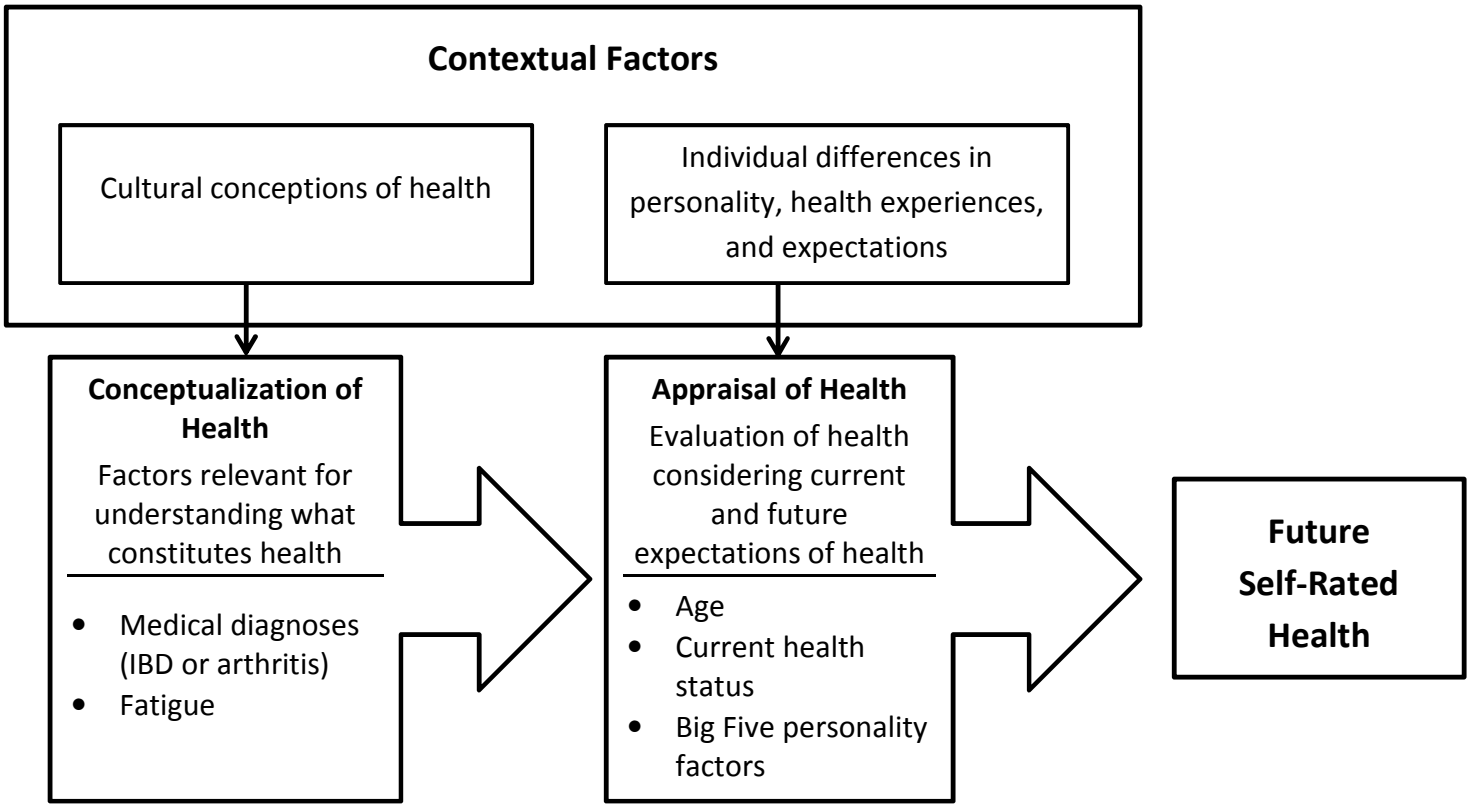

Figure 2. Operational model of the role of contextual factors in future self-rated health as suggested by the Cognitive Process Model of self-rated health [1]. Arrows represent the steps in the hierarchical regression model rather than causal pathways.

Table 1. *Demographic Characteristics of the Two Chronic Illness Samples.*

	Arthritis	IBD
N	365	290
Sex (% female)	82.6	76.3
Age		
Mean (SD)	43.7 (11.1)	36.2 (11.9)
Range	19-79	18-77
Ethnicity (% Caucasian)	93.8	96.0
Country (%)		
Canada	31.4	24.1
United States	52.1	60.0
United Kingdom	6.9	8.3
Australia	6.9	3.8
Europe	2.5	3.4
Other	0.3	0.3
Employment status (%)		
Full-time	43.5	51.1
Part-time	12.7	18.0
Unemployed/retired	19.0	21.5
On disability	24.8	9.5
Education (%)		
High school or less	16.5	17.5
University	63.7	57.3
Graduate school	19.8	25.2
Relationship status (%)		
Married	69.5	58.6
Separated/Divorced/Widowed	14.7	11.6
Never married	15.8	29.8

Note: IBD = Inflammatory bowel disease

Table 2. Mean differences in current and future self-rated health (SRH) and fatigue between those who did and did not experience a recent disease flare-up in the arthritis and inflammatory bowel disease samples (IBD).

	Sample					
	Arthritis (N = 365)			IBD (N = 290)		
	Recent flare-up (n = 318)	No recent flare-up (n = 47)		Recent flare-up (n = 218)	No recent flare-up (n = 65)	
	Mean (SD)	Mean (SD)	t(363)	Mean (SD)	Mean (SD)	t(281)
Current SRH	2.54 (.96)	3.00 (1.07)	-2.84**	2.57 (.99)	3.28 (.74)	-5.05**
Future SRH	2.62 (.78)	2.93 (.78)	-2.40**	2.66 (.86)	2.99 (.81)	-2.67**
Fatigue	4.21 (.97)	3.29 (1.22)	5.47**	3.90 (1.04)	3.25 (1.15)	4.27**

Note: *p < .05, **p < .01; There were 7 non-responders in the IBD sample.

Table 3.

Bivariate Correlations Among Personality, Subjective Health, and Fatigue in the Arthritis (ARTH) and Inflammatory Bowel Disease (IBD) Samples.

Variable	1	2	3	4	5	6	7	8	9
1. Conscientiousness	---	-.15*	.29**	.34**	.27**	.32**	.07	.13*	.15*
2. Neuroticism	-.36**	---	-.23**	-.21**	-.07	-.52**	-.16**	-.30**	-.24**
3. Extraversion	.22*	-.31**	---	.23**	.45**	.38**	.05	.17**	.12*
4. Agreeableness	.39**	-.29**	.18**	---	.19**	.27**	.02	.19**	.04
5. Openness	.26**	-.31**	.37**	.21**	---	.30**	.03	-.04	.04
6. Optimism	.18**	-.54**	.36**	.26*	.22**	---	.35**	.20**	-.31**
7. Current self-rated health	.09	-.23**	.18**	.08	.13*	.18**	---	.29**	.61**
8. Future self-rated health	.12*	-.28**	.20**	.19**	.15**	.35**	.23**	---	.30**
9. Fatigue	-.23**	.36**	-.27**	-.13*	-.18**	-.34**	-.43**	-.40**	---
ARTH Mean	3.81	3.08	3.07	3.96	3.81	3.34	2.58	2.66	4.03
ARTH Standard deviation	.70	.89	.88	.62	.68	.78	.98	.80	1.07
ARTH Cronbach's alpha	.82	.87	.85	.77	.81	.81	---	.77	.83
IBD Mean	3.72	3.23	3.07	3.82	3.83	3.19	2.73	2.74	3.73
IBD Standard deviation	.73	.87	.90	.68	.68	.89	1.03	.85	1.11
IBD Cronbach's alpha	.81	.84	.86	.79	.83	.86	---	.79	.86

Note: *$p < .05$, **$p < .01$; The correlations for S1 ($N = 365$) appear above the diagonal, and the correlations for S2 ($N = 290$) appear below the diagonal.

Table 4. *Hierarchical Regression Analysis Testing the Contribution of Personality to Future Self-rated Health in the Arthritis Sample, (N = 365).*

Predictor	Step 1 β	Step 2 β	Step 3 - C	Step 3 - E	Step 3 - N	Step 3 - A	Step 3 - O	Step 3 β - All
Age	.05	.01	.01	.01	.01	.01	.01	-.02
Education level	-.01	-.03	-.03	-.04	-.05	-.03	-.06	-.05
Current self-rated health	.23**	.08	.08	.08	.07	.08	.08	.06
Fatigue	---	-.36**	-. 35**	-. 34**	-. 32**	-. 35**	-.35**	-.32**
Personality factor	---	---	.04	.09	-. 16**	. 14**	.09	---
Conscientiousness	---	---	---	---	---	---	---	-06
Extraversion	---	---	---	---	---	---	---	.05
Neuroticism	---	---	---	---	---	---	---	-.13*
Agreeableness	---	---	---	---	---	---	---	.11*
Openness	---	---	---	---	---	---	---	.04
	Step 1	Step 2	Step 3 - C	Step 3 - E	Step 3 - N	Step 3 - A	Step 3 - O	Step 3 - All
R^2	.06	. 16	.16	. 17	.18	.17	. 16	.18
F	6.89**	16.92**	12.19**	14.29**	15.69**	15.37**	12.25**	9.54**
ΔR^2	.0 6	. 11	.00	.01	.02	.02	.01	.04
ΔF	6.89**	44.45**	.53	3.34	9.22**	7.88**	3.16	3.22*

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: first step, df = (3, 361); second step, df = (2, 360), third step, df = (1, 359), fourth step with five predictors added, df = (5, 353); * $p < .05$, ** $p < .01$.

Table 5. *Hierarchical Regression Analysis Testing the Contribution of Personality to Future Self-rated Health in the Inflammatory Bowel Disease Sample, N = 290.*

Predictor	Step 1 β	Step 2 β	Step 3 - C	Step 3 - E	Step 3 - N	Step 3 - A	Step 3 - O	Step 3 β - All
Age	-.08	-.10	-.10	-09	-.09	-.09	-.09	-.09
Education	-.08	-.09	-.09	-.09	-.09	-.07	-.09	-.07
Current subjective health	.31**	.10	.10	.11	.10	.10	.10	.11
Fatigue	---	-.46**	-.46**	-.45**	-.42**	-.45**	-.46**	-.40**
Personality factor	---	---	.06	.06	-.15*	.14*	-.03	---
Conscientiousness	---	---	---	---	---	---	---	.02
Extraversion	---	---	---	---	---	---	---	.04
Neuroticism	---	---	---	---	---	---	---	-.09
Agreeableness	---	---	---	---	---	---	---	.13*
Openness	---	---	---	---	---	---	---	-.09
	Step 1	Step 2	Step 3 - C	Step 3 - E	Step 3 - N	Step 3 - A	Step 3 - O	Step 3 - All
R^2	.10	.27	.28	.28	.29	.29	.27	.31
F	10.07**	25.79**	21.11**	20.90**	18.13**	22.58**	20.65**	13.60**
ΔR^2	.09	.17	.01	.00	.01	.02	.00	.04
ΔF	10.07**	65.89**	2.04	1.27	4.29*	7.65**	.36	3.07**

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: two predictors, first step, df = (2, 287); second step, df = (2, 285), third step, df = (1, 284), third step with five predictors added, df = (1, 280), fourth step with six predictors, df = (5, 278); * $p < .05$, ** $p < .01$.

Table 6.

Indirect Effects of Personality Traits on Future Self-rated Health Through Optimism Across the Arthritis and Inflammatory Bowel Disease (IBD) Samples

Sample (N)	Path	B (*SE*)	*t*	Indirect effects			Overall Model R^2	*F* (*df*)
				Data (SE)	Boot-strapping (SE)	Bias-corrected and accelerated CIs		
Arthritis (365)	N – OP (a)	-.39 (.04)	-9.26**				.22	57.74** (6,358)
	OP – FSRH (b)	.25 (.06)	4.31**					
	N – FSRH (c)	-.14 (.05)	-3.04**					
	N – OP – FSRH (c')	-.05 (.05)	-.89	-.10 (.03)	-.10 (.03)	-.16; -.05		
Arthritis (365)	A – OP (a)	.26 (.06)	4.20**				.23	17.36** (6,358)
	OP – FSRH (b)	.25 (.05)	4.73**					
	N – FSRH (c)	.19 (.06)	2.87**					
	N – OP – FSRH (c')	.12 (.06)	1.85	.07 (.02)	.07 (.02)	.03; .12		
IBD (290)	N – OP (a)	-.52 (.06)	-9.37**				.31	20.83** (6,283)
	OP – FSRH (b)	.17 (.06)	2.97**					
	N – FSRH (c)	-.16 (.05)	-2.89**					
	N – OP – FSRH (c')	-.07 (.06)	-1.09	-.09 (.04)	-.09 (.04)	-.17; -.02		
IBD (290)	A – OP (a)	.34 (.07)	4.61**				.32	21.28** (6,283)
	OP – FSRH (b)	.18 (.05)	3.43**					
	N – FSRH (c)	.18 (.07)	2.71**					
	N – OP – FSRH (c')	.12 (.07)	1.75	.06 (.03)	.06 (.03)	.02; .13		

Note: Age, education level, current SRH, and fatigue were entered as covariates in the models for both samples. CI = confidence interval; N = Neuroticism; A = Agreeableness; OP = optimism; FSRH = future self-rated health; Boot strapping analyses was conducted with 5,000 resamples; *$p < .05$, **$p < .001$.