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Personality and Stressor-Related Affect

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Abstract

Greater increases in negative affect and greater decreases in positive affect on days stressors occur portend poorer mental and physical health years later. Although personality traits influence stressor-related affect, only neuroticism and extraversion among the Big Five personality traits have been examined in any detail. Moreover, personality traits may shape how people appraise daily stressors, yet few studies have examined how stressor-related appraisals may account for associations between personality and stressor-related affect. Two studies used participants (N=2022, age 30–84) from the National Study of Daily Experiences II (NSDE II) to examine the associations between Big Five personality traits and stressor-related affect, in addition to how appraisals may account for these relationships. Results from Study 1 indicate that higher levels of extraversion, conscientiousness, and openness to experience, and lower levels of neuroticism, are related to less stressor-related negative affect. Only agreeableness was associated with stressor-related positive affect, such that higher levels were related to greater decreases in positive affect on days stressors occur. The second study found that stressor-related appraisals partially accounted for the significant associations between stressor-related negative affect and personality. Implications for these findings in relation to how personality may influence physical and emotional health are discussed.

Keywords

Big Five; Personality; Stressor-Related Affect

Researchers have long investigated the link between psychological stress and health (e.g. Seyle 1956, McEwen & Seeman, 2003). An emerging body of evidence suggests that emotional reactions to even minor daily stressors, such as having an argument or missing a work deadline, create aggregated effects with a lasting impact on health. For example, the degree to which positive and negative affect levels changes on days when stressors occur are related to an increased risk of reporting a future affective disorder (Charles, Piazza, Mogle,

Sliwinski, & Almeida, 2013), developing a chronic condition (Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013), and a greater likelihood of mortality (Mroczek et al., 2013).

Personality factors may explain, in part, individual differences in stressor-related affect. For example, people who have higher levels of neuroticism, a personality trait associated with anxiety and depressive symptoms, report higher levels of negative affect on days stressors occur (Mroczek & Almeida, 2004). Scientists have focused on the role of neuroticism and extraversion in stress research given their established associations with positive and negative emotional experiences (e.g., Larsen & Ketelaar, 1991). Fewer studies, however, have examined the role of other Big Five personality traits on stressor-related affect. The current studies assess the independent effects of each of the Big Five personality traits (neuroticism, extraversion, conscientiousness, openness to experience, and agreeableness) on both positive and negative stressor-related affect, and how stressor-related appraisals may explain these associations.

Affect, Stressors, and Health

People report higher levels of negative affect and lower levels of positive affect on days when they report encountering a stressor (e.g., Almeida, 2005; Bolger & Schilling, 1991; Mroczek et al., 2013). These phenomena, in turn, are related to physical and mental health outcomes. Heightened stressor-related negative affect is associated with disease susceptibility (Piazza et al., 2013, Cacioppo, 1998), higher levels of subsequent depression, (Cohen, Gunthert, Butler, O'Neill, & Tolpin, 2005) and risk of developing an affective disorder (Charles et al., 2013). The degree to which positive affect decreases on days when stressors occur is associated with poor sleep outcomes (Ong et al., 2013). Another study found that stressor-related decreases in positive affect predicted mortality even after adjusting for stressor-related negative affect, suggesting that stressor-related positive affect uniquely contributes to future health (Mroczek et al., 2013).

Personality and Stressor-Related Affect

There is currently much empirical interest in exploring associations between personality traits and stressor-related affect because stress is one hypothesized conduit contributing to why personality is such a robust predictor of health and longevity (Hampson & Friedman, 2008). Interactional and transactional stress models guide much of this personality and stress-related research (Bolger & Zuckerman, 1995; Lazarus & Folkman, 1984; Smith, 2006). These models propose that personality is associated with stress in the following ways. First, those with certain personality characteristics are more likely to expose themselves to more frequent and severe stressful experiences. Second, individual differences in personality traits may influence appraisals of potentially stressful circumstances. Lastly, personality is associated with the effectiveness of the coping responses whereby cognitive and behavioral efforts can prevent, manage, or alleviate distress. Although a handful of studies support these personality-stress associations, more research is needed to determine the role and extent personality has in the conjunction with daily stressors.

Research has focused extensively on neuroticism's effect, finding that higher levels of neuroticism are associated with greater exposure and reactivity to stressors (e.g. Bolger & Schilling, 1991; Mroczek & Almeida, 2004). Researchers posit that people high in neuroticism express a "hyper-reactivity" to stressors, such that repeated activation of negative affect leads to an increased sensitization to stressors referred to as "kindling effects" (Gilbert, 1994). This heightened sensitivity to stressors, in turn, increases affective reactivity to negative events, which has been linked with heightened activity of the HPA axis as indicated by increased daily concentrations of the stress hormone cortisol (Nater, Hoppmann, & Klumb, 2010; Portella, Harmer, Flint, Cowen, & Goodwin, 2005). In addition, people higher in neuroticism typically exhibit sub-optimal coping strategies such as self-blame or denial (Lazarus & Folkman, 1984; Penley & Tomoka, 2000; Suls, 2001).

Studies examining the role of extraversion, a personality trait characterized by high levels of positive affect and sociability, have focused predominantly on reactions to laboratory-based stimuli (e.g., Gomez, Cooper, & Gomez, 2000; Carver & White, 1994; Lucas & Baird, 2004; Penley & Tomoka, 2002). In addition, they often investigate the extent to which positive affect increases in response to a positive experience. Results have been mixed, with some studies showing that people high in extraversion experience greater increases in positive affect in response to positive stimuli (Gomez et al., 2000; Gross, Sutton, & Ketelaar, 1998), and others revealing either contrary or null results (Carver & White, 1994; Lucas & Baird, 2004). Fewer studies have examined whether or not people high in extraversion are less reactive to negative events. One study, for example, found that people higher in extraversion reported higher levels of happiness, pride, and self-satisfaction, and lower levels of fear and stress in response to a stressful speech task (Penley & Tomoka, 2002). Those scoring higher in extraversion also use more effective coping strategies when dealing with stressors such as problem-solving (Carver & Connor-Smith, 2010). These results suggest that high levels of extraversion may be associated with less stressor-related declines in positive affect.

The remaining Big Five personality traits – conscientiousness, openness to experience, and agreeableness – have been less studied in stress research. Several recent studies have focused on the stress-reducing benefits of conscientiousness, a personality trait characterized by self-control, deliberation, and competence. Individuals scoring higher in conscientiousness generally report fewer daily hassles (Gartland, O'Connor, & Lawton, 2012), less job strain (Zellars, Perrew, Hochwater, & Anderson, 2006), and generally lower levels of negative affect (Fayard, Roberts, Robbins, & Watson, 2012). Higher conscientiousness has also been implicated in more optimal function of the HPA axis, indicated by reduced daily concentrations of cortisol (Nater et al., 2010). Reduced cortisol levels among people high in conscientiousness were largely driven by their higher levels of positive affect. The authors suggested that higher levels of conscientiousness may act as a strong affect-related regulator of the HPA axis. This regulation hypothesis is consistent with a laboratory study showing that higher levels of conscientiousness were associated with greater emotional recovery from, but not reactivity to, negative affective stimuli (Javara et al., 2012). In terms of coping mechanisms, typically those scoring higher in conscientiousness utilize more effective coping strategies to deal with stress (for review see Penley & Tomoka, 2002) with some suggesting that conscientiousness can act as a psychological resource that protects an individual from experiencing stress (Zellars et al., 2006).

Studies examining levels of agreeableness (the extent to which a person is kind, cooperative, and good-natured) and openness to experience (the tendency to be imaginative or creative) in relation to stress are even rarer. One study found that people high in agreeableness experienced significantly greater negative affect when they encountered interpersonal conflicts (Suls, Martin, & David, 1998). No study, to the best of our knowledge, has specifically examined openness to experience and stressor-related negative affect. Laboratory studies, however, have found that low levels of openness were associated with a blunted cortisol response (Oswald, Zandi, Nestadt, Potash, Kalaydjian, & Wand, 2006), and greater blood pressure reactivity to lab stressors (Williams, Rau, Cribbet, & Gunn, 2009).

Finally, past research has traditionally focused on the effects of single personality traits on stressor-related affect, yet interactive effects may emerge when studying these traits. For example, research has shown that the combined effects of low extraversion and high neuroticism are particularly risky for the development of coronary heart disease (Denollet, 1997). Additionally, the combination of high neuroticism and low conscientiousness has been shown to predict high levels of stress and dysfunctional coping patterns (Grant & Langan-Fox, 2006; Vollrath & Torgerson, 2000). Therefore, it is possible that a combination of personality factors may display differential influences on stressor-related affect.

The Current Investigation

Two studies test predictions from the transactional models described above for the Big Five personality traits. Study 1 examines the overarching premise that personality is associated to stressor-related affect and the number of stressors encountered (e.g., Bolger & Zuckerman, 1995). The second study extends these analyses to examine the premise that appraisals may partially account for personality and stressor-related affect associations.

The Big Five traits are oblique (correlated) factors (Biesanz & West, 2004) representing the full/broad personality profile of an individual. As such, examining the unique associations between each personality trait with stressor-related affect is necessary to understand the independent contribution of each one to the stress process. Emerging evidence, however, suggests that trait by trait interactions among the Big Five may provide more precise understanding regarding how personality is related to behavior (Turiano, Whiteman, Hampson, Roberts, & Mroczek, 2012), physiological health (Turiano, Mroczek, Moynihan, & Chapman, 2013) and stress coping mechanisms (Vollrath & Torgersen, 2000). Based on prior literature indicating that conscientiousness buffers against the negative effects of other traits such as neuroticism, we will investigate how traits may combine in ways to either attenuate or exacerbate levels of stressor-related positive and negative affect. Moreover, because personality traits may have separate relationships with positive and negative stressor-related affect (e.g. Mroczek et al., 2013; Ong et al., 2013), the current study extends prior work that has historically focused solely on negative affect by examining both negative and positive stressor-related affect.

Study 1

The first study examines how stressor-related negative and positive affect may vary by personality trait. Based on findings from prior research, we expect to replicate findings that high levels of neuroticism are related to greater increases in stressor-related negative affect and greater decreases in stressor-related positive affect. Additionally, based on the literature documenting the protective benefits of both extraversion and conscientiousness in affective responses to stress, we hypothesize that high levels of conscientiousness and extraversion are associated with less change in stressor-related affect. Furthermore, extrapolating from findings of physiological reactivity to stress, we predict that openness to experience is related to less stressor-related affect as well. Based on the findings showing that agreeableness is associated with increased affective reactivity in response to interpersonal conflicts (Suls et al., 2001), we hypothesize that high levels of agreeableness are associated with increased stressor-related negative affect and greater declines in stressor-related positive affect. We also hypothesized that conscientiousness and extraversion would possibly reduce the negative consequences of high trait neuroticism and explored other potential interactions between the personality traits. Consistent with prior literature, we predict that higher levels of conscientiousness and extraversion will be related to fewer reported daily stressors, and that higher levels of neuroticism will be related to a greater number of daily stressors. We make no specific predictions regarding openness to experience or agreeableness.

Sample and Design

Data were derived from the second Midlife in the United States Survey (MIDUS II), a nationally representative study of U.S. adults. A subset of the MIDUS II participants (N=2022) completed the National Study of Daily Experiences (NSDE II), a daily diary study where participants completed telephone interviews about their daily experiences over eight consecutive days (Almeida, McGonagle and King, 2009). The NSDE II participants were predominantly white (92%), ranged from 30–84 years old ($M=55$), and were fairly well educated (96% of participants reported having at least a high school education). Of the 2022 NSDE II participants, 257 people were missing data for the personality measures of neuroticism, conscientiousness, agreeableness, and extraversion. An additional 15 people were missing data for openness to experience. Therefore, the current analyses are based on the 1750 participants with complete data. These participants were slightly older than the original sample (mean age=57), but did not differ in reported ethnicity or education level. The NSDE protocol was approved by the institutional review boards of the University of Arizona and the Pennsylvania State University, respectively, and participants provided informed consent.

Measures Assessed in NSDE II

Daily negative affect—Each day, participants were asked how much of the time over the past 24 hours they felt nervous, worthless, hopeless, lonely, afraid, jittery, irritable, ashamed, upset, angry, frustrated, restless or fidgety, that everything was an effort, and so sad nothing could cheer you up. Participants rated their response on a five-point scale ranging from 0

(none of the time) to 4 (all of the time). Scores were then averaged across the 13 items for each day ($\alpha=.86$)

Daily positive affect—Daily Positive Affect was measured in NSDE II through 13 items including in good spirits, cheerful, extremely happy, calm, satisfied, full of life, close to others, like you belong, enthusiastic, attentive, proud, active, and confident. On each of the 8 days, participants were asked how much of the time over the past 24 hours they felt each affective state on a scale ranging from 0 (none of the time) to 4 (all of the time). Scores were then averaged across the 14 items for each day ($\alpha = .94$).

Daily stressors—Daily stress was measured by using the semi-structured Daily Inventory of Stressful Events, a validated instrument for assessing daily stressors (Almeida et al., 2002). The DISE asks participants about the occurrence of seven different types of daily stressors within various life domains and captures a variety of interpersonal stressors, work stressors, and network stressors (see Almeida et al., 2002 for a detailed description of the DISE). This measure was comprised of 7 stem questions that asked if the following stressors had occurred in the past 24 hours: an argument with someone; almost having an argument but avoiding it; a stressful event at work or school; a stressful event at home; experiencing race, gender, or age discrimination; having something bad happen to a close friend or relative; and having had anything else bad or stressful happen in the past 24 hours. Stressors were then summed for each day.

Average number of stressors—The average number of stressors score was assessed by summing and averaging the total number of stressors mentioned across the eight days.

Measures Assessed in MIDUS II

Personality traits—Personality traits were assessed in MIDUS II through adjectives describing each Big Five personality trait (Prenda & Lachman, 2001). Participants were asked how much each adjective described themselves on a scale from 1 (not at all) to 4 (a lot). The adjectives included moody, worrying, nervous, and calm – reverse coded (neuroticism); outgoing, friendly, lively, active, and talkative (extraversion); organized, responsible, hardworking, thorough, and careless – reverse coded, (conscientiousness); creative, imaginative, intelligent, curious, broad minded, sophisticated, and adventurous (openness); and helpful, warm, caring, softhearted, and sympathetic (agreeableness). Mean scores were then calculated from the adjectives of each trait.

The MIDUS Big Five scale was developed from a combination of existing personality trait lists and inventories (for review see Lachman & Weaver, 1997). The scales have good construct validity (Mroczek & Kolarz, 1998) and all five traits significantly correlate with the NEO trait scales (Prenda & Lachman, 2001). Reliability alphas for each personality trait were: agreeableness = .80, conscientiousness = .68, extraversion = .76, neuroticism = .74, and openness = .77. Inter-item correlations for each personality trait ranged from .50–.66 (neuroticism), .37–.58 (extraversion), .30–.65 (openness), .39–.57 (conscientiousness), and .40–.70 (agreeableness).

Demographics—Sociodemographic variables included age, gender, and education.

Statistical Analyses

We used multi-level modeling in SAS (Proc Mixed) to examine the moderating role of personality in stressor-related negative and positive affect. We chose to use multi-level modeling to analyze intra-individual variability. Both stressor and affect were nested within persons, allowing both to vary over days within and between persons.

For our Level 1 analyses, we examined the association between the occurrence of a stressor and its association with affect within participants. Stressor-related affect is thus defined as the difference in levels of affect on days when stressors occurred, as calculated by the slope estimate when the stressor variable is entered. Our Level 2 analyses introduced between-person factors with personality traits being our primary variables of interest. Interaction terms between personality traits and the stressor variable were then analyzed to assess the influences of each personality trait on stressor-related affect. The following model with conscientiousness and average stressor level as a covariate is included as an example:

$$\text{Level 1: } NA_{ij} = \beta_{0j} + \beta_{1j}(\text{stressor}_{ij}) + r_{ij}$$

$$\begin{aligned} \text{Level 2: } \beta_{0j} &= \gamma_{00} + \gamma_{01}(\text{conscientiousness}_j) + \gamma_{02}(\text{average stress}_j) + \mu_{0j} \\ \beta_{1j} &= \gamma_{10} + \gamma_{11}(\text{conscientiousness}_j) + \mu_{1j} \end{aligned}$$

In our Level 1 equation, NA_{ij} is the amount of negative affect on day i for person j . For our Level 2 equation, we included our between person covariates and personality traits. Separate models analyzed the effects of each personality trait. For example, our first model included conscientiousness as the personality of interest; our second model included only neuroticism as the personality trait of interest, our third model included only openness to experience, and so on for each of the five personality traits. Each of these Models (1 through 5) are included in Table 2. Then, in Model 6 (also presented in Table 2), we included all personality traits that were significantly associated with stressor-related negative affect in the separate models into one full model. Finally, we included interaction terms between personality traits in separate models testing each potential two-factor interaction between each personality trait. To test stressor-related positive affect, analyses were repeated using positive affect as the dependent variable.

Results and Discussion

Bivariate correlations between our main variables of interest are shown in Table 1. All personality variables were significantly related to daily levels of affect and stressors. High levels of conscientiousness, agreeableness, openness, and extraversion were associated with higher levels of daily positive affect and lower levels of daily negative affect, whereas neuroticism was associated with lower levels of positive affect and higher levels of negative affect. Consistent with prior research, higher levels of conscientiousness and extraversion were associated with fewer stressors, as were higher levels of agreeableness. Higher levels of neuroticism and openness were associated with experiencing a greater number of stressors. Personality traits were significantly and positively correlated with each other with values

ranging from $r = .242$ to $r = .517$ with the exception of neuroticism, which was significantly and negatively correlated with all other personality traits ($r = -.149$ to $r = -.242$).

Participants reported between 0 and 5 stressors on each day of the interviews ($M = .53$, $SD = .67$ across the 8 days). Across all participants, 61% of all days were experienced without any stressors. Participants reported 1 stressor on 29% of the days, and 2 or more stressors on 10% of all days (ranging from 8.07% reporting 2 stressors to .01% reporting 6). Given the skewness, stressors were coded as having been experienced either 0, 1, or 2 or more times. People who experienced more stressors had a higher education level ($r = .129$, $p < .001$) and were younger ($r = -.135$, $p < .001$). Men reported significantly fewer stressors than women ($t(14568) = -11.16$, $p < .001$). Based on the significance of these variables, age, gender, and education were included as covariates in all models. Average number of stressors was included as well to ensure that stressor-related affect was assessed after adjusting for difference in exposure to stressors (i.e., average number).

Personality and negative stressor-related affect—Consistent with previous research, negative affect was significantly higher on days when individuals experienced a stressor (Bolger & Schilling, 1991; Neupert, Almeida, & Charles, 2007). Table 2 shows the results from models examining the associations between personality and stressor-related negative affect. Personality traits were all significantly associated with daily levels of negative affect. Higher levels of neuroticism were associated with more negative affect, and higher levels of conscientiousness, openness, extraversion, and agreeableness were associated with less negative affect. Older age, less stressor exposure, and higher education levels were also associated with less negative affect.

Models 1 through 5 confirm our main hypotheses: high levels of conscientiousness, extraversion, and openness were related to less stressor-related negative affect. In order to assess the sizes of these effects, we computed pseudo r-square statistics for each model as outlined by Singer and Willett (2003). Results indicate that conscientiousness accounts for 11% of the between-person variance in stressor-related negative affect. Extraversion accounted for 8%, and openness to experience accounted for 5%. Figure 1 provides an illustration of this pattern using conscientiousness as the example. Additionally, high levels of neuroticism were significantly associated with greater stressor-related negative affect, with neuroticism accounting for 16% of the between-person variance. Of the Big Five traits, only agreeableness was not significantly associated with stressor-related negative affect when examined separately with only the covariates included in the model.

Next, we entered all personality traits together (except agreeableness, which did not significantly influence stressor-related negative affect; Model 6). Neuroticism, openness and conscientiousness remained significant moderators of the negative affect/stress relationship in this model, accounting for 18% of the between-person variance in stressor-related negative affect.

To unpack the significant interactions between each personality variable and a stressor, we ran separate models that examined the relationship between each personality trait and negative affect on days when individuals experienced no stressors, days when individuals

experienced one stressor, and days when individuals experienced two or more stressors. Results illustrate the stronger association between personality and negative affect on days when stressors occur. For example, the relationship between conscientiousness and less negative affect is strongest ($\gamma = -.17$, $SE = .03$, $p < .001$) on days when a person experiences two or more stressors, as compared to days when people report no stressors ($\gamma = -.058$, $SE = .01$, $p < .001$), indicating that conscientiousness may provide a buffer against negative affect, particularly on days when individuals experience stressors.

We then tested potential three-way interactions to see if personality traits interacted with each other to influence stressor-related affect (e.g. high levels of both neuroticism and conscientiousness). None of the combinations of personality traits significantly predicted stressor-related negative affect (analyses available upon request).

Personality and positive stressor-related affect—We next ran the same analyses using positive affect as the dependent variable (Table 3). Positive affect was significantly lower on days when individuals experienced a stressor. In addition, lower levels of neuroticism and higher levels of conscientiousness, openness, extraversion, and agreeableness were each associated with greater positive affect. Older age, less stressor exposure, and higher education levels were also associated with greater positive affect.

As indicated in Table 3, agreeableness was the only personality variable that was significantly associated with the relationship between stress and positive affect, accounting for 5% of the variance in stressor-related positive affect. The same finding held true when all personality traits were entered into one model together, and none of the other personality traits moderated the positive affect/stressor relationship. Additionally, there were no significant three-way interactions between stress and personality traits, indicating that various combinations of personality traits were not associated with stressor-related positive affect.

Finally, we explored whether the relationship between agreeableness and stressor-related positive affect differed based on whether the stressor was interpersonal in nature. Past research on agreeableness has shown that people who are high on agreeableness are particularly adverse to interpersonal conflict (Jensen-Campbell, Gleason, Adams, & Malcolm, 2003). Separate analyses examining the effects for interpersonal stressors and again for non-interpersonal stressors revealed that high levels of agreeableness were significantly associated with greater decreases in stressor-related positive affect for both types of stressors, although the estimate for interpersonal stressors ($\gamma = -.06$) was higher than that for non-interpersonal stressors ($\gamma = -.04$). Analyses available upon request.¹

¹We also separately analyzed interpersonal and non-interpersonal stressors for stressor-related negative affect for each personality variable. Results revealed that the relationship between personality and each type of stressor (interpersonal and non-interpersonal) were similar. Thus, we did not distinguish between interpersonal and non-interpersonal stressor in our main analyses.

Study 2

Results from Study 1 established associations between the Big Five personality traits and both positive and negative stressor-related affect. Study 2 aimed to identify pathways explaining these associations. We focused on how people appraised the stressor, such as its perceived severity, how it disrupted daily life, and how much control people had over the stressor. Personality traits are defined by relatively predictable thoughts and behaviors, including how people appraise situations around them (e.g., Bouchard, Guillemette, & Landry-Leger, 2004). For example, one study found that higher levels of neuroticism and lower levels of extraversion, agreeableness, and conscientiousness were associated with greater perceptions of perceiving an upcoming exam as a threat (Bouchard et al., 2004). Greater endorsement of positive secondary appraisals, where students rated their ability to cope with the threat, were related to lower levels of neuroticism and higher levels of extraversion, openness to experience, and conscientiousness. Another study found that people who scored higher on neuroticism tended to perceive their stressors as being more severe and appraised them as more harmful to their daily life compared to their lower scoring peers (Espejo et al., 2011). In Study 1, only conscientiousness, neuroticism, and openness to experience were each uniquely associated with stress-related negative affect, so we examined these three personality traits and their association with stressor-related appraisals. For stressor-related positive affect, we only examined the association between appraisals and agreeableness based on the findings from Study 1. In all of these analyses, we hypothesized that stressor characteristics such as severity, appraisals, and control would partially mediate the relationship between personality traits and stressor-related affect.

Sample and Design

Study 2 used the same participants and designs as Study 1. From the original sample used in Study 1 (N=2022), only people who reported at least one stressor could be used in these analyses. From the entire NSDE sample, 1814 people experienced at least 1 stressor during the 8 day period. These people were similar to the original sample, with an average age of 55 years and 95% reporting at least a high school education. Slightly more than half (57%) of the participants were female.

Measures Assessed in NSDE II

This study included all of the measures described in Study 1, above, as well as the following described below.

Stressor severity—Participants were asked to rate each stressor they experienced on a 4 point scale ranging from “not at all stressful” to “very stressful.”

Stressors affect in life domains—Participants rated how much did each stressor pose a risk to seven different areas of their lives including their plans for the future; finances; how participants felt about themselves; how others felt about them; personal health; health of others; and disruption of daily routine. Participants rated risk for each question on a scale from 1 (no risk at all) to 4 (a lot of risk)

Stressor control—Participants were asked how much control they had over each stressor on a scale ranging from 1 (no control at all) to 4 (a lot of control).

Stressor-related affect—In Study 1, stressor-related negative affect and stressor-related positive affect were calculated as a slope using SAS PROC MIXED with affect (either positive or negative) as the outcome variable, and stressor (0, 1, or 2) as the predictor variable in the model along with the covariates. The effect of stressors was allowed to vary across person in these analyses. Similar to the analyses for Study 1, models were run with affect as the outcome variable and stressor (0, 1, or 2) as the predictor variable. Average number of stressors was also included as a covariate to adjust for differences in exposure across people. Again, slope was allowed to vary (calculated by the RANDOM statement) to calculate person's deviation from the average slope. Unlike Study 1, however, these separate deviations, or estimates, were then saved and added to the overall group estimate of stressor-related affect (constant across participants) to produce individual slope scores for each individual. Separate stressor-related negative and positive affect slopes for each individual were calculated in different models.

Results and Discussion

Bivariate correlations between main variables of interest are shown in Table 4. Greater stressor severity, greater appraisals of risk to life domains, and less feelings of control were each associated with greater stressor-related negative affect. Stressor characteristics were not associated with stressor-related positive affect. Stressor characteristics were also associated with personality traits. High levels of conscientiousness and extraversion were associated with less stressor severity and lower appraisals of risk. High levels of neuroticism were associated with greater stressor severity and higher appraisals of risk in life domains. High levels of openness to experience were associated with less stressor severity, but unrelated to appraisals of risk for specific life domains with the exception of 'feelings about yourself' ($r = -.084, p = .001$). High levels of agreeableness were not associated with stressor severity, and were associated with lower appraisal of risk of disrupting daily routine, financial situation, feelings about yourself, and how others feel about you.

Stressor characteristics and stressor-related negative affect—Regression models examined the effect that stressor appraisals had on explaining the relationship between the personality traits of conscientiousness, neuroticism, and openness to experience and stressor-related negative affect. In these regression models, stressor-related negative affect was the outcome variable, and the predictor variables included personality, appraisals, and the covariates education, gender and age. Models were run without the appraisals, and then with the additional of the appraisals to compare how the association between personality and stressor-related affect varied with the inclusion of these appraisals. Results of these analyses are shown in Table 5. Model 1 represents the relationship between each personality trait and stressor-related negative affect. Model 2 added subjective severity ratings, and Model 3 added specific appraisal of the stressors.

Model 1 shows that higher levels of conscientiousness are associated with less stressor-related negative affect. Specifically, for every 1 standard deviation increase in

conscientiousness, there is a .21 standard deviation decrease in stressor-related negative affect. Models 2 and 3 indicate that stressor severity, stressor appraisals in specific life domains, and controllability are related to stressor-related negative affect and partially mediate the role of conscientiousness, decreasing the effect of conscientiousness from $-.21$ to $-.13$ (a 38% decrease). Similar results are shown for both neuroticism and openness. These appraisals reduce the effect of neuroticism from $.31$ to $.20$ (a 35% decrease), and decrease the effect of openness from $-.11$ to $-.07$ (or by 36%). Taken together, results suggest that stressor-related appraisals explain about 35% of the variance in the association between personality and stressor-related negative affect.

Stressor characteristics and stress-related positive affect—Based on the results of Study 1, we conducted regression models assessing the role of stressor-related appraisals on the relationship between agreeableness and stressor-related positive affect. None of the analyses were significant (analyses available upon request), suggesting that these stressor characteristics did not explain the relationship between agreeableness and stressor-related positive affect.

General Discussion

This study examined the associations between personality traits and stressor-related affect, and how these associations may be mediated by stressor-specific appraisals. Results indicate that all Big 5 personality traits except agreeableness were significantly associated with stressor-related negative affect. Neuroticism, conscientiousness, and openness had unique associations with stressor-related affect when all significant personality traits were included in a model together, and stressor-related appraisals accounted for over one-third of these associations. In contrast, only agreeableness was significantly related to stressor-related positive affect, and none of the stressor-related appraisals explained this association.

Stressor-related negative affect

Neuroticism had the strongest association with stressor-related negative affect. These results support our hypothesis and are consistent with a large body of literature that documents neuroticism's moderating influence on stressor-related negative affect (e.g. Bolger & Schilling, 1991; Mroczek & Almeida, 2004). The current study examined daily negative affect and stressor occurrence in the same interview, and as such cannot make causal inference about their association. One possibility is that the occurrence of a stressor elicits distress, so this measure indicated stress reactivity. Another possibility is that on days when people are experiencing high levels of negative affect, events that may otherwise not have been noticed are now perceived and responded to as a stressor. Either of these interpretations suggests that higher levels of neuroticism are related to greater sensitivity to stressors. This greater sensitivity to potentially negative situations is consistent with previous studies showing that people high in neuroticism have a tendency to view everyday stressors as more threatening than people low in neuroticism (Lazarus & Folkman, 1984) and show a heightened reactivity to them (e.g., Mroczek & Kolarz, 1998). In addition, high levels of neuroticism are associated with negative appraisal styles and increased perceived stressor severity (Tong et al., 2006). Results of these current studies replicate previous research,

suggesting that people high in neuroticism therefore experience more stressor-related negative affect in part because they perceive stressors as more severe, more threatening, and less under their control.

Conscientiousness was also independently associated with stressor-related negative affect. In contrast with neuroticism, conscientiousness served as a protective factor, where higher levels were associated with less of an increase in negative affect in response to stress. As with neuroticism, stressor-related appraisals partially account for this relationship. This apparent stress-buffering effect is consistent with previous studies where people scoring higher in conscientiousness perceive normative life events (Gartland et al., 2012) as well as induced laboratory stressors (Javaras et al., 2012) as less stressful than persons scoring lower in conscientiousness. The hallmarks of high conscientiousness are a strong sense of responsibility, order, and planning for the future, all factors that may contribute to better planning and preparation for life's challenges. Conscientiousness persons not only report fewer stressful events in their lives, they are more likely to utilize adaptive coping mechanisms to effectively handle such stress when stressors are encountered (Bartley & Roesch, 2011).

Similar to conscientiousness, openness to experience was also associated with an attenuation of stressor-related negative affect, and stressor-related appraisals partially accounted for this relationship. Our results suggest that events from daily life parallel findings of laboratory studies that have linked openness with less reactive responses to stressors (Oswald et al., 2006; Williams et al, 2009). Furthermore, studies on personality and coping strategies have linked openness with emotion-focused coping strategies including reappraisal techniques (O'Brien & DeLongis, 1996). Results of this study suggest that appraisals of stressors such as severity, threat, and controllability contribute to the reason why people high in openness experience less stressor-related negative affect.

Stressor-related positive affect

The personality traits that were associated with stressor-related negative affect were not the same traits that were associated with stressor-related positive affect. Agreeableness was the only personality trait not associated with stress-related negative affect, and the only personality trait that was associated with stress-related positive affect. Higher levels of agreeableness were associated with greater decreases in positive affect on days when a stressor occurred. This finding is in line with another study that found that people who were high in agreeableness experienced greater distress when they experienced interpersonal conflict (Suls et al., 1998), although our findings held for both interpersonal and non-interpersonal stressors.

Stress-related appraisals did not mediate the relationship between agreeableness and stressor-related positive affect. Perhaps factors related to the nature of agreeableness itself, as opposed to the stressor, drive this relationship. For example, people high in agreeableness tend to be trusting, helpful and cooperative, and thus stressors may be more unexpected and disappointing than their lower agreeable peers (Suls et al., 1998). People are thought to react best to situations where their individual characteristics are in line with the characteristics of

the environment (Lewin, 1935). Person-environment fit may help explain why people high in agreeableness experience greater decreases in stressor-related positive affect.

Although agreeableness is typically associated with more positive outcomes, prior research using MIDUS data has found that higher levels of agreeableness were actually related to worse self-rated health (Turiano et al, 2011) and lower income levels (Judge, Livingston, & Hurst, 2012; Nybus & Pons, 2005). Theoretically, this has been attributed to certain aspects of agreeableness such as altruism, which is primarily the component of agreeableness that the MIDUS questions assess (also tapping into aspects of trust). These components are important to note because others have suggested that contradictory findings involving agreeableness may depend on how this personality trait is assessed (Lowe, Edmundson, & Widiger, 2009). Unfortunately, we are unable to explore this possibility further as the adjectives used to measure agreeableness in the current study (helpful, warm, caring, softhearted, sympathetic) do not fully tap into the more argumentative and hostile aspects of low agreeableness.

None of the other personality traits that were associated with stressor-related negative affect had any significant relationship with stressor-related positive affect. The results of this study underscore how positive and negative affect are separate constructs related to different personality traits, events, and long term emotional health (e.g., Rook, 2001; Stallings, Dunham, Gatz, Baker, & Bengtson, 1997). Most studies focus on the association between negative affect and stressors; relatively few studies have looked at the lower levels of positive affect that are present on days when stressors occur. A recent study, however, suggest that these changes may be even more consequential for well-being than those related to negative affect (Mroczek et al., 2015). This study found that in a sample of middle to older aged men, greater decreases in stress-related positive affect, but not increases in stress-related negative affect, predicted increased mortality (Mroczek et al., 2015). Future work should examine individual differences in positive in addition to negative stressor-related affect, as variations in personality and other psychosocial factors may not influence positive and negative affective responses to stress in the same way.

Finally, contrary to our hypotheses, there were no significant interactions between personality traits and stressor-related affect. This is somewhat surprising, as past research has demonstrated that certain combinations of personality traits are associated with experienced stress levels, coping patterns, and overall health (Denollet, 1997, Grant & Langan-Fox, 2006, Vollrath & Torgerson, 2000). In particular, the combination of high neuroticism and low conscientiousness has been shown to be particularly detrimental for health (Friedman & Kern, 2014). Future work will need to examine this same question with more nuanced assessments of personality in order to clarify whether specific facets of each personality trait are responsible for these interactions.

Strengths and limitations

The main limitation with this study was that the Midlife Development Inventory scale used to measure personality was quite brief, with only 4 to 7 items used to assess each trait. This abbreviated assessment minimized participant burden, yet resulted in low internal consistencies and the inability to study facets of each personality trait. Despite the moderate

level of internal consistency, however, this measure of conscientiousness has been shown to have high test–retest reliability and good construct validity (Mroczek & Kolarz, 1998), as well as a strong correlation with the more expansive NEO personality measure (Lachman & Weaver, 1997). Future work should utilize more extensive personality batteries since the examination of specific facets underlying each personality trait have shown promise in more precise prediction of behavior and health related factors (Paunonen, Haddock, Forsterling, & Keinonen, 2003; Turiano, Spiro, & Mroczek, 2012).

Another limitation had to do with the timing in which stressful events and daily negative affect were measured. Participants were asked about their emotions and any stressors experienced over the past 24 hours. This recollection of both their emotional and stressful experiences over the past day may be influenced by many factors. For example, people high in neuroticism tend to selectively recall negative information more so than people low in neuroticism (Martin, Ward, & Clark, 1983). Therefore, it is possible that two people may experience the identical event yet only one may report it as a stressor. In addition, questions about stressors and affect were asked in the same interview. As a result, we cannot distinguish any potential causal factors for this association or whether a third factor, such as the prospect of engaging in an unpleasant activity where stressors are inevitable, was driving both the occurrence of stressor and negative affect. Future momentary sampling studies can explore the effects of possible memory biases and the sequential nature of these experiences.

Finally, even though participants were selected from a national cohort of U.S. adults, the generalizability of our study is limited due to the fact that most participants were Caucasian and had higher socioeconomic status than the national average. Future studies should include minority groups and individuals of lower income levels in light of work demonstrating that people with low socio-economic status tend to have heightened reactivity to stress (Baum, Garofalo, & Yali, 1999).

Future directions

The associations between personality and stressor-related affect have important implications for mental and physical health. Greater changes in affect in responses to stress are associated with poorer physical and mental health outcomes (e.g., Charles et al., 2013; Piazza et al., 2013). Personality traits also influence the development and progression of disease and overall health throughout the life span (Sutin, Zonderman, Ferrucci, & Terracciano, 2013; Weston, Hill, & Jackson, 2015). For example, high levels of neuroticism have been linked to higher disease development and the development of chronic conditions (Hampson & Friedman, 2008; Charles, Gatz, Kato, & Pedersen, 2008), whereas high levels of conscientiousness predict reduced disease progression (e.g., HIV) via lower perceived stress levels (O’Cleirigh, Ironson, Weiss, & Costa, 2007), and better cognitive functioning such as a decreased incidence of mild cognitive impairment and reduced hazard of developing Alzheimer’s Disease (Wilson, Schneider, Arnold, Bienias, & Bennett, 2007). Finally, studies examining longevity have found protective effects of conscientiousness, extraversion, and openness (Hampson & Friedman, 2008; Ploubidis & Grundy, 2009). The current findings suggest that stressor-related affect may be another potential mechanism through which personality factors influence health. As researchers continue to examine potential

mechanisms that may explain why personality traits are related to health outcomes such as health behaviors (e.g. Turiano et al., 2015), future work may also benefit by examining emotion regulation strategies.

Conclusion

Stressors and the affect associated with their occurrence are strongly related to well-being. People who experience greater increases in negative affect and greater decreases in positive affect in response to a stressor are more likely to have subsequent mental and physical health problems. Results of this study indicate that personality traits are differentially associated with positive and negative stressor-related affect; neuroticism, conscientiousness and openness to experience uniquely contribute to the degree of stressor-related negative affect, and stressor-related appraisals partially account for this relationship. Only agreeableness relates to the degree of stressor-related positive affect, but how people appraise their daily stressors are unrelated to this association. These findings suggest that these differences in stressor-related affect may serve as one potential mechanism through which personality traits impact health and emphasize the need for future studies to examine not just changes in negative, but also changes in positive affect in response to stress.

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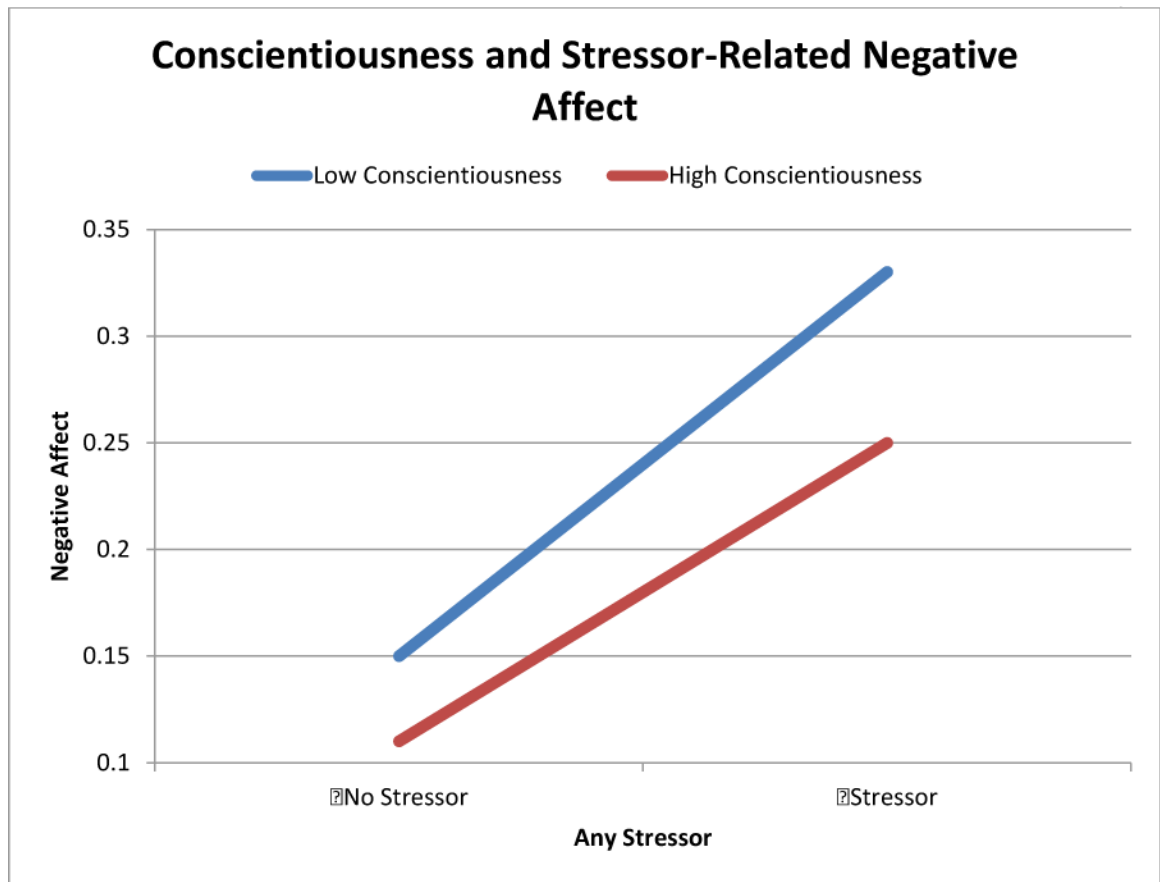


Figure 1.
Influence of Conscientiousness on the Relationship Between Stress and Negative Affect

Table 1

Correlations Among all Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Daily Negative Affect	–											
2. Daily Positive Affect	-0.489	–										
3. Conscientiousness	-0.142	0.240	–									
4. Agreeableness	-0.041	0.217	0.259	–								
5. Openness	-0.060	0.193	0.256	0.319	–							
6. Extraversion	-0.122	0.327	0.242	0.496	0.517	–						
7. Neuroticism	0.263	-0.333	-0.192	-0.149	-0.224	-0.242	–					
8. Average Stress	0.344	-0.274	-0.073	-0.043	0.067	-0.032	0.167	–				
9. Number of Stressors	0.380	-0.221	-0.037	-0.029	0.031	-0.020	0.008	0.029	–			
10. Age	-0.118	0.175	-0.044	0.102	0.010	0.062	-0.220	-0.229	-0.135	–		
11. Education	0.011	-0.049	0.017	-0.096	0.198	-0.033	-0.099	0.204	0.129	-0.118	–	
12. Gender (Ref=male)	0.069	0.000	0.143	0.360	-0.084	0.105	0.145	0.124	0.059	-0.030	-0.155	–

Note: Significant values are indicated in bold and are significant at the $p < .001$ level

Table 2

Multi-level Models Predicting Negative Affective Stressor Reactivity

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Conscientiousness	SE	Extraversion	SE	Openness	SE	Neuroticism	SE	Agreeableness	SE	All traits	SE
Intercept	0.189	0.014	0.195	0.014	0.181	0.014	0.164	0.014	0.200	0.014	0.174	0.014
Average Stress	0.141	0.012	0.149	0.012	0.154	0.012	0.129	0.011	0.150	0.012	0.123	0.011
Gender (Ref=female)	-0.017	0.010	-0.015	0.010	-0.007	0.010	0.003	0.010	-0.015	0.010	-0.010	0.010
Age	-0.001	0.000	-0.001	0.000	-0.001	0.000	0.000	0.000	-0.001	0.000	0.000	0.000
Education	-0.026	0.006	-0.029	0.006	-0.024	0.006	-0.019	0.006	-0.030	0.006	-0.021	0.006
Conscientiousness	-0.068	0.011									-0.051	0.012
Stressor * Conscientiousness	-0.042	0.007									-0.026	0.007
Extraversion			-0.048	0.004							-0.037	0.010
Stressor * Extraversion			-0.024	0.005							-0.002	0.006
Openness					-0.018	0.010					0.031	0.011
Stressor * Openness					-0.038	0.008					-0.023	0.007
Neuroticism							0.075	0.008			0.064	0.009
Stressor * Neuroticism							0.050	0.005			0.043	0.005
Agreeableness									-0.022	0.011		
Stressor * Agreeableness									-0.003	0.006		

Note: Significant values are indicated in bold and are significant at the p<.001 level

Table 3

Multi-level Models Predicting Positive Affective Stressor Reactivity

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
	Conscientiousness gamma	SE	Extraversion gamma	SE	Openness gamma	SE	Neuroticism gamma	SE	Agreeableness gamma	SE
Intercept	2.76	0.04	2.73	0.04	2.84	0.04	2.85	0.04	2.70	0.04
Average Stress	-0.30	0.04	-0.34	0.03	-0.36	0.04	-0.28	0.03	-0.33	0.04
Gender (Ref=female)	0.00	0.03	0.00	0.03	-0.06	0.03	-0.08	0.03	0.04	0.03
Age	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Education	0.01	0.02	0.02	0.02	-0.01	0.02	-0.02	0.02	0.03	0.02
Conscientiousness	0.42	0.04								
Extraversion			0.43	0.03						
Openness					0.30	0.03				
Neuroticism							-0.36	0.03		
Agreeableness									0.33	0.03
Stressor * Agreeableness									-0.05	0.01

Note: Significant values are indicated in bold and are significant at the $p < .001$ level

Table 4

Correlations Among Variables of Interest

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Stressor-related negative affect slope	–														
2. Stressor-related positive affect slope	-0.042	–													
3. Neuroticism	0.325	0.065	–												
4. Conscientiousness	-0.197	-0.071	-0.192	–											
5. Openness	-0.120	-0.079	-0.224	0.256	–										
6. Extraversion	-0.159	-0.136	-0.242	0.242	0.517	–									
7. Agreeableness	-0.045	-0.131	-0.149	0.259	0.319	0.496	–								
8. Stressor Severity	0.326	-0.055	0.238	-0.059	-0.117	-0.110	0.031	–							
9. Daily Routine	0.257	-0.032	0.109	-0.083	-0.029	-0.070	-0.075	0.323	–						
10. Finances	0.217	-0.016	0.074	-0.078	0.037	-0.054	-0.056	0.129	0.210	–					
11. Feeling about self	0.372	-0.003	0.186	-0.137	-0.084	-0.146	-0.071	0.250	0.249	0.259	–				
12. Perception by others	0.179	-0.021	0.092	-0.08	0.018	-0.051	-0.114	0.104	0.241	0.19	0.386	–			
13. Personal health	0.317	-0.018	0.117	-0.068	0.025	-0.025	0.029	0.196	0.274	0.154	0.286	0.151	–		
14. Others health	0.068	0	-0.033	0.008	-0.025	-0.002	0.091	0.162	0.076	0.074	0.107	0.103	0.168	–	
15. Plans for future	0.23	-0.007	0.058	-0.032	0.046	-0.024	-0.009	0.187	0.234	0.373	0.305	0.243	0.152	0.166	–
16. Sense of control	-0.082	-0.002	-0.068	0.024	0.069	0.091	-0.034	-0.143	-0.056	-0.041	-0.003	0.08	-0.019	-0.168	-0.094

Note: Significant values are indicated in bold and are significant at the $p < .01$ level

Table 5

OLS regression with NA reactivity slopes regressed on Stressor Severity and Appraisals

Variable	Conscientiousness						Neuroticism						Openness					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE
Intercept	0.053	0.005	-0.023	0.005	-0.018	0.005	0.000	0.005	-0.059	0.005	-0.045	0.005	0.03	0.005	-0.044	0.005	-0.034	0.005
Gender (Ref=female)	-0.119	0	-0.090	0.000	-0.065	0.000	-0.046	0.000	-0.034	0.000	-0.021	0.000	-0.108	0	-0.082	0	-0.056	0
Age	-0.114	0.003	-0.092	0.003	-0.113	0.003	-0.083	0.003	-0.070	0.003	-0.095	0.003	-0.101	0.003	-0.086	0.003	-0.106	0.003
Conscientiousness	-0.207	0.006	-0.182	0.006	-0.132	0.005												
Neuroticism							0.311	0.004	0.253	0.004	0.200	0.004						
Openness													-0.106	0.005	-0.072	0.005	-0.068	0.005
Stressor Severity			0.324	0.005	0.039		0.288	0.005	0.184	0.005			0.184	0.005	0.328	0.005	0.212	0.005
Appraisals																		
Daily Routine					0.054	0.004					0.062	0.004					0.055	0.004
finances					0.058	0.006					0.059	0.006					0.059	0.006
feelings about self					0.215	0.005					0.209	0.005					0.219	0.005
Perceptions by others					0.017	0.005					0.015	0.005					0.02	0.005
Personal health					0.145	0.006					0.135	0.006					0.156	0.006
others health					-0.064	0.004					-0.054	0.004					-0.071	0.004
Plan for future					0.055	0.005					0.054	0.005					0.057	0.005
Sense of Control					-0.047	0.003					-0.042	0.003					-0.051	0.003

Note: Significant values are indicated in bold and are significant at the p<.05 level