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Personality Traits Predict Long-Term Physical Health via Affect Reactivity to Daily Stressors

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Abstract

Researchers hypothesize that how people react to daily stressful events partly explains the relationship between personality and health, yet no study has examined longitudinal associations between these factors. The current study focused on the role of negative affect reactivity to daily stressful events as a mediating pathway between personality and physical health outcomes using three waves of data spanning 20 years from a nationwide probability sample of 1,176 adults. Results indicated that negative affect reactivity partially mediated personality and physical health. Wave 1 neuroticism was associated with greater negative affect reactivity at Wave 2, which predicted the development of chronic conditions and functional limitations at Wave 3. Higher conscientiousness at Wave 1 was associated with less negative affect reactivity at Wave 2, which predicted better physical health at Wave 3. These findings highlight the usefulness of using a daily-stress framework for understanding how personality impacts health over time, which has important implications for stress management and disease prevention.

Keywords

personality, physical health, daily stress, stress reactivity, negative affect, open data

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Personality traits are robust predictors of physical health outcomes later in life (Friedman & Kern, 2014; Hampson & Friedman, 2008). One pathway that may explain the personality–health connection is how people react to daily stressful experiences (Bolger & Zuckerman, 1995; Hampson, 2012). Greater negative affect (NA) on days when stressors occur compared with days that are stressor free (hereafter referred to as *NA reactivity*) is associated with increases in future morbidity and mortality (Chiang et al., 2018; Piazza et al., 2013). However, no study has examined NA reactivity as a mediating pathway linking personality traits and the development of future physical health outcomes. In the current study, we used three waves of a large national study to examine the role of NA reactivity as a mediating pathway between personality and physical health outcomes over a 20-year period.

Personality and Health

Studies that examine associations between the Big Five personality traits and physical health have focused extensively on conscientiousness. People who are conscientious (characterized by being goal oriented, well organized, and responsible) live longer, healthier lives. Conscientiousness predicts lower disease incidence (Goodwin & Friedman, 2006), better cognitive health (Wilson et al., 2015), and increased longevity (Turiano et al., 2015). From a stress framework, conscientiousness may exert a protective effect on physical health for several reasons. Conscientious individuals report

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fewer daily hassles (Leger et al., 2016) and less job strain (Zellars et al., 2006). They also appraise daily stressful events as less severe (Leger et al., 2016), have high confidence in their ability to deal with stressors (Gartland et al., 2012), and have less of a dip in emotional well-being when they experience a stressful event (Gartland et al., 2014).

Neuroticism, a tendency to experience frequent negative emotions and emotional instability, is also linked extensively to physical health. In general, individuals high in neuroticism are at a greater risk for developing illness and chronic conditions (Goodwin & Friedman, 2006; Hampson, 2012) as well as an elevated risk of mortality (Almada et al., 1991). One hallmark of neuroticism is the tendency to have strong emotional reactions to stressful situations. People high in neuroticism experience longer lasting and more intense negative emotions when stressors occur (Suls & Martin, 2005). This heightened emotional activation and instability results in wear and tear on physiological systems, which in turn leads to increased morbidity and susceptibility to disease (McEwen & Stellar, 1993). Multiple studies have supported this differential-reactivity model, finding that higher levels of neuroticism are associated with greater reactivity to stressors (e.g., Bolger & Schilling, 1991; Mroczek & Almeida, 2004).

Studies examining extraversion (high levels of positive affect and sociability), agreeableness (characterized by being kind and good-natured), and openness (the tendency to be imaginative or creative) are less common and yield mixed findings. A coordinated analysis of 15 studies found that agreeableness is associated with reduced mortality risk (Graham et al., 2017). Yet certain aspects of low agreeableness, such as hostility and the tendency to be angry, are associated with worse physical health (Miller et al., 1996), and still other studies have found no association (Turiano et al., 2012). Generally, research has found no relationship between openness and health (Turiano et al., 2012; Weiss & Costa, 2005). Thus, these three dimensions of personality may be less predictive of health than conscientiousness and neuroticism.

Affective Reactivity to Stressors as a Mechanism

Given that some personality traits are predictors of future health outcomes, it is important to identify mechanisms that explain this relationship. Researchers have identified multiple pathways that link personality and health, including health behaviors, psychophysiology, and situation selection (for a review, see Smith, 2006). The current study focused on a particular mechanism: how people react to stressful experiences. Emotional reactions to even minor daily stressors, such as having an argument or missing a work deadline, can have lasting impacts on health. Greater increases in NA on days when stressors occur are linked with a range of health outcomes, including chronic medical conditions (Piazza et al., 2013), inflammation (Sin et al., 2015), allostatic load (Piazza et al., 2019), and a greater likelihood of mortality (Mroczek et al., 2013).

Interactional models of personality propose that individual differences in personality may influence how people appraise and react to daily stressful events (Bolger & Zuckerman, 1995; Smith, 2006). These differences, in turn, lead to the development of disease and poor health. Neuroticism has been extensively linked with increased NA reactivity to daily stressors (e.g., Bolger & Schilling, 1991). Although fewer studies have investigated the link between other personality traits and reactivity to daily stress, some have found that higher levels of conscientiousness, extraversion, and openness are related to less NA reactivity to daily stressors (Leger et al., 2016). Despite theoretical suggestions that NA reactivity is a hypothesized pathway linking personality and health, no study has focused on NA reactivity as a mediator between personality traits and future physical health outcomes across adulthood.

Statement of Relevance

What makes some people prone to illness and poor health, whereas others live healthy lives? Personality traits are robust predictors of physical health and disease later in life. The important question is why individual differences in personality relate to physical health. This is the first study to show that negative affect reactivity (heightened negative affective reactions to daily stressful experiences) is a pathway that explains longitudinal associations between two personality traits (neuroticism and conscientiousness) and critically important physical health outcomes. Over time, negative affect reactivity may alter physiological processes and make people more vulnerable to disease. These findings highlight the usefulness of employing personality traits to identify people who are more reactive to daily stressors and employing negative affect reactivity as a point of intervention that could be instrumental in shaping future health. Fundamentally understanding these links is important for preventing illness and encouraging long and healthy lives.

The Current Study

In the current study, we used a national database to investigate the link between personality and physical health by examining whether NA reactivity mediates the relationship between personality and physical health outcomes over a 20-year period. We first sought to build on a large body of work linking personality traits with future physical health outcomes. We hypothesized that low levels of conscientiousness and high levels of neuroticism would independently predict three self-reported physical health outcomes: number of chronic conditions, activities of daily living (ADLs), and instrumental activities of daily living (IADLs). We made no specific predictions about extraversion, agreeableness, or openness. Second, we hypothesized that NA reactivity would mediate the relationship between the aforesaid personality traits and health outcomes. We examined both chronic conditions and levels of functional limitation given the encompassing nature of these constructs. Self-reports of chronic conditions and levels of functional impairment correlate strongly with objective measures of disease and are used to predict health needs, costs, and future increases in morbidity and mortality (Avelino-Silva et al., 2014; Henderson et al., 2009). The current study is novel in that it tested longitudinal associations among personality traits, NA reactivity, and physical health in a large sample of men and women whose ages ranged across much of the adult life span and who contributed three waves of data across 20 years.

Method

Sample and design

Participants completed Waves 1 to 3 of the Midlife in the United States (MIDUS) survey. Participants were recruited from a random-digit-dialing sample of nationally representative adults between the ages of 25 and 75 years. Data were collected in 1995–1996 (MIDUS I; Wave 1), 2004–2006 (MIDUS II; Wave 2), and 2013–2014 (MIDUS III; Wave 3). During Wave 2, a subset of the MIDUS II participants (n = 2,022) also completed the National Study of Daily Experiences (NSDE II), a daily-diary study in which participants were contacted every evening for 8 consecutive days and asked questions about their everyday experiences. Participants in the present analyses had personality measures at Wave 1, reported experiencing at least one stressor during NSDE II, and had complete data for all health indicators at Wave 3. The final sample consisted of 1,176 participants. Given this sample size, we determined that there was adequate power (> .90) for detecting small effects (r = .10) for the relationship among personality traits, NA reactivity, and health outcomes.

At Wave 1, participants were 25 to 74 years old (M = 46.56), 57% were female, and 41% had a college degree. Compared with participants who had complete data, participants with incomplete data had higher levels of ADLs, $t(6306) = 7.04$, $p < .001$, and IADLs, $t(6306) = 6.14$, $p < .001$, assessed in MIDUS I, and higher NA reactivity, $t(1812) = 6.95$, $p < .001$, assessed in NSDE II. The MIDUS and NSDE protocol were approved by the institutional review boards of the University of Arizona and The Pennsylvania State University, respectively, and participants provided informed consent.

Measures

Wave 1 demographics. Sociodemographic variables included age, gender, and education because of known associations with personality, affect reactivity, and health outcomes.

Wave 1 personality. Personality traits were assessed in MIDUS I through adjectives describing each Big Five personality trait (Prenda & Lachman, 2001). Adjectives included "organized," "responsible," "hardworking," and "careless" (conscientiousness); "moody," "worrying," "nervous," and "calm" (neuroticism); "outgoing," "friendly," "lively," "active," and "talkative" (extraversion); "creative," "imaginative," "intelligent," "curious," "broad-minded," "sophisticated," and "adventurous" (openness); and "helpful," "warm," "caring," "softhearted," and "sympathetic" (agreeableness). Participants were asked how much each adjective described them on a scale from 1 (*not at all*) to 4 (*a lot*). Mean scores were calculated for the averages of each trait after reverse-scoring appropriate items. The Big Five scale was developed from a combination of existing personality-trait inventories (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 coefficients for each personality trait were as follows: conscientiousness: α = .58, neuroticism: α = .74, extraversion: α = .76, openness: α = .77, and agreeableness: α = .80.

Wave 2 daily stressors. Daily stressors were measured using the Daily Inventory of Stressful Events (Almeida et al., 2002). Participants were asked whether they had experienced any number of stressors in the past 24 hr (1 = yes, 0 = no). Stressors included having an argument with someone, almost having an argument but avoiding it, experiencing a stressful event at work or school, experiencing a stressful event at home, experiencing discrimination, having something bad happen to a close friend, and having anything else bad or stressful happen. Items were summed for each day. Participants reported between

zero and five stressors on each day of the interview (M = 0.57, SD = 0.41). Given the skewed nature of the data (participants reported experiencing two or more stressors on only 10% of days), participants were categorized as either having experienced a stressor on a given day (1) or not (0).

Wave 2 daily NA. Daily NA was assessed using scales developed for MIDUS (Mroczek & Kolarz, 1998). Participants were asked how much of the time over the past 24 hr they felt nervous, worthless, hopeless, lonely, afraid, jittery, irritable, ashamed, upset, angry, frustrated, restless or fidgety, so sad that nothing could cheer them up, and that everything was an effort. Participants rated their response to each item on a 5-point scale from 0 (*none of the time*) to 4 (*all of the time*). Scores were averaged across the 13 items for each day. Cronbach's αs for each day ranged between .83 and .86.

Wave 2 NA reactivity. NA reactivity was defined as the within-person slope representing the difference in levels of NA on days when stressors occur compared with days when no stressors occur. Following other daily-stress studies, we computed affect-reactivity scores for each participant using a two-level multilevel model in which the occurrence of a daily stressor was entered as a predictor of NA for a given person on a given day (e.g., Bolger et al., 1989). The Level 2 models adjusted for between-person stress exposure. This method calculates how much NA reactivity individuals experience while adjusting for average stressor exposure. The following models were generated using SAS PROC MIXED:

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

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}\left(\text{average stress}_{j}\right) + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10} + \mu_{1j}$$

In the Level 1 equation, NA_{ij} is the amount of negative affect on day i for person j. It is a function of daily negative affect for person j on a day when no stressors occur (β_{0j}) and the expected change in negative affect for person j on days when a stressor does occur (β_{1j}). The Level 2 equation includes the average number of stressors a person experiences as a covariate.

Waves 1 and 3 chronic condition. Participants were asked whether they had any of 27 chronic conditions (e.g., asthma, arthritis, ulcers, high blood pressure, stroke) in the past 12 months (Marmot et al., 1997). A composite score for the total number of chronic conditions was created by summing the number of endorsed conditions. As in previous research, participants with four or more chronic conditions were grouped together to prevent the data from being skewed. At Wave 3, 17% of participants had zero chronic conditions, 22% had one condition, 20% had two conditions, 14% had three conditions, and 27% had four or more conditions.

Waves 1 and 3 functional limitations. ADLs and IADLs assessed functional impairment (Katz et al., 1963). ADLs reflect a person's ability to function at a basic level on his or her own. The items included bathing or dressing oneself, walking one block, and climbing one flight of stairs (MIDUS I: M = 1.07, SD = 0.31; MIDUS III: M = 1.42, SD = 0.72). IADLs reflect a person's ability to engage in other everyday activities. These items included lifting or carrying groceries, climbing several flights of stairs, walking more than one mile, walking several blocks, engaging in moderate activity, and engaging in vigorous activity (MIDUS I: M = 1.44, SD = 0.62; MIDUS III: M = 1.97, SD = 0.93). For each item, participants indicated the extent to which their health limited their ability to perform this daily activity on a 4-point scale from 1 (*not at all*) to 4 (*a lot*). Scores were averaged; higher scores indicated greater functional impairment.

Analyses

First, we examined descriptive statistics for and correlations among personality traits, daily stress processes, and physical health outcomes. We then tested links between Wave 1 personality traits, Wave 2 daily NA reactivity, and Wave 3 health using negative binomial regressions for the outcome of chronic conditions and linear regressions for the outcome of functional limitations. All models adjusted for age, gender, education, and a baseline health variable (i.e., baseline chronic conditions or functional limitations). In a second step, affect-reactivity scores were entered into each model. In addition, a bootstrap procedure for mediation models examined whether Wave 2 affect reactivity mediated the relation between Wave 1 personality traits and Wave 3 health outcomes (Preacher & Hayes, 2008, pp. 13–54). We directly examined the statistical significance of the indirect effects by using 10,000 bootstrapped samples and 95% confidence intervals (CIs). Effects are considered statistically significant when a CI does not include zero. All continuous variables were converted into standard-deviation units for ease of interpretation.

Results

Correlations

Bivariate correlations between our main variables of interest are shown in Table 1. Wave 1 personality traits were related to Wave 2 NA reactivity and Wave 3 health outcomes. Specifically, higher levels of neuroticism were

Table 1. Descriptive Statistics for and Correlations Among Variables of Interest

Variable	Descriptive statistics	Correlations										
		2	3	4	5	6	7	8	9	10	11	12
1. Wave 1 neuroticism	M = 2.20, SD = 0.66	**–0.15**	**–0.17**	**–0.05**	**–0.17**	**0.28**	**–0.19**	**0.09**	–0.07	**0.14**	**0.12**	**0.13**
2. Wave 1 conscientiousness	M = 3.47, SD = 0.43	—	**0.23**	**0.29**	**0.23**	**–0.15**	0.03	**0.13**	0.07	**–0.09**	**–0.11**	**–0.11**
3. Wave 1 openness	M = 3.03, SD = 0.50		—	**0.33**	**0.48**	**–0.11**	–0.01	–0.05	**0.18**	–0.05	**–0.07**	**–0.12**
4. Wave 1 agreeableness	M = 3.48, SD = 0.47			—	**0.52**	–0.05	**0.08**	**0.28**	**–0.09**	**0.07**	**0.07**	**0.08**
5. Wave 1 extraversion	M = 3.22, SD = 0.55				—	**–0.13**	0.05	**0.09**	–0.03	–0.04	0.01	–0.04
6. Wave 2 NA reactivity	M = 0.15, SD = 0.09					—	**–0.11**	0.03	**–0.11**	**0.10**	**0.13**	**0.15**
7. Age (years)	M = 46.53, SD = 11.20						—	–0.01	–0.06	**0.20**	**0.22**	**0.34**
8. Gender (reference = male)	56.60%							—	**–0.15**	**0.13**	**0.16**	**0.17**
9. Education (years)	M = 7.42, SD = 2.43								—	**–0.12**	**–0.24**	**–0.24**
10. Wave 3 chronic conditions	M = 2.11, SD = 1.46									—	**0.39**	**0.48**
11. Wave 3 ADLs	M = 1.42, SD = 0.72										—	**0.84**
12. Wave 3 IADLs	M = 1.97, SD = 0.93											—

Note: Significant correlations are indicated in boldface ($p < .001$). NA = negative affect; ADL = activity of daily living; IADL = instrumental activity of daily living.

Table 2. Results From Negative Binomial and Ordinary Least Squares Regression Models With Personality Facets Predicting Physical Health Outcomes

	Chronic conditions		ADLs		IADLs	
Predictor	*b*	95% CI	*b*	95% CI	*b*	95% CI
Neuroticism	0.08**	[0.03, 0.14]	0.12***	[0.07, 0.18]	0.11***	[0.06, 0.16]
Conscientiousness	−0.06*	[−0.11, −0.01]	−0.11***	[−0.16, −0.06]	−0.09***	[−0.14, −0.05]
Openness	−0.04	[−0.09, 0.01]	−0.01	[−0.07, 0.04]	−0.01	[−0.07, 0.04]
Agreeableness	−0.01	[−0.07, 0.05]	0.00	[−0.05, 0.05]	−0.01	[−0.05, 0.04]
Extraversion	−0.04	[−0.09, 0.01]	−0.01	[−0.05, 0.05]	−0.04	[−0.08, 0.01]

Note: All models adjusted for age, gender, education, and Wave 1 health. ADL = activity of daily living; IADL = instrumental activity of daily living; CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$.

associated with greater NA reactivity to daily stressors, and higher levels of conscientiousness, openness, and extraversion were associated with lower NA reactivity. Agreeableness was not related to NA reactivity. Higher levels of neuroticism and agreeableness were associated with higher numbers of chronic conditions and greater levels of functional limitations (both ADLs and IADLs), and conscientiousness and openness were associated with lower numbers of chronic conditions and lower levels of functional limitations. Extraversion was not related to any physical health outcome. Wave 2 NA reactivity was also correlated with Wave 3 health outcomes; higher NA reactivity was associated with higher levels of chronic conditions, ADLs, and IADLs.

Personality and health

Results for adjusted models are reported in Table 2. After adjusting for age, gender, education, and Wave 1 chronic conditions or functional limitations, we found that conscientiousness and neuroticism remained significant predictors of Wave 3 physical health. Specifically, higher levels of conscientiousness were related to lower numbers of chronic conditions, fewer ADLs, and fewer IADLs 20 years later, whereas higher levels of neuroticism showed the opposite association. Wave 1 agreeableness, extraversion, and openness were not associated with Wave 3 physical health outcomes after we adjusted for demographic factors and baseline health.

Tests of mediation

Mediation models were conducted for each personality trait. Openness, extraversion, and agreeableness did not significantly predict Wave 3 physical health, and there was no significant indirect effect of Wave 2 NA reactivity. Neuroticism and conscientiousness were the only personality traits that predicted Wave 3 health outcomes after we adjusted for demographic factors and baseline health. Figure 1 shows the mediation models that tested the indirect effect of NA reactivity between neuroticism and each physical health outcome, and Figure 2 shows the same mediation models with conscientiousness as the independent variable.

Neuroticism. Wave 2 NA reactivity was entered into the model examining the effect of Wave 1 neuroticism on Wave 3 health outcomes. The total effect of neuroticism on chronic conditions (β = 0.08, 95% CI = [0.03, 0.14]), ADLs (β = 0.12, 95% CI = [0.07, 0.18]), and IADLs (β = 0.11, 95% CI = [0.06, 0.16]) was significant. The direct effect of neuroticism on chronic conditions (β = 0.07, 95% CI = [0.01, 0.12]), ADLs (β = 0.10, 95% CI = [0.04, 0.15]), and IADLs (β = 0.09, 95% CI = [0.04, 0.14]) was reduced but still significant. Bootstrap analyses revealed that there was a significant indirect effect for NA reactivity between neuroticism and chronic conditions (β = 0.02, 95% CI = [0.01, 0.03]), ADLs (β = 0.02, 95% CI = [0.01, 0.04]), and IADLs (β = 0.02, 95% CI = [0.01, 0.04]), indicating that the longitudinal association between neuroticism and all health outcomes was mediated by NA reactivity. The percentage of the total effect of neuroticism on physical health that was mediated by NA reactivity (i.e., the ratio of the indirect effect to the total effect; P_M) was 25% for chronic conditions, 17% for ADLs, and 18% for IADLs. In sum, high levels of neuroticism were associated with greater NA reactivity, which in turn was related to increases in future physical health problems.

Conscientiousness. As with neuroticism, NA reactivity was entered into the model examining the effect of conscientiousness on future health outcomes. The total effect of conscientiousness on chronic conditions (β = −0.06, 95% CI = [−0.011, −0.01]), ADLs (β = −0.11, 95% CI = [−0.16, −0.06]), and IADLs (β = −0.09, 95% CI = [−0.14, −0.05]) was significant. The direct effect of conscientiousness on chronic conditions (β = −0.05, 95% CI = [−0.10, −0.01]), ADLs (β = −0.10, 95% CI = [−0.15, −0.05]), and

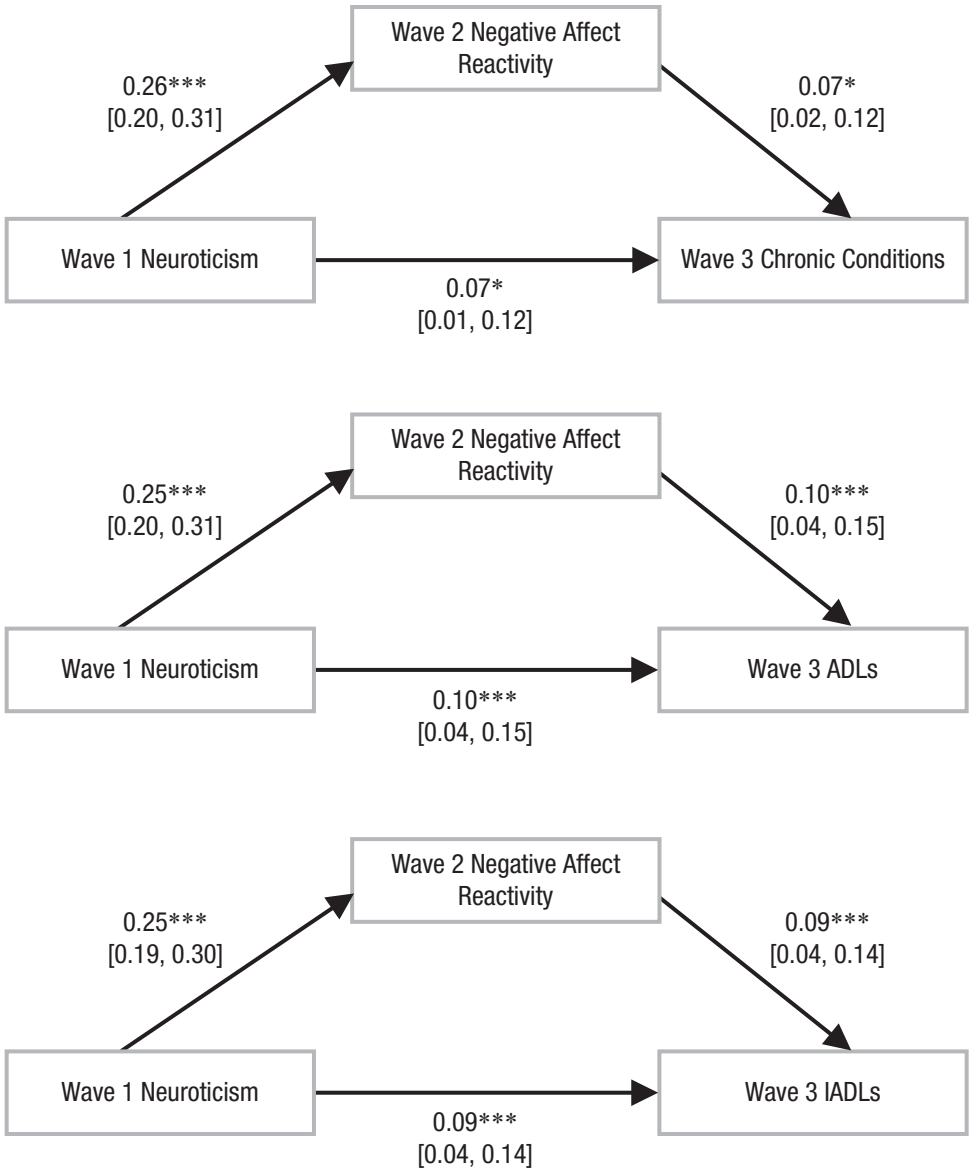

Fig. 1. Mediation models showing the influence of negative affect reactivity at Wave 2 on the relationship between neuroticism at Wave 1 and three physical health outcomes at Wave 3: chronic conditions (top), activities of daily living (ADLs; middle), and instrumental activities of daily living (IADLs; bottom). The direct effect is shown below each model. All estimates are standardized coefficients. Values in brackets are 95% confidence intervals. Asterisks indicate significant path estimates (*$p < .05$, ***$p < .001$).

IADLs (β = −0.08, 95% CI = [−0.13, −0.03]) was reduced but still significant. Bootstrap analyses revealed that there was a significant indirect effect for NA reactivity between conscientiousness and chronic conditions (β = −0.01, 95% CI = [−0.02, −0.01]), ADLs (β = −0.01, 95% CI = [−0.03, −0.01]), and IADLs (β = −0.01, 95% CI = [−0.02, −0.01]), indicating that the longitudinal association between conscientiousness and all health outcomes was mediated by NA reactivity. The percentage of the total effect of conscientiousness on physical health that was mediated by NA reactivity (P_M) was 17% for chronic conditions, 9% for ADLs, and 11% for IADLs. In sum, high levels of conscientiousness were associated with less NA reactivity, which in turn was related to better health.

Discussion

Chronic illness costs the United States billions of dollars annually in health-care expenses and is the leading cause of disability and death (Centers for Disease Control and

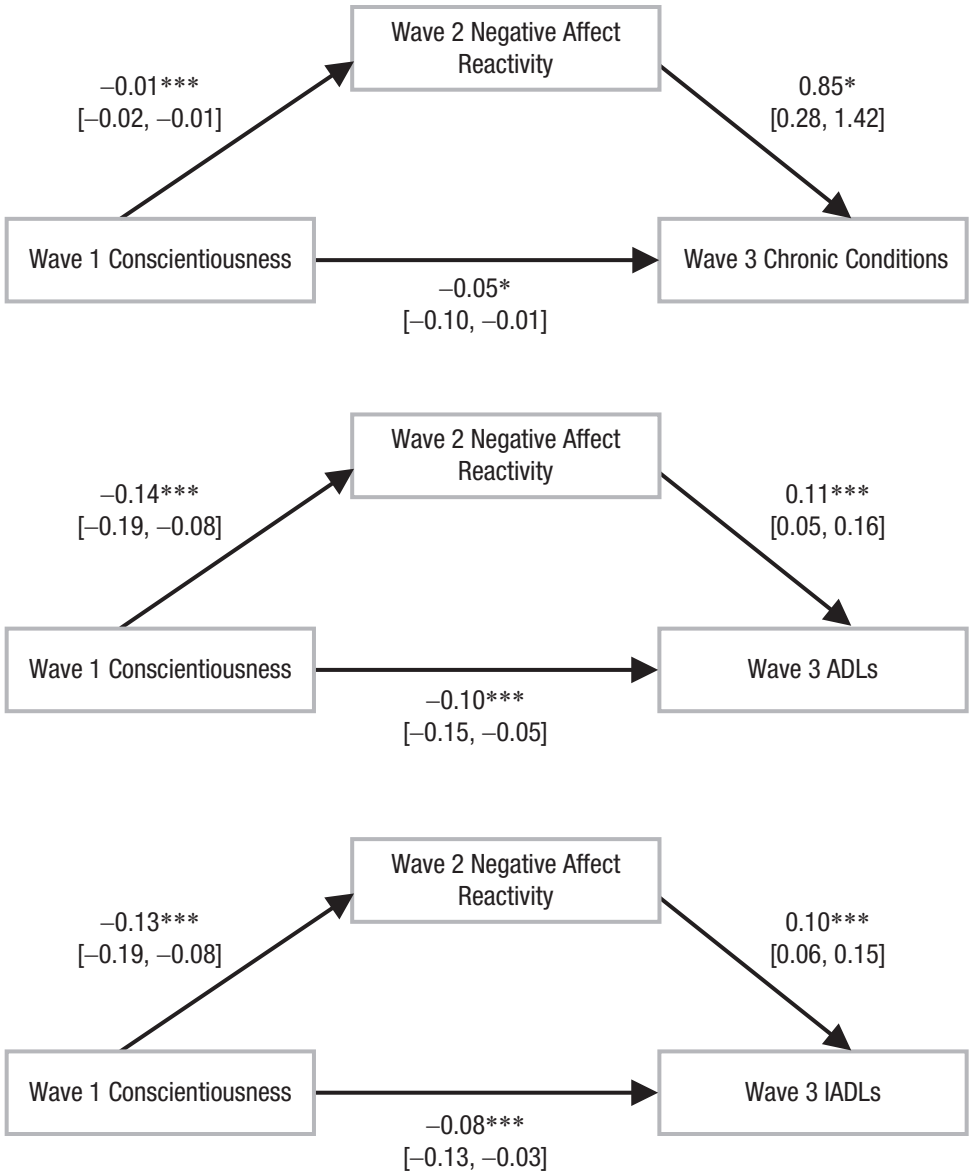

Fig. 2. Mediation models showing the influence of negative affect reactivity at Wave 2 on the relationship between conscientiousness at Wave 1 and three physical health outcomes at Wave 3: chronic conditions (top), activities of daily living (ADLs; middle), and instrumental activities of daily living (IADLs; bottom). The direct effect is shown below each model. All estimates are standardized coefficients. Values in brackets are 95% confidence intervals. Asterisks indicate significant path estimates (*$p < .05$, **$p < .01$, ***$p < .001$).

Prevention, 2014). Functional limitation predicts further health outcomes including increased need for medical care and mortality (Avelino-Silva et al., 2014). This is the first study to examine daily NA reactivity as a pathway that explains longitudinal associations between personality traits and critically important physical health outcomes. In a large national sample of adults observed across a 20-year period, higher levels of neuroticism were associated with worse future physical health, and higher levels of conscientiousness were associated with better physical health. Furthermore, these associations were partially mediated by NA reactivity to daily stressors, indicating that part of the reason that people high in neuroticism and low in conscientiousness had worse physical health later in life was that they had stronger negative reactions to stress in their daily lives. These results provide support for studying personality through a differential-stress-reactivity framework (i.e., Bolger & Zuckerman, 1995) and highlight the important role of emotional responses to daily events as a mechanism that accounts for the robust relationship between personality traits and physical health.

Our findings are consistent with and expand on existing studies on the separate relationships between personality traits and physical health, between personality and NA reactivity to daily stressors, and between NA reactivity and health. Remarkably, this is the first time all of these pieces have been put together in a longitudinal study. First, we replicated earlier findings in the MIDUS data set using prospective Wave 3 data while controlling for baseline health, demonstrating that neuroticism is associated with an increased number of chronic conditions and greater functional limitations, whereas conscientiousness is associated with decreased conditions and limitations (Goodwin & Friedman, 2006). Also consistent with prior studies (e.g., Turiano et al., 2015), our results showed no relationship between extraversion, agreeableness, or openness and these physical health outcomes. Second, our findings extend a previous study that demonstrates links between personality traits and NA reactivity assessed concurrently (Leger et al., 2016). By assessing personality traits at Wave 1 and NA reactivity at Wave 2, we demonstrated that these links stand the test of time. Finally, our study also supports previous findings that heightened NA reactivity to daily stressors is associated with physical health outcomes in the long term, including the development of chronic conditions and worsening of functional limitations (Piazza et al., 2013).

In support of our main hypothesis, our analyses showed that heightened NA reactivity to daily stressors partially explained the relationship between personality traits and physical health outcomes. This contribution is novel in that it links personality traits with both future physical health outcomes and a psychological mediator in a single prospective investigation across two decades and three waves of data collection. People who are high in neuroticism and low on conscientiousness are more reactive to events in daily life. Multiple mechanisms may explain how neuroticism exacerbates and conscientiousness protects from adverse reactions to daily stressors. People high in neuroticism appraise stressors as more severe, see stressors as a greater threat to themselves, and use suboptimal coping strategies such as blame and denial (Penley & Tomaka, 2002). People high in conscientiousness appraise stressors as less severe, perceive themselves as being able to handle stressors competently, and are able to maintain positive affect after a stressful experience (Gartland et al., 2012, 2014). Over time, repeated heightened reactions to daily stressful events may cause wear and tear on bodily symptoms, making people more vulnerable to disease (McEwen & Stellar, 1993). How people react to daily stressful events has long been hypothesized to be a conduit through which personality traits may impact physical health (Bolger & Zuckerman, 1995), and this is the first study to empirically test and find support for this idea.

These results are qualified by a few limitations. First, given the observational nature of the data, we are unable to make definitive claims about causal associations between personality, NA reactivity, and physical health. However, personality is generally considered to be a relatively stable characteristic, and theoretical models of personality and health development suggest that personality predicts health and well-being through stress reactivity compared with the reverse (Bolger & Zuckerman, 1995). Additionally, one major strength of the study is that we examined these associations in a prospective, longitudinal design over three separate time points across a 20-year period. Adjusting for relevant covariates including physical health at Wave 1 reinforces our conclusions. Another limitation has to do with how personality and health were measured. First, the scale used to measure personality was brief, resulting in low internal consistencies for conscientiousness. Despite the small number of items used, however, this measure has 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). Second, health measures used in this study have strong predictive outcomes in the literature but are nonetheless limited by self-reports. In future work, researchers should extend these findings by examining other health outcomes, including cognitive health, biomarkers, and mortality. In addition, researchers could examine physiological responses to stressors, including cortisol and cardiovascular reactivity to both daily stressors and laboratory-based stress tasks (e.g., Stawski et al., 2013). Finally, most participants in this study were White and well-educated, so generalizability is limited. Replications across samples of more varied race, ethnicity, and socioeconomic status should be included in future studies.

Conclusion

This study found that NA reactivity was one mechanism that can explain the associations between personality and future physical health outcomes. These findings illustrate that people high in neuroticism or low in conscientiousness have worse physical health later in life in part because of heightened affective reactions to everyday stressful experiences. Our results highlight the efficacy of using personality traits to identify people who are more reactive to daily events and the potential to target NA reactivity as a point of intervention that could be instrumental in shaping future physical health.

Transparency

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Author Contributions

K. A. Leger developed the study idea. K. A. Leger and N. A. Turiano analyzed and interpreted the data. K. A. Leger and W. Bowling drafted the manuscript. J. L. Burris, N. A. Turiano, and D. M. Almeida provided critical revisions. All the authors approved the final manuscript for submission.

Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

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Open Practices

Data were drawn from Waves 1 to 3 of the Midlife in the United States survey and Wave 2 of the National Study of Daily Experiences; all data are publicly available via the Inter-University Consortium for Political and Social Research (ICPSR) and can be accessed at https://www.icpsr.umich.edu/web/ICPSR/series/203/studies?archive=ICPSR&sortBy=7. Data sets used in the current study were (a) Midlife in the United States (MIDUS 1), 1995-1996; (b) Midlife in the United States (MIDUS 2): Daily Stress Project, 2004-2009; and (c) Midlife in the United States (MIDUS 3), 2013-2014. The design and analysis plans for the present study were not preregistered. This article has received the badge for Open Data. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

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