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Personality change predicts self-reported mental and physical health

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Abstract

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Keywords

change, health, physical, mental, reported, self, predicts, personality

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Personality Change Predicts Self-Reported Mental and Physical Health

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Abstract

Objective Personality dimensions are known to predict mortality and other health outcomes, but almost no research has assessed the effects of changes in personality traits on physical and mental health outcomes. In this article, we examined the effects of changes in the Big Five personality dimensions on health as assessed by the Short Form Health Survey (SF-36).

Method Respondents were 11,105 Australian adults aged 20–79 years (52.7% female). Latent difference score modeling was used to examine whether personality change over a 4-year period was associated with mental and physical health, and whether these effects were moderated by birth cohort.

Results Increases in Conscientiousness and Extraversion were found to be associated with improved mental and physical health, whereas increased Neuroticism was linked with poorer health. The nature of these associations varied significantly by birth cohort.

Conclusion The findings have implications for understanding how changes in personality traits over time are related to health, and could be used to aid the development of effective health promotion strategies targeted to specific personality traits and birth cohorts.

Keywords: Personality change, self-reported health, latent difference score modeling.

Personality Change Predicts Self-Reported Mental and Physical Health

Longitudinal research has demonstrated that personality traits are associated with a range of health outcomes, including self-reported health, hypertension, obesity, mental illness, and early mortality (e.g., Bogg & Roberts, 2004; Friedman et al., 1993; Hampson & Friedman, 2008; Kern & Friedman, 2008; Kubzansky, Martin, & Buka, 2009; Martin, Friedman, & Schwartz, 2007). In particular, Neuroticism (N) predicts poorer health, whereas Conscientiousness (C) appears to have positive effects on health; findings for Extraversion (E), Agreeableness (A), and Openness to Experience (O) have been less conclusive.

Most longitudinal research in this area has examined whether personality traits assessed at a single time point predict health outcomes several years later (e.g., Friedman et al., 1993, 1995; Hampson, Goldberg, Vogt, & Dubanoski, 2006; Shipley, Weiss, Der, Taylor, & Deary, 2007). This approach raises a number of important theoretical issues because it assumes that, while health has the potential for change over time, personality traits remain largely stable. The stability of personality is consistent with traditional conceptualizations of personality traits as reflecting enduring patterns of thoughts, feelings, and behaviors (Roberts, Walton, & Viechtbauer, 2006). However, recent empirical and theoretical work suggests that although personality traits are relatively stable over time, they have potential for change and continued development during the adult life span (e.g., Roberts & Mroczek, 2008). As elaborated below, personality change could reflect an interaction of maturational and social/environmental influences (e.g., Roberts et al., 2006).

Personality change may have implications for understanding the relationships between personality and health. This is because variations in traits such as N and C over time have the potential to affect health either directly (e.g., through physiological changes) or indirectly (e.g., via changes in health behaviors or social support), but this is not captured in the vast majority of studies. Two studies recently found that changes in some personality traits, particularly N and C, are associated with measures of health and well-being (Turiano et al., 2012; Mroczek & Spiro, 2007). The objective of the present article is to extend these studies and examine whether changes in personality traits over time are associated with self-reported mental and physical health.

Longitudinal Associations between Personality Trait Levels and Health

Longitudinal studies reveal that personality traits assessed at one time point predict subsequent health outcomes. N predicts health problems such as hypertension (Goodwin & Friedman, 2006; Spiro, Aldwin, Ward, & Mroczek, 1995), mental illness (Kotov, Gamez, Schmidt, & Watson, 2010), and increased mortality (Chapman, Fiscella, Kawachi, & Duberstein, 2010; Mroczek & Spiro, 2007; Shipley et al., 2007; Wilson et al., 2005). There is a variety of ways through which N could negatively influence health. One possibility relates to increased stress reactivity, since individuals with higher N scores show a tendency toward greater emotional and physiological responses to stressors (Lahey, 2009). The heightened stress response is associated with elevated sympathetic nervous system activity and activation of the hypothalamic-pituitary-adrenal axis, which over time could place a strain on the cardiovascular system and contribute to conditions such as hypertension and heart disease (Lahey, 2009). In addition, there is also evidence that high N is associated with less adaptive coping strategies (e.g., disengagement) in response to stressful situations (Connor-Smith & Flachsbart, 2007; Lahey, 2009). These have the potential to exacerbate the effects of heightened stress reactivity and impair health. There is also evidence linking higher N with reduced social support, perhaps reflecting difficulties initiating and maintaining supportive social relationships (Connor-Smith & Flachsbart, 2007). Social support is important for adaptive coping and is an important predictor of health and well-being. Finally, N could influence health indirectly, since individuals with higher levels of N are more likely to engage in behaviors that compromise health, including smoking and alcohol consumption (Lahey, 2009), and less likely to engage in behaviors that benefit health, such as physical activity (Courneya & Hellsten, 1998) and medication adherence (Hampson & Friedman, 2008). Over time, these behavioral trends could compromise physical and mental health.

In contrast, C tends to have protective effects on health, reducing the risk of health conditions such as obesity and hypertension (Brummett et al., 2006; Goodwin & Friedman, 2006; Hampson et al., 2006), depression and anxiety (Kotov et al., 2010), and early mortality (Friedman et al., 1993, 1995; Hampson et al., 2006; Martin et al., 2007). It has been theorized, and subsequently supported by empirical findings, that C could exert these effects by increasing health-enhancing behaviors such as physical activity, healthy eating patterns, and health screening, and the avoidance of health-compromising behaviors such as smoking and alcohol consumption (Bogg & Roberts, 2004; Courneya & Hellsten, 1998). The C factor comprises a number of different facets, but it appears as though responsibility, traditionalism, and self-control are the ones most strongly predictive of health behaviors (Bogg & Roberts, 2004).

A number of studies have also examined the relationships between E and health, but these have produced mixed results. For example, several studies have shown that high E has positive effects on health, with a reduced mortality risk (e.g., Wilson et al., 2005), improved mental health (Goodwin & Friedman, 2006), and a lower risk of physical conditions such as respiratory disease (Shipley et al., 2007) and stroke (Goodwin & Friedman, 2006). In contrast, other studies have linked high E with poorer health, as reflected by an elevated mortality risk (Shipley et al., 2007; Ploubidis & Grundy, 2009) and a greater risk of obesity (Magee & Heaven, 2011). Finally, other research indicates weak or nonsignificant associations between E and health outcomes such as mortality (Jorm et al., 1993; Martin et al., 2007; Taylor et al., 2009; Weiss & Costa, 2005). The divergent findings for E may reflect the specific aspects assessed in different studies. Higher sociability, for example, may be associated with increased social support, which may explain the positive relationships between high E and health. In contrast, greater sensation seeking may predict health risk behaviors such as smoking and alcohol consumption, which have negative effects on health (Ploubidis & Grundy, 2009). The association between E and health may also be influenced by other personality domains. For instance, Vollrath and Torgersen (2008) demonstrated that, when combined with low constraint or low C, E may have negative effects on health status. Those individuals were more likely to binge drink, drank more often, were more likely to smoke, and scored high on a general index of risky behaviors. Therefore, the associations between E and health remain unclear and are likely to be complex and reflect the specific domains of E examined.

The health implications of Agreeableness (A) and Openness to Experience (O) are less clear. O may contribute to lowered mortality and improved health (Ferguson & Bibby, 2012; Goodwin & Friedman, 2006; Taylor et al., 2009), perhaps because aspects of O such as intellect and cognitive ability are positively related with health (Ferguson & Bibby, 2012; Taylor et al., 2009). Although A has been linked with reduced odds of mortality in some studies (Girdon, 2004), other findings suggest that it does not predict health and well-being (Goodwin & Friedman, 2006; Weiss & Costa, 2005).

Personality is dynamic

As noted earlier, most longitudinal research in this area has examined personality at a single time point, which assumes that personality remains stable. This has received some support since personality traits are fairly stable over time, as reflected in retest correlations of personality measures (Caspi, Roberts, & Shiner, 2005). However, there is increasing support for the plasticity of personality traits over time. For example, recent longitudinal research demonstrates mean-level (i.e., average trait levels of the population) and individual changes in personality traits during adulthood, suggesting that personality is dynamic, with the possibility for continued changes across the entire life span, including old age (Caspi et al., 2005; Hopwood et al., 2011; Mroczek & Spiro, 2007; Roberts & DelVecchio, 2000; Roberts & Mroczek, 2008; Specht, Egloff, & Schmukle, 2011). For instance, N tends to decrease with age, whereas C and, to a lesser extent, A show gradual increases (Roberts & Mroczek, 2008). O increases in young adulthood, stabilizes somewhat during middle adulthood, and then declines in older age (Roberts & Mroczek, 2008; Specht et al., 2011). Changes in E during adulthood are less clear, with some evidence showing that E declines with age (McCrae et al., 1999; Specht et al., 2011). On the other hand, Roberts and Mroczek (2008) examined two aspects of E and found that social vitality declined over time, whereas social dominance increased.

A number of different explanations have been proposed to explain the potential for personality stability and plasticity during adulthood. Change mechanisms might include maturational processes and changing social roles in adulthood (McCrae & Costa, 2008; Roberts, Wood, & Caspi, 2008; Specht et al., 2011). McCrae and Costa (2008) argued that personality development over the individual's life span reflects intrinsic maturation. They proposed that there are biological factors that underlie the development of personality traits, with the majority of development occurring in the first third of life, but with some potential for continual development in later life (McCrae & Costa, 2008). Caspi et al. (2005) argued that individuals experience increasing psychological maturity from late adolescence to middle age, reflecting an increased capacity to be a productive member of society, marked by decisiveness and more considerate and charitable behaviors (Caspi et al., 2005). This explanation is consistent with mean-level reductions in N and increases in A and C observed during adulthood.

Personality change has also been explained with respect to environmental and social influences. That is, over the course of one's life, an individual will experience changes to his or her external environments (e.g., location of home and work, changing social environments) and roles in society (e.g., work or family roles), as well as changes brought about through significant life events such as loss of a spouse (Roberts & Mroczek, 2008; Specht et al., 2011). These environmental and social changes have the potential to influence personality change at an individual level. Changing social roles, particularly relating to work (e.g., leadership, status change) and marriage, are associated with specific expectations and demands of appropriate behavior (Caspi & Roberts, 2001; Roberts et al., 2008). These roles have the potential to promote personality change as the individual adopts new behaviors by observing others or themself doing things in different ways (Caspi & Roberts, 2001; Roberts et al., 2008). These factors explain individual-level changes in personality that are observed in different studies (e.g., Roberts et al., 2006).

Implications of Personality Change for Health

Changes in personality traits at an individual level have the potential to influence a range of outcomes, including one's health and well-being, but this has only been examined by two recent studies (Mroczek & Spiro, 2007; Turiano et al., 2012). It is possible that increases in N over time have the potential to impair health because of heightened stress reactivity. This is particularly relevant within the context of the Kindling Hypothesis (Monroe & Harkness, 2005), whereby first-onset depressive episodes are argued to produce personality scarring that results in increased N post-episode. This scarring has consequences for future health since increases in N over time could lower one's resilience and tolerance to stressors (Ormel, Oldehinkel, & Brilman, 2001). As a consequence, the individual experiences heightened emotional and physiological stress responses that may compromise their resilience to stressors and increase vulnerability to recurrent health events. Furthermore, increases in N could correspond with an increased propensity to engage in less healthy behaviors. This was partially supported by Mroczek and Spiro (2007), who examined whether changes in N and E assessed over a 12-year period (1988–2000) were significantly associated with mortality at 18-year follow-up (1988–2005). Their results indicated that higher N predicted mortality, with increases in N independently predicting elevated mortality risk. They concluded that changes in N may influence health and well-being, possibly via increased stress and anxiety and/or the development of health-compromising behaviors.

Similarly, increases in E and C could have protective effects on health. Increased C could lead to health-enhancing behaviors, whereas E could lead to increased socialization and hence increased social support, all of which could benefit health. Turiano et al. (2012) found some support for this proposition. They examined whether personality change over a 10-year period was associated with three measures of health (self-rated physical health, blood pressure, and days where work or home life was limited because of physical health reasons) in 3,990 U.S. participants. Their results demonstrated that both trait levels and changes in personality traits were associated with their measures of health. In particular, changes in E, C, and A were significantly associated with self-reported health, providing further evidence that, in addition to trait levels, personality change can influence health outcomes.

Unfortunately, few other studies have examined the impact of personality change on health outcomes in adults. Thus, current understanding of the influence of personality change on health remains unclear. There is a need, for instance, to examine changes in all five personality traits, and also to investigate whether factors such as age moderate the effects of personality change on health. The latter point is particularly relevant given that the nature of personality change is likely to vary by life stage. Maturational theories suggest that personality change is most pronounced in young adults and becomes more stable with age. This is partially supported by longitudinal studies showing that changes in social dominance (a dimension of E), C, and N are more pronounced in younger adults (Roberts et al., 2006). This suggests that changes in personality could be stronger predictors of health in younger adults. In contrast, some environmental and social changes (e.g., death of a spouse) could feasibly influence personality change and contribute to health in older adults. Therefore, the possibility that maturational and environmental factors can induce personality change implies that personality change might vary by age. These possibilities require investigation to further understand the nature of the relationship between personality change and health.

The Present Study

The purpose of the present study is to extend recent personality research and investigate whether changes in the five major personality domains are associated with self-reported mental and physical health in males and females. Self-reported mental and physical health will be assessed by the Short-Form Health Survey (SF-36), which is routinely and widely used to assess health and functioning in a variety of clinical and nonclinical samples (Hemingway, Stafford, Stansfeld, Shipley, & Marmot, 1997; Ware, Kosinski, & Gandek, 1993/2000). The SF-36 is well validated, provides important information on multiple components (e.g., psychological, social, biological) of an individual's health and well-being (Ware et al., 1993/2000), and is sensitive to changes in health and well-being over relatively short periods of time (Hemingway et al., 1997). The Five-Factor Model of personality was examined using Saucier's (1994) Mini-Markers scale. It is important to note that through this measure, O is assessed primarily by items reflecting Intellect. Therefore, in order to facilitate interpretation of our results, we will refer to Intellect rather than O in the remainder of this article. Finally, since the nature of personality change differs by age, we also examine whether the relationships between personality change and health vary in different birth cohorts.

Method

Participants

The Household, Income and Labour Dynamics in Australia (HILDA) Survey is a survey-based study of Australian households that commenced in 2001, with follow-up data collected every 12 months (Wooden, Freidin, & Watson, 2002). The primary purpose of this survey is to collect information on income dynamics, family dynamics, and labor market dynamics from a random selection of Australian householders. However, data on health and psychological factors such as personality are also collected. Data were collected via four questionnaires, two of which were administered by interview to at least one adult member of the household and assessed household information (e.g., housing, child care). The other two questionnaires were intended to be administered to all household members aged 15 years and over. One of these questionnaires was administered via interview and assessed information about employment and income of the individual. The other questionnaire was self-completed and assessed information relating to health, attitudes, and personality.

The HILDA Survey was developed to collect data from a representative sample of Australian households, using a multistaged approach that targeted a random selection of households within geographic areas (Census Collection Districts) in Australia. Wave 1 of the HILDA Survey included 7,682 households and 15,127 eligible individuals, of whom 13,969 provided data (Wooden et al., 2002). The sample differed slightly from the Australian population on several demographic factors, such as a greater proportion of females (52.6%

vs. 50.7%) and a greater representation of individuals who were married or in a de facto relationship (63.4% vs. 58.7%; Wooden et al., 2002). However, these variations were considered minor, and in general, the sample is broadly representative of the Australian population (Wooden et al., 2002).

Ethics approval to use the HILDA data for the purposes of the present research was obtained from our university's Human Research Ethics Committee. We examined data from Wave 5 (the first year personality was assessed) and Wave 9 (the second time personality was assessed), representing a 4-year developmental window. In the remainder of this article, Waves 5 and 9 are referred to as Time 1 and Time 2, respectively. In this research, we analyzed data from 11,105 adults aged 20–79 years ($M = 45.27$, $SD = 15.59$) at Time 1, which included a relatively equal proportion of males (47.3%) and females (52.7%). Data were available from 9,276 participants at Time 2, indicating an attrition rate of 16.5%. Based on existing recommendations, we included participants who did not provide follow-up data and handled missing data using full information maximum likelihood (FIML). This is discussed further in the statistical analysis section.

Measures

Personality

At Times 1 and 2, participants completed a 36-item scale based on a brief version of Goldberg's Big Five Markers Scale (Saucier, 1994). Each item consisted of a single word (e.g., talkative, efficient), and participants were instructed to indicate how well each word described them on a 7-point Likert scale (does not describe me at all to describes me very well). N consisted of eight items, with adjectives such as jealous, envious, and selfish (Cronbach's $\alpha = 0.83$). C comprised seven adjectives reflecting organization and orderliness ($\alpha = 0.79$). E was reflected by seven adjectives representing talkativeness and liveliness (α = 0.75), with Intellect assessed by six items encompassing creativity, complexity, and imagination (α = 0.74). Finally, A was assessed according to four items reflecting warmth and kindness (α = 0.78).

Self-Reported Mental and Physical Health.

Self-reported health was assessed at Times 1 and 2 using the SF-36 (Ware et al., 1993/2000). This scale consists of 36 items, 35 of which are used to calculate eight health subscales. The Physical Functioning subscale consists of 10 items (α = 0.93) that assess the extent to which individuals are able to perform normal activities of daily living (e.g., bend/kneel, climb flights of stairs). Role Physical comprises four items (α = 0.91) assessing whether physical health contributes to problems with work or other daily activities. The Bodily Pain subscale consists of two items (α = 0.89) indicating the extent to which individuals experience pain, and whether this interferes with daily activities. The General Health subscale comprises five items that reflect issues surrounding personal health, such as perceived physical health (α = 0.84). In the analyses, the Physical Functioning, Role Physical, Bodily Pain, and General Health subscales were used to reflect Physical Health (Ware et al., 1993/2000).

Social Functioning comprises two items that provide an indication of the extent to which physical and emotional problems affect normal social activities (α = 0.86). Vitality is assessed via four items that reflect energy and vigor (α = 0.86). Role Emotional includes three items that provide insight into whether emotional problems interfere with work or daily activities (α = 0.85). Finally, the Mental Health subscale consists of five items that assess depression and anxiety (α = .84). The Social Functioning, Role Emotional, Vitality, and Mental Health subscales were used to reflect overall Mental Health (Ware et al., 1993/2000).

For all eight SF-36 subscales, higher values indicate improved health and functioning. Based on existing recommendations (Ware et al., 1993/2000), raw scores on each scale were transformed to a score out of 100 and then converted to norm-based scores (which have a mean of 50 and a standard deviation of 10) using Australian SF-36 population norms (Australian Bureau of Statistics, 1995).

Statistical Analysis

The longitudinal associations between personality and self-reported health were examined using latent difference score modeling (Ferrer & McArdle, 2010; Selig & Preacher, 2009) performed with Mplus version 6.11 (Muthén & Muthén, 1998–2010). The modeling approach tested whether baseline personality and personality change were associated with self-reported mental and physical health at Time 2. Separate models were tested for self-reported physical and mental health, but all models included the five personality dimensions.

Self-reported mental and physical health were assessed as latent variables, with Physical Health reflected by Physical Functioning, Role Physical, Bodily Pain, and General Health and Mental Health reflected by Social Functioning, Role Emotional, Mental Health, and Vitality. The personality subscales were also examined as latent variables, but items were parceled to ensure greater parsimony in the models (Bandalos, 2002; Little, Cunningham, Shahar, & Widaman, 2002). For each personality factor, this involved randomly assigning relevant items into two parcels, with parcel membership being the same at Time 1 and Time 2.

A simplified version of the model tested for Physical Health is shown in Figure 1 (the same approach was used for Mental Health). The model involved testing whether each personality factor at Time 1 was associated with self-reported Physical Health at Time 2, controlling for self-reported Physical Health at Time 1. Change in each personality factor between Time 1 and Time 2 was represented as a latent difference variable (Ferrer & McArdle, 2010; Selig & Preacher, 2009); this model tested whether latent difference scores for each personality factor were significantly associated with self-reported Physical Health at Time 2. The model included age (as a continuous variable) and sex as covariates.

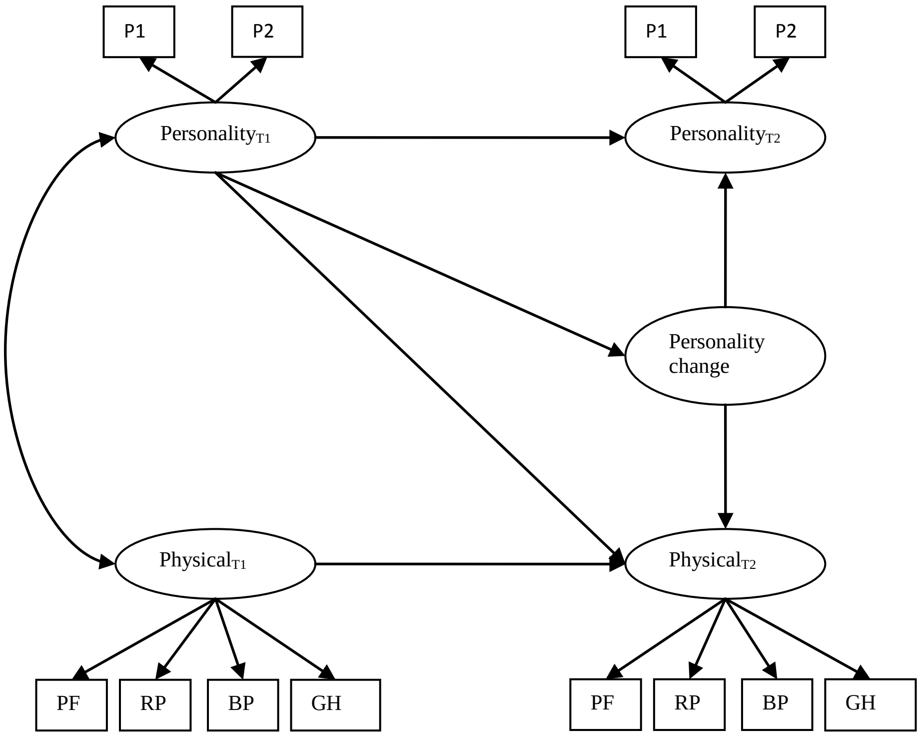

Figure 1. Latent difference score model examining the relationship between personality change and Physical Health. Latent difference scores were calculated for each of the five personality domains and examined simultaneously in each model. Sex and age were included as covariates, and this analytic approach was replicated for Mental Health. P1 = Parcel 1; P2 = Parcel 2; PF = Physical Functioning; RP = Role Physical; BP = Bodily Pain; GH = General Health.

Birth Cohort × Personality Change interactions were included in the models to examine whether the relationships between personality change and health varied according to age. Birth cohort was represented by four age categories as assessed at Time 1 (2005): 20–34 years (1971–1985), 35–49 years (1956–1970), 50–64 years (1941–1955), and 65–79 years (1926–1940). The ages reflected by these birth cohort categories correspond closely with categories used to assess personality change across adulthood (Caspi et al., 2005; McCrae et al., 1999). Separate Birth Cohort × Personality Change interaction terms were then included in the model for each of the five personality traits. This approach was replicated with self-reported mental health as the dependent variable. Significant interactions were further investigated by performing the analyses again, stratified by birth cohort. We then examined the nature of the relationship between the respective personality change and the self-reported health outcome in each birth cohort. This provided insight into the nature of these relationships according to the birth cohorts.

For all models, model fit was assessed using comparative fit index (CFI), Tucker-Lewis index (TLI), root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). An appropriate model fit was determined by CFI and TLI values approaching.95, an RMSEA value below.06, and an SRMR below.08 (Hu & Bentler, 1998). Missing data were dealt with using FIML, which is preferred over other methods such as imputation and pairwise deletion because of greater efficiency and reduced bias (Enders & Bandalos, 2001).

Results

Table 1 indicates that scores of the five personality factors were fairly stable over the 4-year period in each of the four birth cohorts. However, in the total sample, mean values of N ($p < .001$), E ($p < .001$), and Intellect ($p < .001$) decreased significantly over time, whereas C increased ($p < .05$); A did not differ significantly between Time 1 and 2 ($p = .15$). The changes with respect to N and C support those observed by Roberts and Mroczek (2008). Furthermore, the nature of personality change differed between the birth cohorts. For instance, the magnitude of the decrease in N was greatest in the 1956–1970 birth cohort ($p < .001$), with the decreases in Intellect ($p < .001$) and A ($p < .001$) being greatest in the 1926–1940 cohort. The increase in C was greatest in the 1971–1985 cohort ($p < .001$), and the reduction in E was less pronounced in the 1926–1940 birth cohort ($p < .001$).

Table 1.

The stability of the five personality domains, and means (standard errors) of each personality factor at time 1 and time 2, presented separately for each birth cohort.

	1971 – 1985 (n = 3175)	**1956 – 1970 (n = 3727)**	**1941 – 1955 (n = 2662)**	**1926 – 1940 (n = 1541)**
C				
Baseline	35.07 (0.13)	36.47 (0.12)	37.15 (0.14)	37.94 (0.18)
Follow-up	35.81 (0.15)	36.53 (0.12)	37.33 (0.15)	37.55 (0.21)
Stability	.68	.72	.73	.68
N				
Baseline	24.06 (0.15)	22.88 (0.13)	20.26 (0.16)	18.20 (0.21)
Follow-up	23.26 (0.17)	22.10 (0.15)	19.54 (0.17)	17.29 (0.23)
Stability	.60	.66	.69	.66
E				
Baseline	32.14 (0.14)	31.76 (0.13)	31.55 (0.15)	31.38 (0.19)
Follow-up	31.90 (0.16)	31.62 (0.14)	31.51 (0.16)	31.53 (0.20)
Stability	.74	.78	.76	.72
I				
Baseline	26.09 (0.12)	25.77 (0.11)	25.26 (0.13)	23.70 (0.17)
Follow-up	25.45 (0.14)	25.40 (0.12)	24.72 (0.14)	22.86 (0.20)

Stability	.70	.73	.75	.64
A				
Baseline	21.39 (0.07)	21.56 (0.06)	21.91 (0.07)	21.80 (0.10)
Follow-up	21.31 (0.08)	21.53 (0.07)	21.84 (0.08)	21.53 (0.12)
Stability	.60	.66	.64	.53

Note. C=Conscientiousness; N= Neuroticism; E=Extraversion; I=Intellect; A=Agreeableness

Personality Change and Self-Reported Physical Health

In the total sample, the baseline measures of personality were not significantly associated with Physical Health (Table 2). The only exception was for A, which had a weak positive relationship with Physical Health ($\beta = .03$, $p < .05$). However, increases in C ($\beta = -.57$, $p < .001$) and E ($\beta = .08$, $p < .001$) were associated with higher Physical Health, whereas increases in N were associated with poorer Physical Health ($\beta = -.06$, $p < .001$). The model fit was appropriate as indicated by the CFI (.93), TLI (.91), RMSEA (.05), and SRMR (.08).

Table 2.

Results of the latent difference score models examining the associations between baseline personality, personality change, and Mental and Physical Health.

	Mental Health	Physical Health
	Standardised ß	Standardised ß
$N_{Baseline}$	.07***	.00
$C_{Baseline}$	.16*	.10
$E_{Baseline}$	.02*	.00
$A_{Baseline}$	.07**	.03*

$O_{Baseline}$	-.04**	.01
N_{change}	-.17***	-.06***
C_{change}	.60***	.57***
E_{change}	.17***	.08***
A_{change}	.02	.02
O_{change}	.05***	.02
N_{change} × Birth Cohort	.18***	.05*
C_{change} × Birth Cohort	-.17***	-.05
E_{change} × Birth Cohort	-.41	-.08*
A_{change} × Birth Cohort	-.03	-.03
O_{change} × Birth Cohort	-.13	.03

Note. N = Neuroticism; C = Conscientiousness; E = Extraversion; A = Agreeableness; O = Openness to Experience.

* p < .05, ** p < .01, *** p < .001

The N Change × Birth Cohort interaction was significant (β = .05, $p < .05$), with the effects evident in the 1971–1985 (β = −.12, $p = .005$) and 1956–1970 cohorts (β = .08, $p < .001$), but not in those born prior to 1956. The relationship between increases in E and Physical Health also differed significantly by birth cohort (β = −.08, $p < .05$), with the effects strongest in the 1971–1985 cohort (β = .19, $p < .001$), weaker in the 1956–1970 (β = .08, $p < .001$) and 1941–1955 cohorts (β = .07, $p < .01$), and not significant in the 1926–1940 cohort (β = .05, $p = .16$). In contrast, birth cohort did not moderate the effects of changes in C, A, or Intellect.

Personality Change and Self-Reported Mental Health

As shown in Table 2, baseline N (β = .07, $p < .001$), A (β = .07, $p < .01$), C (β = .16, $p < .05$), E (β = .02, $p < .05$), and Intellect (β = −.04, $p < .01$) were weakly but significantly associated with Mental Health in the total sample. Independent of these associations, changes in N, C, E, and Intellect were significantly linked with Mental Health at Time 2. In particular, increased C (β = .60, $p < .001$) and increased E (β = .17, $p < .001$) were positively associated with higher Mental Health scores; increases in Intellect were also positively associated with Mental Health, but the effect was weak (β = .05, $p < .001$). Increases in N were related to poorer Mental Health scores (β = −.17, $p < .001$). The model fit was appropriate as indicated by the CFI (.92), TLI (.90), RMSEA (.06), and SRMR (.10).

The N Change × Birth Cohort interaction was significant (β = .18, $p < .001$), indicating that the relationship between change in N and Mental Health varied by birth cohort. Investigation of this interaction demonstrated that the association between increasing N and poorer Mental Health was stronger in the 1971–1985 cohort (β = −.21, $p < .001$) and the 1926–1940 cohort (β = −.25, $p < .001$) relative to the 1956–1970 (β = −.14, $p < .01$) and 1941–1955 birth cohorts (β = −.13, $p < .001$).

The relationships between increases in C and Mental Health also varied by birth cohort (β = −.17, $p < .001$), with this relationship being evident in adults born in 1956 and after, but not in those born prior to 1956. Similarly, the association between increases in E and Mental Health was also found to vary between birth cohorts (β = −.41, $p < .001$), with the effects observed for the two younger birth cohorts, but again not in the older adults. Finally, the Intellect Change × Birth Cohort interaction was significant (β = −.13, $p < .001$) and indicated a different trend to those reported above. In particular, change in Intellect was not associated with Mental Health in adults born after 1940, but a strong effect was evident in the 1926–1940 cohort ($\beta = .52$, $p < .001$).

Discussion

The present article examined whether changes in personality traits were associated with self-reported mental and physical health. This is an important area of research given that personality traits are dynamic and can change over the course of the adult life span. The results indicate that changes in certain personality traits (particularly C, N, and E) over a 4-year period were associated with self-reported mental and physical health. To our knowledge, the relationship between personality change and health has only been previously examined by Turiano et al. (2012) and Mroczek and Spiro (2007). Our study extends the research on personality change and health by examining self-reported mental and physical health in a large sample of men and women and by investigating whether the effects differed between four birth cohorts.

In our sample, individuals who became more conscientious over the 4-year period had better mental and physical health. Increases in C over time may lead to improved health by promoting health-enhancing behaviors (e.g., physical activity, medication adherence, healthy eating) and reducing health-compromising behaviors such as smoking and alcohol consumption (Bogg & Roberts, 2004; Courneya & Hellsten, 1998). Increased C could also facilitate the achievement of important life goals (e.g., career success) and social functioning, which could benefit overall well-being (Hayes & Joseph, 2003). In this study, the benefits of increases in C appeared particularly salient in younger and middle-aged adults than in older adults. One possible explanation for this finding is that the nature of the changes in mental health varies according to age. Hemingway et al. (1997), for example, found that changes in the SF-36 Mental Health subscale scores were greatest in younger adults. Increases in C have also been shown to be most apparent in younger adults (Roberts & Mroczek, 2008), and this was also observed in our study. Therefore, increased C may have quite significant protective effects on mental health in younger and middle-aged adults because this is when the changes in mental health and C are most pronounced.

Individuals who became more neurotic with time had poorer mental and physical health, with the nature of these relationships varying by birth cohort. Increased N was linked with poorer mental health in the total sample, but the relationship was stronger in younger and older adults. The findings for younger adults are not surprising given that changes in mental health are most pronounced in this age group (Hemingway et al., 1997). The slightly stronger effect in the older age group was less expected, but it might reflect significant life events that affected both N and mental health in this age group. For instance, the global financial crisis (GFC) occurred between the first (2005) and second (2009) time points in this study. It represented a considerable life stressor leading to concerns regarding financial security, particularly for retirees and those anticipating retirement, and has been linked with poorer health and well-being in older Australian adults (Sargent-Cox, Butterworth, & Anstey, 2011). It is therefore possible that the effect of the GFC on well-being in older adults reflects fears and anxieties regarding financial stability following retirement and might explain the link between increased N and poorer mental health in this group.

Our findings corroborate and extend those of Mroczek and Spiro (2007), who found that increases in N over time were predictive of mortality in a sample of older males. Increased N may impair health via heightened anxiety and emotional reactivity (Lahey, 2009), which is consistent with the Kindling Hypothesis often applied to understanding recurrent depression and anxiety episodes (Monroe & Harkness, 2005). Increased N may also contribute to poorer health through reduced social support, less adaptive coping styles

(Connor-Smith & Flachsbart, 2007; Lahey, 2009), and/or by promoting health-compromising behaviors such as smoking, alcohol consumption, and physical inactivity (Lahey, 2009).

Increases in E were also associated with improved mental and physical health. For physical health, this effect decreased in importance with increasing age, whereas for mental health, the effect was also absent in older adults. These differences between birth cohorts might explain some of the contradictory findings that have been reported in the literature (e.g., Goodwin & Friedman, 2006; Shipley et al., 2007). That changes in E were more strongly associated with changes in mental and physical health in young adults is not surprising given that this is a period marked by considerable changes in an individual's social life. For example, during this period many individuals marry, have children, establish careers, and become more active members of society (Roberts et al., 2006). These changes correspond with increases in specific domains of E, such as assertiveness and social dominance (Roberts & Mroczek, 2008). Increased social interactions during young adulthood could lead to greater success in the execution of life scripts, more defined self-identity and role fulfillment through interaction with and confirmation from others, and greater levels of perceived control in managing life goals. Thus, increases in E in young adulthood in particular may lead to a number of benefits in social functioning, which could translate to improved mental and physical health. In our study, E decreased over time, which might explain the declining importance of E for physical and mental health among older respondents.

Changes in Intellect were only weakly associated with self-reported mental health but not physical health. However, decreased Intellect was strongly related to poorer Mental Health in older adults. Previous studies have indicated that components of O such as Intellect may be associated with improved mental health (Ferguson & Bibby, 2012; Goodwin & Friedman, 2006; Taylor et al., 2009). In older adulthood, there are marked declines in some cognitive abilities, which are especially pronounced in individuals with conditions such as dementia. Therefore, it is possible that reductions in Intellect in older age correspond with reductions in well-being as assessed by the SF-36 Mental Health component. In contrast, changes in A were not related to either mental or physical health, suggesting this may not be an independent predictor of health and well-being in adults.

Strengths and Limitations

There are some important strengths and limitations of the present research. The large sample size, which is broadly representative of Australian adults, was a key strength of this study and allowed for an examination of these relationships in different cohorts. This is important given that the nature of personality change differs by age. Furthermore, the SF-36 provides important insights into aspects of health and well-being that are not reflected in mortality data or disease presence. That is, measures of morbidity and mortality provide critical information but can be limited because they require long periods of follow-up and/or large numbers of cases to provide meaningful data (Hemingway et al., 1997). They can also overlook other important aspects of an individual's overall health, particularly in relation to social and psychological functioning (Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997). However, the SF-36 relies on self-reported data, which could be inaccurate and potentially biased by factors such as personality. For example, individuals with higher N may overestimate their health problems, whereas an individual with higher A may underestimate their health problems. Notwithstanding these concerns, these biases may have been offset by our large sample.

Furthermore, the Mini-Markers scale (Saucier, 1994) was used to assess personality, but it includes only 36 items, which may not tap into more specific personality subtypes (e.g., perfectionism) that could be important for health. The measure of N does assess some components of Neuroticism such as anxiety, but the valence of all items is negative and this may have contributed to the skewed distribution of scores in the sample. Finally, the O domain primarily reflected Intellect and overlooked other components of O that may also affect physical and mental functioning.

In addition, the present research utilized a relatively brief snapshot of the total life trajectory, and larger periods of observation may be required to observe the full effects of personality change. Another issue is that we only had access to two time points for personality, which, when examined using latent difference score modeling, provided a useful insight into the temporal relationship between these variables. Despite this, the use of two time points to assess longitudinal relationships is limited, and analyzing data from three or more waves would allow for a more detailed and accurate investigation of the relationship between personality change and health. In particular, use of techniques such as growth mixture modeling to examine distinct trajectories of personality and health could provide additional and important insights into these relationships. Such research should investigate whether changes in personality are also associated with other health outcomes (e.g., chronic disease and mental disorders), as well as establish the stability of the Birth Cohort × Personality interactions witnessed here. Finally, although the analytic approach adopted in this study was rigorous, there is the possibility of reverse causation. It is possible, for instance, that individuals with poorer mental and physical health may experience more stress, reduced functioning, and learned helplessness, which could increase levels of N (e.g., kindling). The bidirectional nature of the relationships between personality and health needs to be examined in future follow-up studies.

Conclusions

This study is the first to examine whether changes in all personality traits consistent with the Five-Factor Model are associated with self-reported measures of mental and physical health over time. The findings build on existing studies demonstrating that measures of personality assessed at a single time point are predictive of a range of subsequent health outcomes. The findings are important because certain personality traits could be targeted through large-scale health promotions. For example, it may be beneficial to tailor health promotions on the basis of personality, as some traits influence how people respond to health messages and campaigns. For individuals with high N and low C, for example, it may be more effective to focus on the benefits of engaging in certain behaviors (e.g., physical activity, healthy eating) rather than the adverse consequences of inaction (Hagger-Johnson & Pollard Whiteman, 2008). Our results also indicate that the nature of the relationship varied by birth cohort, with the associations between changes in N (for example) being most pronounced in younger and older adults. These findings therefore suggest that these interventions and strategies should also consider factors such as age.

Strategies aimed at minimizing increases in N and facilitating increases in C and E may also be effective in promoting health and well-being. This could be achieved through skills training, which has been effective in schools in promoting social competence, assertiveness, empathy, and self-control (Asher & Taylor, 1983; Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Sanz de Acedo Lizarraga, Ugarte, Cardelle-Elawar, Iriarte, & Sanz de Acedo Baquedano, 2003), which are relevant to N, C, and E. Training programs targeting self-regulation of behavior and emotions could also facilitate increased C (Sanz de Acedo Lizarraga et al., 2003) and potentially deliver a positive effect on health.

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