

Conscientiousness and Health Across the Life Course

Brent W. Roberts, Kate E. Walton, and Tim Bogg
University of Illinois at Urbana–Champaign

This article provides an overview of the role conscientiousness plays in the health process over the life course. The authors describe their research on the underlying structure of conscientiousness and how conscientiousness predicts social environmental factors and health behaviors that have a known relationship to health and longevity. The authors then show that conscientiousness continues to develop in young adulthood, midlife, and even potentially in old age. Finally, they show that the life paths and health behaviors that are associated with health are also associated with changes in conscientiousness across the life course.

Our journey begins at the intersection of two seemingly unrelated research findings concerning the trait of conscientiousness, which is defined as the propensity to follow socially prescribed norms and rules regarding impulse control and to be goal directed, planful, and able to delay gratification (John & Srivastava, 1999). The first finding is deceptively simple: Conscientiousness predicts longevity (Friedman et al., 1993). Specifically, it has been shown that people tend to live longer if, as 8-year-olds, they were rated as more conscientious by parents and teachers. Moreover, the impact of conscientiousness has been shown to be equivalent to the effect of cardiovascular disease. The second finding, also relatively simple, is that conscientiousness, despite being a trait, continues to show changes well into middle age (Helson & Kwan, 2000). Specifically, people tend to increase in conscientiousness in young adulthood (Robins, Fraley, Roberts, & Trzesniewski, 2001), middle age (Helson & Wink, 1992), and even into old age (Dudek & Hall, 1991).

The juxtaposition of these two findings raises a number of provocative questions. Why does

conscientiousness predict longevity? Why do people become more conscientious with age? Are the reasons why conscientious people live longer related to the reasons why people become more conscientious? If people increase in conscientiousness as they age, will they add years to their life?

In this overview of our current research on conscientiousness, we provide preliminary answers to some of these questions. We examine (a) the content domain of the construct of conscientiousness, as this dictates, in part, subsequent examination of the role of conscientiousness in health; (b) some of the reasons why conscientiousness predicts longevity; and (c) how and why conscientiousness increases with age.

What Is Conscientiousness?

Before we address questions of why conscientiousness plays a role in longevity and development, it is important to address the construct of conscientiousness itself. The preceding brief review suggests that conscientiousness has both predictive and descriptive value. Unfortunately, many studies of conscientiousness use different definitions of the construct. Some researchers measure conscientiousness in terms of achievement, whereas others focus on order, impulse control, or responsibility. Moreover, recent research suggests that the lower order facets of conscientiousness are as effective as or more effective than composite measures in predicting behavioral outcomes (Ashton, 1998; Mershon & Gorsuch, 1988; Paunonen, 1998; Paunonen

Brent W. Roberts, Kate E. Walton, and Tim Bogg, Department of Psychology, University of Illinois at Urbana–Champaign.

This research was supported by a grant from the Research Board of the University of Illinois at Urbana–Champaign and by National Institute on Aging Grants R03 AG19414 and R01 AG21178.

Correspondence concerning this article should be addressed to Brent W. Roberts, University of Illinois at Urbana–Champaign, 603 East Daniel Street, Champaign, IL 61820. E-mail: broberts@cyrus.psych.uiuc.edu

& Ashton, 2001). For example, Stewart (1999) found that the order facet of conscientiousness was strongly correlated with the performance of newly hired employees, whereas the achievement facet was strongly correlated with the performance of veteran employees. Both facets had substantially higher correlations with performance when examined individually than when combined.

Thus, the story of conscientiousness and health may not be simple. Different aspects of conscientiousness may be more or less predictive of health and longevity. In turn, it may be that certain aspects of conscientiousness are more prone to increase with age than others. At present, there is little conceptual or empirical agreement concerning the underlying structure of conscientiousness. One reason for this lack of consensus is the relative newness of the Big Five taxonomy. Much of the recent research has appropriately focused on whether the Big Five are sufficient in number and to what extent they capture the variance in most, if not all, trait terms (e.g., Paunonen & Ashton, 2001; Paunonen & Jackson, 2000; Saucier & Goldberg, 1998). Although there is agreement that there are five broad categories, along with a willingness to settle on the gross features of these five domains, there is little agreement about the specific facets that make up each of the Big Five (Costa & McCrae, 1998; Saucier & Ostendorf, 1999).

With this in mind, we initiated a series of studies dedicated to identifying the lower order structure of conscientiousness. One route to identifying the structure of conscientiousness is to examine lexically derived trait adjectives, as was done to develop the Big Five (e.g., Goldberg, 1993). Most of the previous psycholexical research has focused on creating marker sets for the Big Five (see Saucier, 2002, for a discussion) or on creating or maintaining a list of adjectives that are cross-culturally valid (e.g., Saucier & Ostendorf, 1999). Both of these strategies result in an abbreviated set of trait adjectives, because their goal is to develop relatively orthogonal measures of the Big Five or find adjectives that perform equivalently across languages. Alternatively, one can sample broadly from the domain of conscientiousness and not be as concerned with the potential overlap with other trait domains.

Roberts, Bogg, Walton, Chernyshenko, and Stark (2004) adopted this broader search strategy to allow them to include more studies and thus identify a maximum number of potential facets of conscientiousness. The results of this study replicated and extended previous research on the lexical structure of conscientiousness (see bottom part of Table 1). Five components found in previous lexical research on the lower order structure of conscientiousness were identified: orderliness (organized vs. sloppy), industriousness (tenacious vs. lazy), reliability (dependable vs. unreliable), decisiveness (decisive vs. indecisive), and impulse control (cautious vs. careless). Unlike previous research, two additional, interpretable facets were found: formalness and conventionality. These dimensions appeared to represent blends of conscientiousness with high and low openness to experience, respectively. The formalness dimension appeared close to what might be termed culture and was defined by adjectives such as formal, sophisticated, and refined. Conventionality was related to supporting social norms and conventions and was marked by the items traditional, conventional, and nonconforming (reversed). Despite the conceptual overlap, the correlations of formalness and conventionality with openness were quite low and far lower than their correlations with conscientiousness itself. In fact, the dimension with the most problematic discriminant validity was the reliability facet, which showed a strong relationship to agreeableness in addition to conscientiousness.

A second route to identifying the underlying domain of conscientiousness is an examination of the factor structure of personality inventories that measure conscientiousness-related traits. In the search for the Big Five, a systematic analysis of previously developed personality inventories provided much-needed confirmation that the Big Five was an appropriate higher order taxonomy for the domain of personality traits (McCrae & John, 1992). Similarly, we examined the factor structure of 36 different scales assessing aspects of conscientiousness drawn from seven major personality inventories, which included the most widely used questionnaires in existence (e.g., the Revised NEO Personality Inventory; Costa & McCrae, 1994, the California Psychological Inventory; Gough & Bradley, 1996, and the Multidimensional Per-

Table 1
Factor Structures of Conscientiousness

Industriousness	Orderliness	Impulse control	Reliability	Conventionality	Virtue	Decisiveness	Punctuality	Formalness
NEO Competence	AB5C Orderliness	AB5C Cautiousness	CPI Responsibility	MPQ Traditionalism	CPI Good Impression			
NEO Achievement Striving	NEO Order	NEO Deliberation	CPI Achievement via Conformance	JPI Traditionalism	CPI Self-Control			
AB5C Organization	16PF Perfectionism	MPQ Self-Control	CPI Socialization	16PF Rule Consciousness	CPI Well-Being			
AB5C Purposefulness	JPI Organization	HPI Impulse Control	JPI Responsibility		HPI Moralistic			
NEO Self-Discipline	AB5C Conscientiousness	HPI Not Spontaneous	HPI Avoids Trouble		HPI Virtuous			
AB5C Efficiency	AB5C Perfectionism							
AB5C Rationality								
NEO Dutifulness								
Lax	Organized	Careful	Unreliable	Traditional		Indecisive	Overprompt	Formal
Lazy	Neat	Cautious	Reliable	Conventional		Decisive	Unpunctual	Sophisticated
Tenacious	Disorganized	Reckless	Undependable	Unconventional		Deliberate	Punctual	Refined
Industriousness	Orderly	Careless	Dependable	Nonconforming		Firm	Negligent	Prim
Thrifty	Sloppy	Uncautious	Responsible	Perfectionistic		Consistent		Informal
Thorough	Disorderly	Impulsive	Unstable			Inconsistent		Dignified
	Overneat	Rash	Purposeful			Wishy-washy		Mannerly
	Forgetful	Systematic				Alert		
	Self-disciplined	Conscientious				Scatterbrained		
		Particular				Illogical		
		Erratic				Efficient		
		Ritualistic				Steady		

Note. NEO = Revised NEO Personality Inventory; CPI = California Psychological Inventory; MPQ = Multidimensional Personality Questionnaire; JPI = Jackson Personality Inventory; HPI = Hogan Personality Inventory.

sonality Questionnaire; Tellegen, 1982; Roberts, Chernyshenko, Stark, & Goldberg, 2005). We found that the 36 measures of conscientiousness were best subsumed by six factors: impulse control, conventionality, responsibility (e.g., reliability), industriousness, order, and virtue.

Interestingly, we found striking convergence across the lexical and questionnaire studies (see Table 1). Impulse control, reliability, conventionality, industriousness, and orderliness replicated across these disparate samples and assessment techniques. Two aspects of this five-facet interpretation of conscientiousness are worth noting. First, no existing personality inventory includes all five, rendering any existing system of assessing conscientiousness inadequate. Most inventories fail to incorporate the conventionality facet, which is often mistakenly identified as an aspect of openness (low openness). Second, in both studies these facets of conscientiousness showed good levels of convergent and discriminant validity with the remaining Big Five, with the exception of the reliability facet. The latter is almost equivalently correlated with conscientiousness and agreeableness.

This more differentiated model provides the starting point for investigating both the development and predictive validity of the domain of conscientiousness. As shown subsequently, it allows us to organize previous research to dis-

cover which aspect of conscientiousness is most important in terms of health-related outcomes.

Why Does Conscientiousness Predict Longevity?

The answer to this question can be found in an elegant model put forward by Adler and Matthews (1994) that helps to organize the various psychological and social factors that affect health. As seen in the model depicted in Figure 1, personality traits can function either indirectly, through their action on the social environmental and health-related behaviors, or directly, through their action on psychophysiological mechanisms. The majority of evidence points to the paths through social environmental factors and health behaviors as the primary ways in which conscientiousness affects health. Therefore, conscientiousness should predict longevity because of the health behaviors and social environmental factors that follow from being more conscientious.

Social environmental factors are context-dependent experiences that either detract from good health (e.g., stressful events or life circumstances) or promote good health (e.g., strong social connections; Adler & Matthews, 1994). For example, one distinctly stressful social environmental factor, poverty, is related to poor health outcomes for both men and women

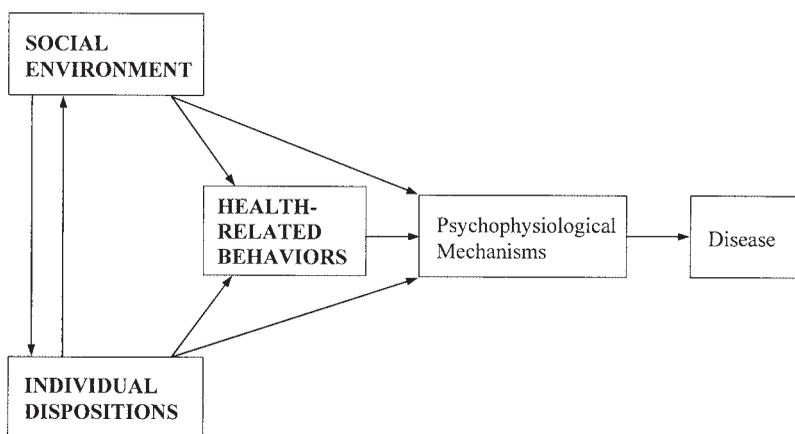


Figure 1. From "Health Psychology: Why Do Some People Get Sick and Some Stay Well?" by N. Adler and K. Matthews, 1994, *Annual Review of Psychology*, 45, pp. 229–259. Copyright 1994 by the Annual Review of Psychology. Adapted with permission.

(Adler et al., 1994; Ostrove, Adler, Kuppermann, & Washington, 2000). Stressful experiences within marriage (e.g., divorce) also are linked to poor health outcomes and decreased longevity (Tucker, Friedman, Wingard, & Schwartz, 1996). In contrast, having greater levels of social connection, such as having more children and belonging to clubs, churches, and other organizations, is linked to positive health outcomes and increased longevity (House, Landis, & Umberson, 1988; Samuelsson & Dehlin, 1994; Tucker, Schwartz, Clark, & Friedman, 1999).

In turn, it is becoming clear that conscientiousness predicts most of these social environmental factors. Broad measures of conscientiousness predict career success and earnings (Judge, Higgins, Thoreson, & Barrick, 1999). Conscientiousness and social responsibility have been linked to greater marital stability (Cramer, 1993; Kelly & Conley, 1987; Tucker, Kressin, Spiro, & Ruscio, 1998), which, in turn, predicts longevity (Tucker et al., 1996). Higher levels of social responsibility in childhood predict having more children and belonging to more organizations in adulthood, both of which contribute to increased longevity (Samuelsson & Dehlin, 1994; Tucker et al., 1999). Conscientiousness is also positively related to religiosity (MacDonald, 2000; Taylor & MacDonald, 1999), which, in turn, is associated with diminished substance abuse (Miller, Davis, & Greenwald, 2000) and increased longevity (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000).

Our own research provides additional support for the argument that conscientious people follow life paths that contribute to better health outcomes. For example, we tracked levels of conscientiousness, social environmental factors, and health behaviors from the ages of 21 to 52 years in a longitudinal study of college-educated women. Women who were more conscientious in college tended to have more children and experience lower rates of divorce than women who were not conscientious (Roberts & Bogg, 2004). In an entirely different longitudinal study of New Zealanders, we found that conscientiousness-related traits helped to shape the paths people followed in work. People who were more conscientious in terms of being more controlled and industrious at the age of 18 years

tended to be in higher socioeconomic work paths at 26 years of age, to feel more involved in their work, and to feel more financially secure (Roberts, Caspi, & Moffitt, 2003). Thus, evidence from a variety of longitudinal studies shows that people who are more conscientious create life paths or developmental niches that are known to promote better health and longevity.

In addition to affecting health through social environmental factors, it appears that conscientiousness has important effects on health and longevity through its relationship to health behaviors. Health-related behaviors are the primary factors contributing to poor health outcomes such as cardiovascular disease and cancer (McGinnis & Foege, 1993). In the United States, the leading behavioral contributors to mortality are tobacco use, unhealthy diets, physical inactivity, excessive alcohol use, gun violence, risky sexual behaviors, risky driving/accidents, and drug use (McGinnis & Foege, 1993). These behaviors are relevant to health and longevity through their relations to cardiovascular disease, cancer, AIDS, and accidental deaths. For example, findings from the Cardiovascular Health Study have shown that, among 5,888 participants 65 years of age and older who completed a 7-year follow-up assessment, the healthy participants were those who did not smoke, had a lower waist circumference, and exercised (Burke et al., 2001).

In several studies, we have tested the relationship between conscientiousness, broadly conceived, and the behaviors that contribute to poor health outcomes. Consistent with research on behavioral inhibition (Clark & Watson, 1999), we found that most aspects of conscientiousness are negatively related to both alcohol and drug abuse (Walton & Roberts, 2004). The two facets most strongly related to these two health outcomes were reliability and impulse control. In addition, we replicated these patterns using observer ratings of personality in addition to self-reports, demonstrating that the correlations were not the result of response biases or social desirability. In turn, Chuah, Drasgow, and Roberts (in press) showed that conscientiousness was positively related to preventative and accident control behaviors, such as seeing a doctor regularly and checking smoke alarms around the house, as well as being related to

risky behaviors such as driving without a seat-belt and consuming illicit substances. From these preliminary studies, it is clear that conscientiousness is related to several domains of risky health behaviors and several domains of preventative health behaviors, both of which may affect health and longevity.

Our most recent research shows that the influence of conscientiousness is more pervasive than these initial studies indicated. We have conducted one of the most comprehensive meta-analyses to date of the relationship between conscientiousness-related traits and health behaviors (Bogg & Roberts, 2004). It turns out that the majority of existing studies that focus on the relationship between conscientiousness and health behaviors test the relationship between one facet of conscientiousness, such as impulse control, and one health behavior, such as tobacco or alcohol consumption. Furthermore, these studies are often found in very narrow outlets that focus on single health behaviors (e.g., the *Journal of Alcohol Studies, Tobacco, or Accident Prevention and Analysis*). To our knowledge, there has been no attempt to integrate findings across each health behavior domain to test how pervasive the influence of conscientiousness-related traits is across the leading causes of mortality. Therefore, we conducted a meta-analysis of the known relationships between conscientious-

ness-related traits and the nine different health behaviors that are among the leading correlates of mortality: alcohol use, disordered eating (including obesity), drug use, physical inactivity, risky sexual practices, risky driving practices, tobacco use, suicide, and violence (McGinnis & Foege, 1993).

We identified 194 relevant studies. Studies were selected if they reported correlations between conscientiousness-related traits and one or more of the health factors just listed. Studies reporting mean-level differences (e.g., between smokers and nonsmokers) were included only if they contained an appropriate control group (e.g., an approximation of the normal population).

Figure 2 shows the average correlations between conscientiousness and these nine behavioral domains. As can be seen, conscientiousness predicts each and every outcome. The significance of the scope of the effects is rather impressive. People who are not conscientious have quite a number of ways to experience premature mortality. They can die through car accidents, through acquisition of AIDS via risky sexual practices, through violent activities such as fights and suicides, and through drug overdoses. People can still suffer from an attenuated life span in middle age through not eating well, not exercising, and smoking tobacco, which all lead to heart disease and cancer.

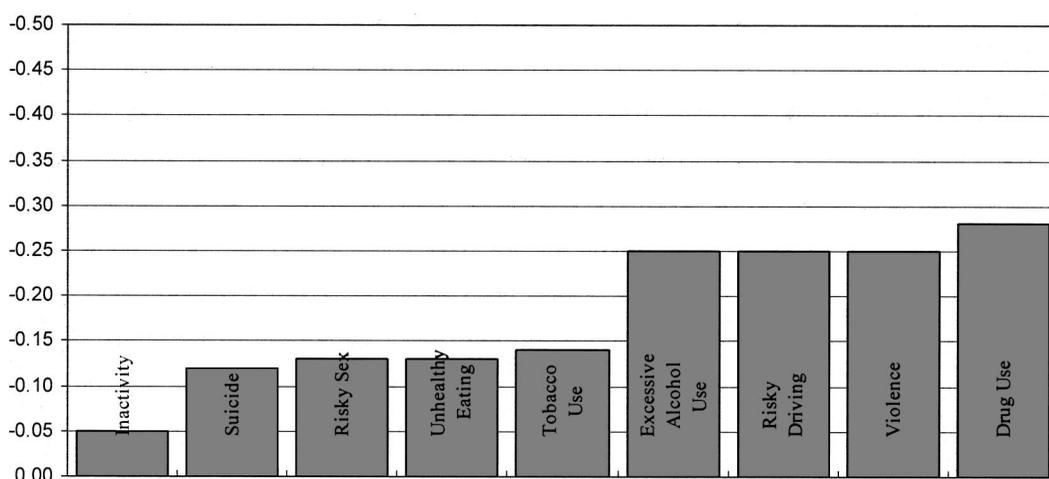


Figure 2. Average correlations among conscientiousness-related traits and health-related behaviors.

We also organized the findings according to our new model of conscientiousness, and this revealed some surprising results (Bogg & Roberts, 2004). The facet of conscientiousness with the strongest and most consistent relationship to health behaviors was conventionality. People who considered themselves more conventional in orientation, reflecting a propensity to adhere to society's norms, were much less likely to abuse drugs, drive in a risky fashion, eat unhealthfully, lead an inactive lifestyle, or abuse alcohol. Of the remaining facets, reliability and impulse control exhibited the most consistent pattern across all health behaviors, but the results were not quite as robust as the conventionality findings. Industriousness and orderliness had less consistent and relatively weak correlations with health behaviors. These findings indicate that specific aspects of conscientiousness are more important for health outcomes than others.

In reference to the Adler and Matthews (1994) health model, conscientiousness turns out to be a critical factor in terms of both social environments and health behaviors. It is clear that the two factors responsible for conscientiousness predicting longevity are the life paths that conscientious people create for themselves and the health-related activities and practices in which they engage. Conscientious people create life contexts that enhance their health and do things that either do not detract from health or promote it.

Why Does Conscientiousness Increase With Age?

Before we address the question of why conscientiousness increases with age, it would be appropriate to review the evidence for the argument that conscientiousness does increase with age. Until recently, the dominant perspective was that once adulthood is reached, there is no subsequent change in personality traits (McCrae & Costa, 1994). Specifically, on the basis of their interpretation of existing longitudinal research, McCrae and Costa concluded that there is no relationship between mean levels of personality traits and age in cross-sectional studies of personality, nor are age-related trends demonstrated in longitudinal data (Costa & McCrae, 1997). They concluded that "traits develop

through childhood and reach mature form in adulthood; thereafter they are stable in cognitively intact individuals" (McCrae & Costa, 1999, p. 145).

A more differentiated perspective emerged recently from both cross-sectional studies and two new narrative overviews of the evidence for personality trait change in adulthood. First, McCrae et al. (1999) reported cross-sectional mean-level differences across the Big Five in five different cultures, including statistically significant increases in conscientiousness across age groups. This finding was replicated in a large cross-sectional Internet sample in which it was shown that conscientiousness continued to increase beyond the age of 30 years (Srivastava, John, Gosling, & Potter, 2003). Second, the authors of the two longitudinal data reviews concluded that people continue to increase in conscientiousness well into adulthood. Helson and Kwan (2000) reviewed data from three cross-sectional studies and three longitudinal studies that covered the majority of the life course from the ages of 20 to 80 years and concluded that there was a significant mean-level change in norm adherence, the trait most similar to the reliability facet of conscientiousness. Roberts, Robins, Caspi, and Trzesniewski (2003) reviewed a more comprehensive list of cross-sectional and longitudinal studies than previously captured in narrative reviews. According to their interpretation of the data, measures of conscientiousness increased across the life course from the ages of 18 to more than 60 years.

In our most recent research, we have analyzed such patterns of change more systematically in a meta-analysis of 92 longitudinal studies spanning the age period from 10 to 101 years (Roberts, Walton, & Viechtbauer, *in press*). Figure 3 shows the patterns of change found in this synthesis of longitudinal data. Consistent with evidence from cross-sectional comparisons of different age groups, traits belonging to the domain of conscientiousness increased in young adulthood (20 to 40 years) and in old age (60 to 70 years). The effect sizes were modest in nature, but when accumulated across the life span they indicated that people may be changing a full standard deviation in terms of conscientiousness from young adulthood through old age. Interestingly, we found no sex differences

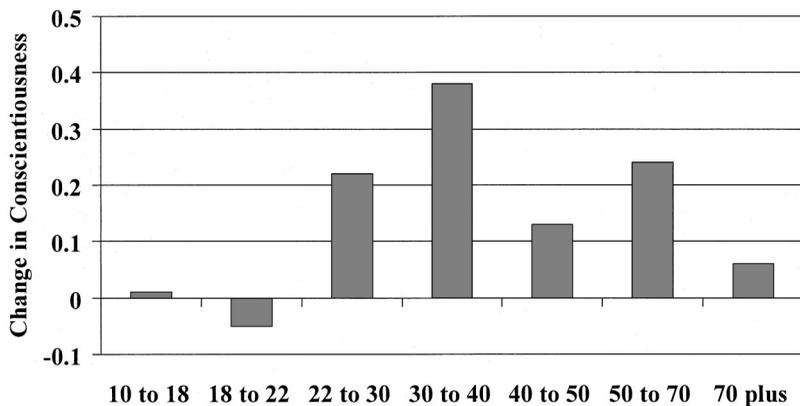


Figure 3. Changes in conscientiousness across the life course in *d*-score units.

in these patterns. Thus, we can state quite comfortably that traits from the domain of conscientiousness increase throughout the life course.

We see two reasons for the increase in conscientiousness from young adulthood to middle age. First, people change through watching themselves enact a new behavior and then drawing conclusions that differ from previous opinions about themselves (Caspi & Roberts, 1999; Roberts & Caspi, 2003). In the case of conscientiousness and health, the behaviors most relevant to change in conscientiousness are, of course, health related. So the question is whether participating in certain health behaviors or changing one's health behaviors is associated with changes in conscientiousness. To test this idea, we tracked changes in conscientiousness in the Mills Longitudinal Study from college through middle age and simultaneously tracked changes in health behaviors such as tobacco and drug consumption (Roberts & Bogg, 2004). We found that women who decreased their consumption of tobacco and marijuana tended to increase in responsibility (e.g., reliability), in both young adulthood and middle age. In contrast, women who continued to consume tobacco and marijuana did not increase in responsibility. These findings provide initial support for the idea that enacting or changing behaviors can subsequently translate into more global changes in one's personality.

The second mechanism thought to impart change in personality traits over time is responding to contingencies found in social envi-

ronments. Specifically, we have hypothesized that the social roles of young adulthood bring rewards for acting in a more conventional and conscientious manner. We describe this as the social investment principle (Roberts & Wood, in press). According to this principle, people build an identity by making psychological commitments to social institutions in the form of social roles such as work, marriage, family, and community. Moreover, it has been argued that investments in these conventional social roles, such as developing a career and a family, are quasi-universal tasks of social living (Helson, Kwan, John, & Jones, 2002). The universal nature of social investment may help to explain the cross-cultural patterns of increases found on traits such as conscientiousness (Helson & Kwan, 2000; Roberts, Wood, & Smith, 2005).

The crux of the process resides in committing oneself to social institutions outside of one's existing identity structure. This act exposes a person to the contingencies contained in the social role. These contingencies come in the form of role expectations for appropriate behavior (Sarbin, 1964). These role expectations come from the self and from the collective "other." For example, people come to their first job with a set of expectations for how they should act that are derived from their experiences watching significant others in the same types of roles, such as parents, mentors, friends, and other influential people (Caspi & Roberts, 1999). In addition, individuals in a person's social circle will hold a set of expectations for

how the person should act and will reward or punish the person according to whether he or she acts consistently with those expectations.

Role expectations exert social control over behavior, such that if a person violates these expectations he or she will be punished. For example, one study showed that delinquent boys relinquished their life of crime after getting married, in part because their wives kept them in line through threats and admonishments (Sampson & Laub, 1990). Similarly, making commitments to conventional institutions, such as religion, exerts a form of social control because one's behavior is directly supervised and monitored by friends and family members who also participate in the typically conventional organization (Hirschi & Stark, 1969). Presumably, these people will provide social reinforcement for acts that are consistent with moral codes of behavior typically calling for more probity and social responsibility.

There is now consistent evidence derived from longitudinal studies that social investment in work and marriage is associated with increases in conscientiousness. For example, it has been shown that women who achieve higher levels of occupational attainment in work tend to increase in achievement, responsibility, and self-control, demonstrating that more continuous investment in work is related to increases in facets from the domain of conscientiousness (Roberts, 1997). Results from an ongoing longitudinal study of both men and women replicated and extended these findings. Success and involvement in work were associated with increases in achievement and control, two facets of conscientiousness, from the ages of 18 to 26 years (Roberts, Caspi, & Moffitt, 2003).

In the domain of relationships, remaining in a close intimate relationship in young adulthood is related to increases in constraint, a facet of conscientiousness related to impulse control (Robins, Caspi, & Moffitt, 2002). Similarly, engaging in a serious partnership for the first time in young adulthood is associated with decreases in neuroticism and increases in conscientiousness (Neyer & Asendorpf, 2001). Avoiding divorce and maintaining a marriage-like relationship for a longer period of time in young adulthood also are associated with increases in responsibility in midlife (Roberts & Bogg, 2004). Longitudinal studies show that invest-

ment in the conventional roles of work and intimate relationships can explain, in part, the increases in conscientiousness observed in young and middle adulthood.

In summary, people increase in conscientiousness in young adulthood and midlife. We propose that people increase in conscientiousness because they see themselves behaving differently over time and because they respond to contingencies in social roles. The latter comes about through investing in conventional social institutions, such as marriage and work. These institutions, embodied in social roles that are intrinsic to the makeup of identity, bring with them expectations and demands for increased responsibility (see Roberts & Caspi, 2003). Arguably, these two mechanisms of change are not independent; we can assume that people see their behaviors change in response to the expectations that come with adult roles. In turn, both of these mechanisms appear to contribute to the normative patterns of increase in conscientiousness-related traits in adulthood.

Conclusion and Future Directions

It is clear from our overview that conscientiousness, health behaviors, and social investment form an amalgamation of factors that contribute to health and also contribute to their mutual development. Being more conscientious is associated with avoiding potentially harmful behaviors such as tobacco consumption and violent activities. It also is associated with participating in activities, such as exercising and eating healthfully, related to positive health outcomes. In addition, conscientiousness is related to many of the social environmental factors that promote longevity and good health, such as job success, marital stability, larger families, and greater community involvement.

Possibly the most interesting finding is that avoiding risky health behaviors and following life paths that contribute to good health outcomes also are associated with increases in conscientiousness. Thus, the relationship between conscientiousness and health is reciprocal. The behaviors people exhibit and the life paths they follow are dictated in part by being conscientious, in turn facilitating increased conscientiousness. These findings also point to hope for people who may not be overly conscientious in

adolescence and young adulthood, as they might mature in terms of conscientiousness because of their life experiences, which, probabilistically speaking, will most likely entail investing in a career and marriage.

Although convincing, the research to date on these issues is far from definitive, and much work still needs to be done. For example, the preponderance of evidence for the role of conscientiousness in the health process has relied exclusively on self-report methods (cf. Walton & Roberts, 2004). A systematic assessment of personality and health behaviors from multiple perspectives and multiple methods, such as experience sampling, would provide more valid tests of the relationship. Also, most of the research to date on conscientiousness and health behaviors has related personality traits to only one health behavior at a time (e.g., tobacco consumption). It is still an open question whether health behaviors themselves share a common latent trait, and one obvious candidate would be conscientiousness. Another need is better assessments of health and health behaviors. Too much research has relied on self-reports of fitness and diet. Actual fitness assessments via tests of physical strength and aerobic conditioning could be used instead, providing a better assessment of the physical manifestation of conscientiousness and other personality traits.

A second domain that needs greater attention is the longitudinal relationships among the three sets of variables described here. Most of the longitudinal studies described were not designed with conscientiousness, health behaviors, or social investment in mind. For example, no longitudinal study has incorporated our more comprehensive model of conscientiousness with a thorough assessment of health behaviors across domains or a thorough assessment of social investment patterns. A well-run longitudinal study that integrates these three domains could answer the question we posed at the beginning of this article: Do increases in conscientiousness add years to one's life?

If these patterns replicate and play out in longitudinal data, as we suspect they will, one implication that naturally arises is how then we can proactively change conscientiousness. Given the patterns already identified, it seems clear that persuading people to invest in social

institutions might be one way of facilitating these increases. In young people, this might not necessitate early marriage or work but may be manifested through involvement in community activities or social groups that entail a modicum of responsibility and control. Quite possibly, intervention programs designed to help people stop smoking, eat more healthfully, exercise, and kick their drug habit already contribute to increases in conscientiousness. It would be a simple idea to test. We need only to design a typical intervention study with a control group and the administration of conscientiousness measures before and after the intervention to test the idea.

In conclusion, it appears that many interesting factors arise at the confluence of our two seemingly unrelated research findings. Conscientiousness most likely contributes to longevity through its effect on health behaviors and the life paths that conscientious people create for themselves. Conscientious people tend to avoid risky health behaviors, engage in activities that promote good health, and invest in work, family, and community in ways that are known to contribute to longevity. In turn, people develop (or do not) in terms of conscientiousness because of the behaviors they enact and because of the life paths they follow. The good news is that most people invest in the social institutions of work and family in ways that will promote increases in conscientiousness, which may be one reason for the general pattern of increases in conscientiousness found across both cross-sectional and longitudinal studies. The interesting questions that remain pertain to identifying the mechanisms underlying these relationships and coming to understand whether the development of conscientiousness contributes even more gains to health as people age.

References

- Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist, 49*, 15–24.
- Adler, N., & Matthews, K. (1994). Health psychology: Why do some people get sick and some stay well? *Annual Review of Psychology, 45*, 229–259.

- Ashton, M. C. (1998). Personality and job performance: The importance of narrow traits. *Journal of Organizational Behavior*, *19*, 289–303.
- Bogg, T., & Roberts, B. W. (2004). *Conscientiousness and health behaviors: A meta-analysis*. Unpublished manuscript, University of Illinois, Urbana-Champaign.
- Burke, G. L., Arnold, A. M., Bild, D. E., Cushman, M., Fried, L. P., Newman, A., et al. (2001). Factors associated with healthy aging: The cardiovascular health study. *Journal of the American Geriatric Society*, *49*, 254–262.
- Caspi, A., & Roberts, B. W. (1999). Personality change and continuity across the life course. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (Vol. 2, pp. 300–326). New York: Guilford Press.
- Chuah, S. C., Drasgow, F., & Roberts, B. W. (in press). Personality assessment: Does the medium matter? No. *Journal of Research in Personality*.
- Clark, L. A., & Watson, D. (1999). Temperament: A new paradigm for trait psychology. In L. Pervin & O. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 399–423). New York: Guilford Press.
- Conn, S., & Reike, M. L. (Eds.). (1994). *The 16PF fifth edition technical manual*. Champaign, IL: Institute for Personality and Ability Testing.
- Costa, P. T., & McCrae, R. R. (1994). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1997). Longitudinal stability of adult personality. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 269–292). San Diego, CA: Academic Press.
- Costa, P. T., & McCrae, R. R. (1998). Six approaches to the explication of facet-level traits: Examples from conscientiousness. *European Journal of Personality*, *12*, 117–134.
- Cramer, D. (1993). Personality and marital dissolution. *Personality and Individual Differences*, *14*, 605–607.
- Dudek, S. Z., & Hall, W. B. (1991). Personality consistency: Eminent architects 25 years later. *Creativity Research Journal*, *4*, 213–231.
- Friedman, H. S., Tucker, J. S., Tomlinson-Keasey, C., Schwartz, J. E., Wingard, D. L., & Criqui, M. H. (1993). Does childhood personality predict longevity? *Journal of Personality and Social Psychology*, *65*, 176–185.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, *48*, 26–34.
- Goldberg, L. R. (1999). *International personality item pool: A scientific collaboratory for the development of advanced measures of personality and other individual differences*. Available from International Personality Item Pool Web site, <http://ipip.ori.org/>
- Gough, H. G., & Bradley, P. (1996). *CPI manual* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Helson, R., & Kwan, V. S. Y. (2000). Personality development in adulthood: The broad picture and processes in one longitudinal sample. In S. Hampson (Ed.), *Advances in personality psychology* (Vol. 1, pp. 77–106). London: Routledge.
- Helson, R., Kwan, V. S. Y., John, O. P., & Jones, C. (2002). The growing evidence for personality change in adulthood: Findings from research with personality inventories. *Journal of Research in Personality*, *36*, 287–306.
- Helson, R., & Wink, P. (1992). Personality change in women from the early 40s to the early 50s. *Psychology and Aging*, *7*, 46–55.
- Hirschi, T., & Stark, R. (1969). Hellfire and delinquency. *Social Problems*, *17*, 202–213.
- House, J. S., Landis, K. R., & Umberson, D. (1988, July 29). Social relationships and health. *Science*, *241*, 540–545.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (Vol. 2, pp. 102–138). New York: Guilford Press.
- Judge, T. A., Higgins, C. A., Thoreson, C. J., & Barrick, M. R. (1999). The Big Five personality traits, general mental ability, and career success across the life span. *Personnel Psychology*, *52*, 621–652.
- Kelly, E., & Conley, J. (1987). Personality and compatibility: A prospective analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology*, *52*, 27–40.
- MacDonald, D. A. (2000). Spirituality: Description, measurement, and relation to the five factor model of personality. *Journal of Personality*, *68*, 153–197.
- McCrae, R. R., & Costa, P. T. (1994). The stability of personality: Observation and evaluations. *Current Directions in Psychological Science*, *3*, 173–175.
- McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 139–153). New York: Guilford Press.
- McCrae, R. R., Costa, P. T., Jr., Pedroso de Lima, M., Simoes, A., Ostendorf, F., Angleitner, A., et al. (1999). Age differences in personality across the adult life span: Parallels in five cultures. *Developmental Psychology*, *35*, 466–477.

- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*, 175–215.
- McCullough, M. E., Hoyt, W. T., Larson, D. B., Koenig, H. G., & Thoresen, C. E. (2000). Religious involvement and mortality: A meta-analytic review. *Health Psychology, 19*, 211–222.
- McGinnis, M., & Foege, W. (1993). Actual causes of death in the United States. *Journal of the American Medical Association, 270*, 2207–2212.
- Mershon, B., & Gorsuch, R. L. (1988). Number of factors in personality sphere: Does increase in factors increase predictability of real life criteria? *Journal of Personality and Social Psychology, 55*, 675–680.
- Miller, L., Davis, M., & Greenwald, S. (2000). Religiosity and substance use and abuse among adolescents in the National Comorbidity Survey. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 1190–1197.
- Neyer, F. J., & Asendorpf, J. B. (2001). Personality-relationship transaction in young adulthood. *Journal of Personality and Social Psychology, 81*, 1190–1204.
- Ostrove, J. M., Adler, N. E., Kuppermann, M., & Washington, A. E. (2000). Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychology, 19*, 613–618.
- Paunonen, S. V. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*, 538–556.
- Paunonen, S. V., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*, 524–539.
- Paunonen, S. V., & Jackson, D. N. (2000). What is beyond the Big Five? Plenty! *Journal of Personality, 68*, 821–835.
- Roberts, B. W. (1997). Plaster or plasticity: Are work experiences associated with personality change in women? *Journal of Personality, 65*, 205–232.
- Roberts, B. W., & Bogg, T. (2004). A 30-year longitudinal study of the relationships between conscientiousness-related traits and the family structure and health-behavior factors that affect health. *Journal of Personality, 72*, 325–354.
- Roberts, B. W., Bogg, T., Walton, K. E., Chernyshenko, O., & Stark, S. (2004). A lexical approach to identifying the lower-order structure of conscientiousness. *Journal of Research in Personality, 38*, 164–178.
- Roberts, B. W., & Caspi, A. (2003). The cumulative continuity model of personality development: Striking a balance between continuity and change in personality traits across the life course. In R. M. Staudinger & U. Lindenberger (Eds.), *Understanding human development: Lifespan psychology in exchange with other disciplines* (pp. 183–214). Dordrecht, the Netherlands: Kluwer Academic.
- Roberts, B. W., Caspi, A., & Moffitt, T. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology, 84*, 582–593.
- Roberts, B. W., Chernyshenko, O., Stark, S., & Goldberg, L. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. *Personnel Psychology, 58*, 103–139.
- Roberts, B. W., Robins, R. W., Caspi, A., & Trzesniewski, K. (2003). Personality trait development in adulthood. In J. Mortimer & M. Shanahan (Eds.), *Handbook of the life course* (pp. 579–598). New York: Kluwer Academic.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (in press). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*.
- Roberts, B. W., & Wood, D. (in press). Personality development in the context of the neo-socioanalytic model of personality. In D. Mroczek & T. Little (Eds.), *Handbook of personality development*. Mahwah, NJ: Erlbaum.
- Roberts, B. W., Wood, D., & Smith, J. L. (2005). Evaluating five factor theory and social investment perspectives on personality trait development. *Journal of Research in Personality, 39*, 166–184.
- Robins, R. W., Caspi, A., & Moffitt, T. (2002). It's not just who you're with, it's who you are: Personality and relationship experiences across multiple relationships. *Journal of Personality, 70*, 925–964.
- Robins, R. W., Fraley, C., Roberts, B. W., & Trzesniewski, K. (2001). A longitudinal study of personality change in young adulthood. *Journal of Personality, 69*, 617–640.
- Sampson, R. J., & Laub, J. H. (1990). Crime and deviance over the life course: The salience of adult social bonds. *American Sociological Review, 55*, 609–627.
- Samuelsson, G., & Dehlin, O. (1994). Family network and mortality: Survival chances through the lifespan of an entire age cohort. *International Journal of Aging and Human Development, 37*, 277–295.
- Sarbin, T. R. (1964). Role theoretical interpretation of psychological change. In P. Worchel & D. Byrne (Eds.), *Personality change* (pp. 176–219). New York: Wiley.
- Saucier, G. (2002). Orthogonal markers for orthogonal factors: The case of the Big Five. *Journal of Research in Personality, 36*, 1–31.

- Saucier, G., & Goldberg, L. R. (1998). What is beyond the Big Five? *Journal of Personality*, *66*, 495–524.
- Saucier, G., & Ostendorf, F. (1999). Hierarchical subcomponents of the Big Five personality factors: A cross-language replication. *Journal of Personality and Social Psychology*, *76*, 613–627.
- Srivastava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology*, *84*, 1041–1053.
- Stewart, G. L. (1999). Trait bandwidth and stages of job performance: Assessing differential effects for conscientiousness and its subtraits. *Journal of Applied Psychology*, *84*, 959–968.
- Taylor, A., & MacDonald, D. A. (1999). Religion and the five factor model of personality: An exploratory investigation using a Canadian university sample. *Personality and Individual Differences*, *27*, 1243–1259.
- Tellegen, A. (1982). *A brief manual for the Multidimensional Personality Questionnaire*. Unpublished manuscript, University of Minnesota.
- Tucker, J. S., Friedman, H. S., Wingard, D. L., & Schwartz, J. E. (1996). Marital history at midlife as a predictor of longevity: Alternative explanations to the protective effect of marriage. *Health Psychology*, *15*, 94–101.
- Tucker, J. S., Kressin, N. R., Spiro, A., & Ruscio, J. (1998). Intrapersonal characteristics and the timing of divorce: A prospective investigation. *Journal of Social and Personal Relationships*, *15*, 211–225.
- Tucker, J. S., Schwartz, J. E., Clark, K. M., & Friedman, H. S. (1999). Age-related changes in the associations of social network ties with mortality risk. *Psychology and Aging*, *14*, 564–571.
- Walton, K. E., & Roberts, B. W. (2004). On the relationship between substance use and personality traits: Abstainers are not maladjusted. *Journal of Research in Personality*, *38*, 515–535.

Received September 25, 2004

Accepted September 25, 2004 ■