

## Personality Traits Change in Adulthood: Reply to Costa and McCrae (2006)

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In a response to P. T. Costa, Jr., and R. R. McCrae (2006), the authors show that Costa and McCrae's writings on personality suggest a belief in immutability of personality traits. The authors agree with Costa and McCrae that new personality trait models that provide an accurate lower order structure of personality traits are needed and explain why the Revised NEO Personality Inventory is not the correct model for that purpose. The authors provide direct evidence refuting the hypothesis that personality traits change only because of biologically based intrinsic maturation. The authors present arguments supporting the contention that meta-analyses should be preferred to single longitudinal studies when drawing inferences about general patterns of personality development. Finally, the authors point out why the differences between their position and Costa and McCrae's are important.

*Keywords:* personality traits, personality change, immutable, NEO-PI-R, meta-analysis

We are pleased to be given the opportunity to address several issues raised by Costa and McCrae (2006) in response to our meta-analysis (Roberts, Walton, & Viechtbauer, 2006) of mean-level change in personality. In a collegial fashion, Costa and McCrae have brought up a number of serious issues that deserve to be discussed in greater detail.

### Are Costa and McCrae a Foil?

Although Costa and McCrae have periodically admitted that personality traits change in adulthood (Costa & McCrae, 1989, 2002), they have minimized the change in their writing. For example, consider the following statements: "It appears from several longitudinal studies that most personality traits show little or no change in mean levels after age 30" (Costa & McCrae, 1992, p. 89); "Individual differences in personality traits, which show at least some continuity from early childhood on, are also essentially fixed by age 30" (McCrae & Costa, 1994, p. 173); or more forcefully, "Despite wide differences in measures, subjects, and periods of the life span studied, all these studies concurred in finding relatively little change in the average level of personality traits and surprisingly high stability of individual differences. Barring interventions or catastrophic events, personality traits ap-

pear to be essentially fixed after age 30" (Costa, McCrae, & Siegler, 1999, p. 130).

As we noted in the introduction to our meta-analysis (Roberts et al., 2006), Costa and McCrae have shown a subtle shift in their description of personality development in the last few years (Costa & McCrae, 2002). For example, they have begun to admit that personality changes in adulthood, typically with statements such as that change continues "at a very modest pace throughout adulthood" (McCrae & Costa, 1999, p. 145). Despite this, they continue to emphasize stability of personality. For example, just recently they wrote, "Taken together these results are consistent with the broad prediction of Costa and McCrae (2002) that age changes after age 30 are very limited" (Weiss et al., 2005, p. 184). As we noted in the discussion of our article, this is one place where the meta-analysis is authoritative. There is now strong evidence that personality traits change in adulthood past the age of 30.

### How Should We Organize Personality Traits Below the Big Five?

We agree with Costa and McCrae's argument that future meta-analyses should organize data according to a replicable lower order structure of personality traits. The key question is whether there is a justifiable lower order structure already available and whether the Revised NEO Personality Inventory (NEO-PI-R) is representative of that structure. Our answer is no. The key ingredient for a system to provide an adequate lower order structure of the Big Five is some empirical foundation to selecting lower order traits that goes beyond typical personality inventory construction methods. Unfortunately, in this respect, the NEO-PI-R is like most other Big Five measures. The items of the NEO-PI-R were generated from a top-down model of the Big Five, and as the authors themselves have stated, theoretical insight and intuition were the guiding influence over the generation of items for each domain and the resulting lower order facets for each of the Big Five (Costa & McCrae, 1998). The limits of this rational approach to identifying the lower order structure of the Big Five were highlighted in a

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Preparation of this article was supported by a grant from the National Institute on Aging (R01 AG21178). We thank Tim Bogg, Jennifer Smith, Chris Fraley, Dustin Wood, and Peter Harms for helpful comments on drafts of this article.

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recent effort to establish an empirically justifiable lower order structure of conscientiousness. Roberts, Chernyshenko, Stark, and Goldberg (2005) found that no personality inventory in existence, including the NEO-PI-R, provided a structure that covers the entire domain.

### Interpreting the Data

Researchers do not always interpret data in the same way, even when they agree on the numbers. For example, Costa and McCrae (1988) anticipated our findings when they estimated that the upper limit of personality trait change across the life course would be approximately one standard deviation (p. 860). Costa and McCrae used this estimate to point out that there was not much change in personality traits, whereas we concluded that this was an impressive amount of change. We based our conclusion on the burgeoning evidence that most effect sizes in psychology are between one quarter and one half of a standard deviation (e.g., small- to medium-sized effects; Meyer et al., 2001) and that effect sizes of one standard deviation are considered quite large (Cohen, 1992). According to these standards, the individual decade-to-decade effect sizes we report in our meta-analysis (Roberts et al., 2006) are consistent with most effect sizes in psychology, and the cumulative effect sizes are quite large indeed.

Beyond the numbers is the more interesting question of why we might find these patterns of personality trait development. This is where we find ourselves disagreeing most with the five-factor theory approach to personality development. The five-factor theory argues that personality trait change is purely biological and is governed solely by genetic factors (McCrae et al., 2000). The evidence supporting the position that personality change results from intrinsic maturational processes (i.e., genes) has been refuted by numerous studies (for reviews, see Fraley & Roberts, 2005; Roberts, Wood, & Smith, 2005). For example, several recent studies have shown that there are impressive levels of individual differences in trait change in old age (Mroczek & Spiro, 2003; Small, Hertzog, Hultsch, & Dixon, 2003). Also, researchers have found Gene  $\times$  Environment interaction effects for traits linked to low agreeableness and neuroticism (Caspi et al., 2002, 2003), and these studies have now been replicated several times (Moffitt, Caspi, & Rutter, in press). And finally, our meta-analysis (Roberts et al., 2006) of mean-level change revealed several cohort effects on personality trait change. If people demonstrate individual differences in change that partially contradict normative trends, if individual differences result from Gene  $\times$  Environment interactions, and if cohort standing can affect personality change, then how could personality development be driven only by genes?

The acknowledgment that the environment plays a role in personality development invites the legitimate question of whether there are replicable associations between life experiences and change in personality traits. We take issue with Costa and McCrae's (2006) statement that it has been "difficult to demonstrate any replicable environmental effects on personality traits" (p. 29). Several reviews of this literature have been previously published and show compelling replications across separate longitudinal studies (Roberts, Robins, Caspi, & Trzesniewski, 2003; Roberts, Wood, & Smith, 2005). For example, success in paid work is associated with increases in measures of dominance (Roberts, 1997; Roberts, Caspi, & Moffitt, 2003). Remaining in a stable

relationship is associated with increases in traits from the family of conscientiousness (Roberts & Bogg, 2004; Robins, Caspi, & Moffitt, 2002). Relationship dissatisfaction and insecurity are associated with increases in neuroticism (Neyer & Asendorpf, 2001; Roberts & Chapman, 2000; Robins et al., 2002; Scollon, 2004). And finally, drug consumption is associated with decreases in conscientiousness-related traits (Roberts & Bogg, 2004; Stein, Newcomb, & Bentler, 1987). Given the challenge of running one longitudinal study, finding any sort of replication across longitudinal studies is remarkable.

### Limits of Meta-Analysis

We agree with Costa and McCrae that meta-analyses are not definitive. Nonetheless, we believe that they provide a more reliable estimate of personality continuity and change than any single longitudinal study. We say this not as outsiders looking in on longitudinal work but as researchers enthusiastic about both meta-analysis and longitudinal studies, as we are involved in the assessment, maintenance, and evaluation of seven different longitudinal studies in addition to our meta-analytic work.

One of the primary weaknesses of individual longitudinal studies is their idiosyncratic nature. Many studies focus on elite samples, on men or women, or on specific cohorts. Furthermore, individual longitudinal studies do not afford us the opportunity to test whether many factors can and do affect patterns of personality development. For example, several longitudinal studies are necessary to infer cohort effects (e.g., Helson, Jones, & Kwan, 2004), and the number of studies provided in a meta-analysis offers even stronger tests of this and similar ideas. In this way, meta-analyses are more definitive than any one longitudinal study. This is not to say that they are so reliable as to rule out future longitudinal research. Our impression is that, like other studies, meta-analyses often invite more questions than they answer and thus generate the need for continued longitudinal investigations of personality development and other topics.

### Why Should We Care?

In sum, a sober examination of our differences with Costa and McCrae boils down to the fact that we are willing to state clearly that personality traits change after age 30 and that the environment plays a role in that change. Costa and McCrae, to date, have shown a reticence to describe personality development in this way.

We think this is a crucial difference for several reasons. First, at the moment, we do not fully understand the implications of personality trait change. Personality traits are related to many domains of life, ranging from health to marriage to work (Caspi, Roberts, & Shiner, 2005). How, then, will change in personality traits affect these relationships? For example, conscientiousness is related to all of the leading behavioral factors connected to premature mortality (Bogg & Roberts, 2004). If people increase in conscientiousness with age, are they literally adding years to their life? There is already evidence to that effect for neuroticism. Men who increased less than one half of a standard deviation in neuroticism in adulthood were at a 37% higher risk for dying than their counterparts (Mroczek & Spiro, 2005). In short, personality change may have profound implications for very important outcomes, such as health and longevity.

Second, if we accept that personality traits continue to change even in old age, then we are forced to ask a series of questions that receive little attention in five-factor theory, such as why certain traits stay consistent and why other traits change. What role do environmental factors play in maintaining continuity and promoting change in personality traits? How do genes interact with environments to arrive at what we would see as personality traits? Developmentally speaking, why do humans remain open systems well past childhood and adolescence? Moreover, accepting the fact that personality traits change in adulthood highlights the inadequacies of almost all theoretical positions found in personality psychology and personality development (Roberts & Caspi, 2003). Addressing the questions brought about by personality change will inevitably move the field to a new set of theories and potentially a new vision of personality psychology that is more dynamic, inclusive of both person and environmental variables, and hopefully more accurate (e.g., Mayer, 2005). Though differences between our position and Costa and McCrae's may seem minor, those differences have profound implications for how we understand and study personality and its development.

## References

- Bogg, T., & Roberts, B. W. (2004). Conscientiousness and health behaviors: A meta-analysis of the leading behavioral contributors to mortality. *Psychological Bulletin, 130*, 887–919.
- Caspi, A., McClay, J., Moffitt, T. E., Mill, J., Martin, J., Craig, I. W., et al. (2002, August 2). Role of genotype in the cycle of violence in maltreated children. *Science, 297*, 851–854.
- Caspi, A., Roberts, B. W., & Shiner, R. (2005). Personality development. *Annual Review of Psychology, 56*, 453–484.
- Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., et al. (2003, July 18). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science, 301*, 386–389.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159.
- Costa, P. T., & McCrae, R. R. (1988). Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. *Journal of Personality and Social Psychology, 54*, 853–863.
- Costa, P. T., Jr., & McCrae, R. R. (1989). *The NEO-PI/NEO-FFI manual supplement*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1992). Multiple uses for longitudinal personality data. *European Journal of Personality, 6*, 85–102.
- 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.
- Costa, P. T., Jr., & McCrae, R. R. (2002). Looking backward: Changes in the mean levels of personality traits from 80 to 12. In D. Cervone & W. Mischel (Eds.), *Advances in personality science* (pp. 219–237). New York: Guilford Press.
- Costa, P. T., Jr., & McCrae, R. R. (2006). Age changes in personality and their origins: Comment on Roberts, Walton, and Viechtbauer (2006). *Psychological Bulletin, 132*, 28–30.
- Costa, P. T., Jr., McCrae, R. R., & Siegler, I. C. (1999). Continuity and change over the adult life cycle: Personality and personality disorders. In C. R. Cloninger (Ed.), *Personality and psychopathology* (pp. 129–154). Washington, DC: American Psychiatric Press.
- Fraley, C., & Roberts, B. W. (2005). Patterns of continuity: A dynamic model for conceptualizing the stability of individual differences in psychological constructs across the life course. *Psychological Review, 112*, 60–74.
- Helson, R., Jones, C., & Kwan, V. S. Y. (2004). Personality change over 40 years of adulthood: Hierarchical linear modeling analyses of two longitudinal samples. *Journal of Personality and Social Psychology, 83*, 752–766.
- Mayer, J. D. (2005). A tale of two visions: Can a new view of personality help integrate psychology. *American Psychologist, 60*, 294–307.
- 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., Ostendorf, F., Angleitner, A., Hrebickova, M., Avia, M. D., et al. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology, 78*, 173–186.
- Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., et al. (2001). Psychological testing and psychological assessment. *American Psychologist, 56*, 128–165.
- Moffitt, T. E., Caspi, A., & Rutter, M. (in press). Measured gene-environment interactions in psychopathology: Concepts, research strategies, and implications for research, intervention, and public understanding of genetics. *Perspectives on Psychological Sciences*.
- Mroczek, D. K., & Spiro, A., III. (2003). Modeling intraindividual change in personality traits: Findings from the Normative Aging Study. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 58*, P153–P165.
- Mroczek, D. K., & Spiro, A., III. (2005, January). *Personality change influences mortality in older men*. Paper presented at the 6th Annual Meeting of the Association for Research in Personality, New Orleans, LA.
- Neyer, F. J., & Asendorpf, J. B. (2001). Personality-relationship transaction in young adulthood. *Journal of Personality and Social Psychology, 81*, 1190–1204.
- 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., & 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., & Chapman, C. (2000). Change in dispositional well-being and its relation to role quality: A 30-year longitudinal study. *Journal of Research in Personality, 34*, 26–41.
- 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. (2006) Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132*, 3–27.
- 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. E. (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.
- Scollon, C. N. (2004). *Predictors of intraindividual change in personality and well-being*. Unpublished doctoral dissertation, University of Illinois, Urbana–Champaign.
- Small, B. J., Hertzog, C., Hultsch, D. F., & Dixon, R. A. (2003). Stability and change in adult personality over 6 years: Findings from the Victoria Longitudinal Study. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 58*, P166–P176.
- Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1987). Personality and drug use: Reciprocal effects across four years. *Personality and Individual Differences, 8*, 419–430.
- Weiss, A., Costa, P. T., Jr., Karuza, J., Duberstein, P. R., Friedman, B., & McCrae, R. R. (2005). Cross-sectional age differences in personality among Medicare patients aged 65 to 100. *Psychology and Aging, 20*, 182–185.

Received July 20, 2005

Accepted August 19, 2005 ■