JOURNAL OF Personality

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Journal:	*Journal of Personality*
Manuscript ID	JOPY-16-0145.R1
Manuscript Type:	Special Issue Manuscript
Date Submitted by the Author:	n/a
Complete List of Authors:	Bleidorn, Wiebke; University of California Davis, Department of Psychology Hopwood, Christopher; Michigan State University, Psychology Lucas, Richard
Keywords:	Big Five, personality development, life events, adulthood, longitudinal

Life Events and Personality Trait Change

Wiebke Bleidorn[1]

Christopher J. Hopwood[2]

Richard E. Lucas[2]

[1] *University of California, Davis, United States*

[2] *Michigan State University, United States*

Acknowledgements: Correspondence concerning this article should be addressed to Wiebke Bleidorn, Department of Psychology, University of California Davis, One Shields Avenue, Davis, CA 95616, United States. E-mail: wiebkebleidorn@gmail.com

Running head: LIFE EVENTS AND TRAIT CHANGE

Abstract

Theory and research have emphasized the impact of life events on personality trait change. In this article, we review prospective research on personality trait change in response to 9 major life events in the broader domains of love and work. We expected to find that life events lead to personality trait change to the extent that they have a lasting influence on individuals' thoughts, feelings, and behavior. Moreover, we predicted that love-related life events such as marriage or parenthood would be more strongly related to changes in traits that emphasize affective content whereas work-related life events would be more likely to lead to change in traits that reflect behavioral or cognitive content. The current state of research provided some evidence that life events can lead to changes in personality traits and that different life events may be differently related to specific trait domains. However, a more general conclusion emerging from this review is that the evidence for the nature, shape, and timing of personality trait change in response to life events is still preliminary. We discuss the implications of the results for theory and research and provide directions for future studies on life events and personality trait change.

Keywords: Big Five, personality development, life events, longitudinal, adulthood

Personality traits are relatively enduring patterns of thoughts, feelings, and behaviors that distinguish individuals from one another. Their relatively stable nature notwithstanding, personality traits can and do change across the entire life span. In fact, the rank-order stability of personality traits is far from perfect over moderately long intervals (Lucas & Donnellan, 2001; Wortman, Lucas, & Donnellan, 2012; Roberts & DelVecchio, 2000; though see Ferguson, 2010) and it decreases over increasingly long delays. In addition, the majority of people experience medium-sized to large changes in their Big Five personality traits (agreeableness, conscientiousness, extraversion, neuroticism, and openness; Table 1) as they traverse adulthood (Roberts, Walton, & Viechtbauer, 2006; Roberts & Mroczek, 2008; Roberts, Wood, & Caspi, 2008; Soto, John, Gosling, & Potter, 2011; Specht et al., 2014).

The observed changes in personality traits have led to a great deal of speculation about the conditions and causes of these changes. All major theories of personality development emphasize the role of genes and intrinsic maturation processes in trait stability and change (e.g., McCrae & Costa, 2008; Roberts & Wood, 2006). Accounts differ in the role given to environmental influences, with some emphasizing the impact of major life events such as marriage, unemployment, or parenthood (e.g., Bleidorn, 2015; Hutteman, Hennecke, Orth, Reitz, & Specht, 2014; Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012; Orth & Robins, 2014; Roberts, Wood, & Smith, 2005; Scollon & Diener, 2006). Such theories propose that life events have lasting effects on personality traits because they can modify, interrupt, or redirect life trajectories by altering individuals' feelings, thoughts, and behavior (Orth & Robins, 2014; Pickles & Rutter, 1991). For example, the birth of the first child is a non-reversible life event that requires sudden and oftentimes drastic changes in new parents' daily behavior, routines, and relationships, which may over time translate into personality

trait changes (Belsky & Rovine, 1990; Bleidorn, Buyukcan-Tetik, Schwaba, van Scheppingen, Denissen, & Finkenauer, 2016; Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009).

However, research on life events and personality trait change has yielded mixed results. For example, Specht and colleagues (Specht, Schmuckle, & Egloff, 2011) examined the effects of 12 major life events on Big Five personality traits using data from the German Socio-Economic Panel (SOEP; Wagner, Frick, & Schupp, 2007). This study showed that life events can lead to changes in personality traits but also that the effects varied considerably between both life events and personality traits. For instance, conscientiousness was most responsive to major life events including divorce, retirement, or the birth of the first child. In contrast, neuroticism was largely unaffected by the experience of any of the life events in this study. Conversely, other studies that focused on the impact of one particular life event, such as the first romantic relationship (Neyer & Lehnart, 2007) or graduation from school (Bleidorn, 2012) did report significant effects of these events on neuroticism.

Overall, there seems to be some evidence to suggest that life events can trigger changes in personality traits. However, some important questions remain. First, do different life events differ in their effects on personality trait change? In other words, which life events matter the most? Second, do different traits differ in their susceptibility to life events? That is, which traits change the most in response to life events? A more general question involves whether there is evidence for robust associations that replicate across different datasets and populations.

In this paper, we review the findings from previous studies on life events and Big Five personality trait change with regard to these questions. Specifically, we will discuss the findings from longitudinal studies that have investigated whether and to what degree the Big Five traits change in response to life events in the broad domains of love and work. Most of

these studies operationalized traits with self-report questionnaires and examined rank-order stability and /or mean-level change. Rank-order stability refers to the relative ordering of individuals in a population over time, commonly quantified as test-retest correlation (*r*) across two assessment waves. Mean-level change reflects the degree to which a population decreases or increases in a personality trait over a specific period, typically quantified as a standardized mean difference between two time points (e.g., Cohen's *d*). Before reviewing the findings of these studies, we first offer a definition of life events and propose a general model to explain why and how different life events may have different effects on different Big Five traits.

Life Events

From a developmental perspective, life events can be viewed as specific transitions that require new behavioral, cognitive, or emotional responses (Hopson & Adams, 1976; Luhmann, Hofmann, Eid, & Lucas, 2012; Luhmann, Orth, Specht, Kandler, & Lucas, 2014). Consistent with this view, we adopted a working definition of life events as "time-discrete transitions that mark the beginning or the end of a specific status" (Luhmann et al., 2012; p. 594). A status can refer to a certain position, rank, role, or condition.

On a more abstract level, status is a nominal variable with at least two different levels (e.g., relationship status: single, married, divorced, or widowed). The transition from one status to another designates a life event (e.g., from married to divorced). This definition of life events excludes minor events (such as daily hassles) and experiences that do not involve a status change (such as being victim of a crime) as well as slow transitions that are not time-discrete (such as menopause or psychotherapy). Also, non-events (e.g., not finding a romantic partner, involuntary childlessness) are not included in this working definition.

Our focus on this relatively narrow definition of life events is not meant to imply that there are no other relevant correlates of personality trait change. In fact, several longitudinal studies have found associations between personality trait changes and various life experiences including, for example, work experiences (e.g., Hudson, Roberts, Lodi-Smith, 2012), leisure activities (e.g., Schwaba, Luhmann, Denissen, & Bleidorn, 2016) or health-related changes (Mueller et al., 2016). However, in the present paper, we exclusively review longitudinal studies that have examined the impact of distinct life events on changes in the Big Five personality traits. In particular, we focus on nine life events in the two broad domains of love (romantic relationships, marriage, parenthood, divorce, widowhood) and work (graduation from school/ college; first job, unemployment, retirement). In addition, we only included prospective studies in which the first measurement occasion took place before the event.

How do Different Life Events Lead to Change in Different Personality Traits?

According to our definition, a life event marks a change in status. However, not all changes in status should affect all personality traits. Instead, the precise effects that an event will have is likely to depend both on the ways that event changes a person's day-to-day thoughts, feelings, and behaviors; and on the match between these changed thoughts, feelings, and behaviors, and the specific personality trait that is affected. Below we describe how the characteristics of the events and the features of distinct personality traits should influence the extent to which personality traits change following an event.

Which Life Events Have a Lasting Impact on Personality Traits?

Theory and research suggests that those life events that involve clearly defined and unambiguous sets of behavioral, cognitive, or emotional demands are most likely to lead to enduring personality changes (Caspi & Moffitt, 1993; Kandler et al., 2012; Neyer, Mund,

Zimmermann, & Wrzus, 2014; Roberts & Jackson, 2008; Specht et al., 2011). For example, the transition to the first job usually requires people to be on time, to meet deadlines, and to work thoroughly. In other words, at work, people are typically required to act conscientiously. To the extent that the transition to the first job changes an individual's conscientiousness-related thoughts, feelings, and behavior and to the extent that these changes are stable and generalizable to other life domains, they should translate into broader and lasting trait changes (Fleeson & Jolley, 2006; Roberts, 2006; Roberts et al., 2005).

The idea that life events will not affect personality traits directly but indirectly via their effects on momentary feelings, thoughts, and behaviors is consistent with the sociogenomic model of personality (Roberts & Jackson, 2008; for an update, see Roberts & Jackson, this issue). According to this model, life events most likely affect personality traits in a bottom-up fashion through prolonged effects on an individual's personality-relevant states. This proposition has important implications for the time course of personality trait change. Specifically, changes in response to life events likely unfold in a slow and incremental way over relatively long periods of time (Hennecke, Bleidorn, Denissen, & Wood, 2014; Luhmann et al., 2014; Roberts & Jackson, 2008). This is not to say that there can be no immediate effects of life events on personality traits. Indeed, research on change in other personality-relevant characteristics such as subjective well-being (e.g., Lucas, 2007; Luhmann et al., 2012) or self-esteem (Bleidorn et al., 2016; Chung, Robins, Trzesniewski, Noftle, Roberts, & Widaman, 2013) has shown that change in response to life events is often non-linear or discontinuous.

Why Do Different Life Events Lead to Change in Different Personality Traits?

Even though traits are thought to reflect relatively stable patterns of affect, behavior, and cognition, these three components of traits have been found to be differentially emphasized across the Big Five traits (Pytlik Zillig, Hemenover, & Dienstbier, 2002; Wilt & Revelle, 2015). Across measures, each of the Big Five traits has been shown to be operationalized and described by different levels of affect, behavior, and cognition; and each trait seems to represent one of these three content domains more strongly than the others. Specifically, neuroticism and to a lesser degree also extraversion are typically represented by items that reflect affective content; agreeableness, extraversion, and conscientiousness emphasize behavioral content (with agreeableness and extraversion specifically emphasizing social behavior; Wiggins, 1991); and openness is represented primarily by cognitive content (Wilt & Revelle, 2015; Table 1). \

To the extent that different life events evoke different degrees of affective, cognitive, or behavioral responses, they should have different effects on the rate of change and / or rank-order stability of different Big Five traits. Some life events, such as the transition to the first job, may be primarily associated with behavioral changes. Other life events might have stronger implications for the affective or cognitive components of traits. For instance, the transition to a long-term romantic relationship may be primarily associated with changes in an individual's feelings and to a lesser degree with changes in their thoughts or social behaviors. In contrast, the transition to the first job may be better characterized by evoking behavioral and cognitive changes, and to a lesser degree with affective and social changes.

We hypothesize that life events have different effects on different Big Five traits depending on the degree to which the traits reflect behavioral, social, affective, or cognitive content. Specifically, we expect life events that are mainly associated with behavioral changes to be most strongly associated with changes in conscientiousness. Life events with a

strong social and emotional component should impact agreeableness, extraversion, and neuroticism. Finally, openness to experience should be most sensitive to life events that have implications for an individual's cognitive patterns and thinking. More generally, we expect that life events that fall within the domain of love are more strongly related to changes in traits that emphasize affect and social behavior (agreeableness, extraversion, and neuroticism), whereas work-related life events are more likely to lead to change in traits that reflect behavioral or cognitive content (conscientiousness and openness; Table 1).

Love and Personality Trait Change

Romantic Relationships

In recent years, several longitudinal studies have examined the impact of romantic relationships on Big Five personality trait change. These studies have typically compared the personality trajectories of people who entered a romantic relationship with the personality trajectories of people who remained single throughout the research period. A few studies have also looked into the effects of separation on personality trait change by comparing the personality trajectories of participants who separated from their romantic partners with those who remained committed to their romantic partners (Neyer et al., 2014).

One of the earliest studies by Neyer and Asendorpf (2001) used data from a representative sample of German adults (age 18 – 30 years) who completed both personality and relationship measures at two measurement occasions across four years. This study found that participants who entered a romantic relationship for the first time showed more pronounced decreases in neuroticism and increases in extraversion and conscientiousness than participants who remained single across the study period. In contrast, ending a romantic relationship was not associated with personality trait change.

Neyer and Lehnart (2007) used the same sample to study the effects of the first partnership on personality trait change across three measurement waves over 8 years. The addition of a third measurement wave allowed them to compare personality changes among four different groups: stable singles (participants who remained single across 8 years), early beginners (participants who were in stable romantic relationship across the 8-year research period), timely beginners (participants who entered into a romantic relationship between the first two measurement occasions), and late beginners (participants who entered into a romantic relationship between the last two measurement occasions). With one exception, the results were largely consistent with the findings by Neyer and Asendorpf (2001). Early, timely, and late beginners showed decreases in neuroticism and increases in extraversion after they entered into a romantic relationship whereas stable singles remained stable on these traits throughout the 8-year period. However, for the group of late beginners the effects of relationship formation on conscientiousness did not replicate in the group of late beginners.

The decreasing effect of romantic relationship formation on neuroticism was replicated in another 8-year study from the United States that was comparable in terms of longitudinal design and age group but focused on changes in neuroticism only (Lehnart, Neyer, & Eccles, 2010). Compared to stable singles, participants who entered a romantic relationship for the first time showed decreases in facets of neuroticism such as depression and social anxiety.

Research on the influences of romantic status changes on personality traits highlights a general limitation of this area of research, that random assignment of participants to different life events or control conditions is usually not feasible or ethical. People typically select themselves into certain roles and environments. That is, the experience (or non-

experience) of most life events reflects selection effects implying that putative effects of the life events are confounded with preexisting group differences (Foster, 2010). For instance, singles and relationship beginners have been found to differ in a number of psychological characteristics, including their personality traits (e.g., Neyer & Lehnart, 2007). Causal interpretations of romantic relationship effects on trait change would be compromised to the degree that these preexisting group differences drive the observed differences in personality trait change.

Recently, Wagner, Becker, Luedtke, and Trautwein (2015) aimed to address this problem and provided a more rigorous statistical test of the effects of the first partnership experience on personality change by using propensity score matching techniques. Propensity score matching can be used integrate the information on all observed covariates to create matched samples that statistically differ only with regard to the experience of a particular life event (Rosenbaum & Rubin, 1983; Thoemmes & Kim, 2011). Using matched samples and 4-year longitudinal data, the results of this study only partially replicated the findings of previous studies. Specifically, the first partnership experience was related to higher extraversion and conscientiousness and to lower neuroticism only in participants who had their first partnership experience between the ages of 23 and 25 but not in participants who established their first partnership between the ages of 21 and 23.

Taken together, longitudinal research on romantic relationships and personality trait change has frequently, but not always, found that the transition to first partnership is associated with decreases in neuroticism. Less frequently, studies have found that entering a partnership is associated with increases in extraversion. In contrast, research consistently indicates that separating from one's romantic partner is not related to subsequent personality trait change. Across all studies, the effect sizes of partnership formation on

personality traits were generally small and ranged around *r* ~.20. Also, controlling for observed differences between singles and people who entered a romantic relationship using propensity score matching techniques, these effects were only replicated for young adults in their early twenties.

Marriage

Ample research has examined the impact of marriage on happiness and well-being (Lucas, 2007; Luhmann et al., 2012). In contrast, the question of how this life event may affect newlyweds' personality traits has received relatively little attention. To date, only three prospective studies have examined the effect of marriage on Big Five personality trait change.

To test whether it is the transition into a relationship versus the event of becoming married that is most strongly associated with personality trait change, Neyer and Asendorpf (2001) compared the personality trait changes of unmarried participants who were in a romantic relationship (N= 176) with those who got married (N= 67) during the 4-year research period. This study found no differences between married participants and participants in a romantic relationship. Although this comparison is not well-powered to detect small differences, this limited evidence suggests that it was not marriage but rather beginning a partnership that triggered the abovementioned personality trait changes in young adults.

Costa, Herbst, McCrae, and Siegler (2000) used data from a sample of middle-aged adults (39-45 years) to contrast Big Five personality trait change in participants who got married vs. divorced across two measurement occasions. Although the sample sizes in this study were quite small, they found divorced women (N=29) to show modest increases in extraversion and openness relative to women who got married (N= 20) across 6 to 9 years.

Divorced men (N = 79) showed increases in facets of neuroticism and decreases in facets of conscientiousness; whereas married men (N = 68) decreased in neuroticism. The effect sizes were small to medium-sized and ranged around 4 to 6 *T*-Score points (r = .20 – .30).

These early studies on marriage and personality trait change should be interpreted with caution. The sample sizes of the participant groups who got married were small and it might be that the presumably small effects of marriage on personality went undetected due to a lack of statistical power. Also, both Neyer and Asendorpf (2001) and Costa et al. (2000) contrasted married participants with participants who had experienced a different love-related life event (new partnership vs. divorce) rather than a non-event during the research period. Specht and colleagues (2011) aimed to address these issues in their aforementioned large-scale representative longitudinal study on life events and personality trait change. Using two-wave longitudinal data, they contrasted Big Five trait changes in married participants (N = 664) with those in participants who did not get married during the 4-year research period (N ~14,000). They found that individuals who got married tended to show more pronounced decreases in extraversion and openness to experience as compared to the participants who did not get married. However, the effect sizes were small (r <.20) and the researchers did not distinguish between first and later marriages.

In summary, the scarcity of longitudinal research limits the conclusions that can be drawn concerning the effects of marriage on Big Five personality trait change. In particular, the lack of longitudinal studies with more than two measurement waves and longer time periods is problematic and perhaps surprising, given the societal importance of this life event. Also, no study to date has examined the impact of marriage on personality trait change using a matched control group design (e.g., by means of propensity score matching).

Divorce

The hypothesized links between relationship formation and personality change are relatively straightforward and clear. Because secure romantic relationships are such an important (and relatively universal) experience, entering into such a relationship could be expected to impact the affective aspects associated with traits like neuroticism and perhaps extraversion. In addition, new relationship statuses that require a change in behavior (such as the changes that occur when cohabitating with one's partner) could also affect personality traits that are strongly linked with these behavioral components. However, the effect of relationship dissolution may be more complex. On the one hand, the dissolution itself may influence affective components in ways that correspond to relationship formation: it is possible that the loss of a valued relationship may lead to increases in the affective components of traits like neuroticism. On the other hand, it is unclear how behavioral changes that occur with the end of a relationship (which could reflect a return to behavior patterns from before the relationship began) will influence related traits.

The early work by Costa et al. (2000) discussed above suggested that divorce affects men and women differently. Specifically, they found that middle-aged divorced women show increases in extraversion and openness to experience after the divorce, whereas men tend to show decreases in conscientiousness and increases in facets of neuroticism. Specht et al. (2011) also examined the impact of divorce on personality trait change. The results indicated that both men and women who got divorced (N = 229) became more agreeable and conscientious across the 4-year research period (r <.20). The latter results seem to counter the proposition that stressful life events with less clear behavioral demands most likely trigger change in affective traits such as neuroticism.

More recently, Allemand, Hill, and Lehmann (2015) examined the impact of divorce on personality trait change in a sample of middle-aged German adults (age 45-46 years) across three measurement waves. Compared to the participants who did not experience a divorce (*N*=383) those participants who did experience at least one divorce (*N*=143) showed more pronounced decreases in extraversion during the 12-year research period (r <.20).

Taken together, the impact of divorce on personality trait change is unclear. Although all the studies reviewed above found some associations between divorce and personality trait change, the specific traits that were implicated, the magnitude of change that occurred, and even the direction of the effects that emerged varied across studies. More longitudinal research and especially studies with multiple measurement occasions and matched control groups are needed to draw firmer conclusions about the potential effects of divorce on personality trait change.

Parenthood

The transition to parenthood has been hypothesized to be a particularly relevant turning point to study change in personality traits (e.g., Bleidorn, 2015; Hutteman et al., 2014). In contrast to other life transitions, such as entering a first romantic relationship or marriage, the transition to parenthood is a relatively non-reversible event. Also, the birth of a child is associated with sudden and oftentimes drastic changes in new parents' behavior, thoughts, and feelings, which may have both sudden and continuous effects on their personality (Belsky & Rovine, 1990; Bleidorn et al., 2016). Furthermore, the event itself typically occurs at a period of life when relatively high levels of personality change occurs. Behavioral genetic research suggests that some of the personality changes during this period are specifically associated environmental influences (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Hopwood et al., 2011). Thus, it is plausible that life events during the

transition to parenthood would be moderately or even strongly associated with personality change.

As with the other life events discussed so far, research on the impact of parenthood on personality trait change is based either on relatively small samples specifically recruited to examine life transitions or on large-scale panel studies that happen to assess personality multiple times. For instance, the abovementioned study by Neyer and Asendorpf (2001) was focused primarily on relationship status, but also examined the impact of parenthood as a supplemental question. This study reported no significant effects of the transition to parenthood on any of the Big Five traits across a four-year period and two measurement occasions. Again, however, the sample size in this study was relatively small.

More recently, Jokela et al. (2009) examined whether the transition to parenthood was related to changes in sociability (a facet of extraversion) and emotionality (a facet of neuroticism) across two measurement waves in sample of 1,839 young Finns. This study found that emotionality remained relatively stable in participants who had no children during the nine-year research period, but increased in individuals who had one (d = 0.14) or more children (d= 0.20). Overall, having children was not associated with changes in sociability. However, there was an interaction effect between gender, baseline sociability, and number of children, such that increasing family size predicted increasing sociability in men with high baseline sociability (d ~ .30) and decreasing sociability in men with low baseline sociability (d ~-0.40).

In an investigation that relied on participants from a large-scale German panel study, Specht et al. (2011) found that both men and women tended to decrease in conscientiousness after the birth of a child. This result is somewhat counter to expectations, as research examining life events generally attempts to explain descriptive patterns of

change (such as the normative increase in conscientiousness in young adulthood) from events that typically occur during that period of life. The fact that the personality change that emerged in this sample of new parents appeared to run in the opposite direction to normative change is a surprising finding.

Galdiolo and Roskam (2014) adopted a dyadic approach and compared the mean-level personality trajectories of 204 parent couples with those of 215 non-parent couples. Parents provided Big Five self-report data at three measurement occasions during pregnancy, 6 months postpartum, and 1 year postpartum. The comparison group of non-parents provided only two waves of data, collected across a 6-month interval. The results suggested only one significant effect of parenthood: men but not women who had a child showed decreases in extraversion.

Research on parenthood raises an important complication in studying the impact of life events on personality trait change. Like most other normative life transitions, the birth of a child is not a random event. In almost all modern Western societies, the birth of a child is usually planned and reflects an individual choice implying that putative socialization effects of childbirth are confounded with selection effects. In fact, parents and people without children have been shown to differ systematically in a large number of socioeconomic, social, and psychological characteristics (Dijkstra & Barelds, 2009; Hutteman, Bleidorn, Penke, & Denissen, 2013; Jokela et al., 2009; Jokela, Alvergne, Pollet, & Lummaa, 2011). To statistically account for these selection effects, van Scheppingen et al. (2016) used propensity score matching techniques and two-wave longitudinal data from a representative Australian panel study (HILDA) to compare the Big Five mean-level change in first-time parents and non-parents across a 4-year period. Before using propensity-score matching, parents differed significantly from non-parents with regard to change in extraversion and

conscientiousness. Consistent with previous studies, the unmatched results indicated that parents but not non-parents decreased in these two traits (Galdiolo & Roskam, 2014; Specht et al., 2011). However, after using propensity score matching, the differences between parents' and non-parents' trait changes were no longer significant. Especially in extraversion, there was a clear effect-size decrease after using propensity-score matching, suggesting that selection effects rather than socialization effects explain the differences in personality trait change between parents and non-parents.

In summary, research on whether and how the transition to parenthood affects parents' personality traits has provided mixed results. Whereas some studies pointed to positive changes as indicated by increases in new fathers' extraversion (Jokela et al., 2009), others suggested negative change as indicated by decreases in conscientiousness (Specht et al., 2011), and still others found no differences between change in new parents' and non-parents' personality traits (van Scheppingen et al., 2016). Interestingly, although the transition to parenthood is one of the most salient (and most normative) events that occurs in the relatively constrained period of the lifespan when personality change is greatest, few studies have found strong support for an association between this transition and change in personality traits.

Widowhood

Widowhood is usually understood as an extremely stressful life event with both sudden and gradual negative effects on subjective well-being (e.g., Luhmann et al., 2012). To the best of our knowledge, the only longitudinal research that has examined the effect of widowhood on personality trait change is the study by Specht and colleagues (2011). They found that of those participants who were faced with the death of a spouse (*N*= 228), women showed an increase in conscientiousness whereas men showed a decrease in

conscientiousness (*r* ~.20). Clearly, more longitudinal research with multiple measurement occasions and matched control groups is needed to shed light on the effects of widowhood on Big Five personality trait change.

Summary: Love and Personality Trait Change

Do love-related life events lead to changes in the Big Five personality traits? The existing research has painted a much more muddled picture than one would expect, given the societal and individual relevance of events such as marriage, parenthood, or divorce.

To date, one of the most studied life events in the love domain is the transition to the first partnership. Using different time scales, instruments, and samples from different nations, this research seem to converge on the finding that young adults tend to decrease in neuroticism and increase in extraversion when they enter the first romantic relationship. Notably, the effect sizes are small and more rigorous statistical tests using matched control group designs suggest that these effects might only generalize to certain age groups.

The burgeoning literature on parenthood and personality change has yielded even less clear results. Some studies pointed to small effects on conscientiousness, neuroticism, and extraversion. Yet, the most recent and most rigorous test of the effects of parenthood on the Big Five indicated that there are no differences between parents and a matched group of nonparents. Finally, considerably less research has examined other love-related events such as ending a relationship, marriage, divorce, or widowhood. The dearth of research on these events preclude strong conclusion about the potential effects of these events on change in personality traits.

Work and Personality Trait Change

Because mean-level change in personality traits is often the greatest and rank-order stability is the weakest in young adulthood, ideas about the causes of these changes can be

developed by carefully considering what other changes are occurring during this period of life. Just as patterns of relationships change in predictable ways across young adulthood, work status evolves as young adults move from school to work or the home. Thus, although a goal of personality research is to study personality change throughout the lifespan, hypotheses about the most promising causal factors in personality change can be tested by examining periods of greatest change. In this section, we focus on life events related to school and work, emphasizing how the new roles these changes create may influence personality traits.

School and College

Graduation from some form of schooling is an almost universal life event that members of modern societies generally aspire to experience during the transition from late adolescence to early adulthood. This transition typically occurs at the beginning of a period in life where one salient personality change often occurs—an increase in conscientiousness that typically emerges between the late teens and the early thirties (see, e.g., Lucas & Donnellan, 2011; Wortman, 2012; Roberts et al., 2006). Given the clear relevance of school and work for conscientiousness, it is reasonable to assume that changes in these roles could be associated with changes in conscientiousness. Of course, other role-relate changes occur at this time as well, so change may also extend to other traits in the Big Five.

We are aware of two longitudinal studies that have examined the nature and shape of Big Five personality trait change during this life event. Bleidorn (2012) followed a sample of 360 German high school seniors over three measurement occasions before and after graduation and compared their Big Five trait changes with the trait changes in a sample of 550 German high school juniors. Despite a very short observation period of only 1 year, this study found significant mean-level changes in different Big Five traits. Specifically, senior

students experienced significant increases in conscientiousness (*d* = .34), agreeableness (*d* = .24), and openness (*d* = .25), and to a lesser degree decreases in neuroticism (*d* = -.07). Notably, these changes were most pronounced during the first two assessments before and after graduation. Junior students who completed all measurements while still enrolled in school showed less pronounced increases in conscientiousness (*d* = .20) and openness (*d* = .22) than seniors and no changes in agreeableness and neuroticism.

This study found further that, compared to their classmates, those students who invested more time and effort into studying and their homework showed more pronounced increases in conscientiousness and openness and more pronounced decreases in neuroticism. The latter finding provided some evidence for the sociogenomic model of personality (Roberts & Jackson, 2008; this issue) and other bottom-up approaches to personality development that promote the view that that much of development is likely to start with behavioral changes, typically in response to situations or in pursuit of goals.

In a somewhat similar study, Luedtke, Roberts, Trautwein, and Nagy (2011) also tracked German students (*N*~ 2,000) from high school to university, vocational training, or work, with 3 assessments over 4 years. Consistent with Bleidorn (2012), this study found significant mean-level changes in students' Big Five traits, particularly across the two assessments before and after graduation from school (see also, Luedtke, Trautwein, & Husemann, 2009). Specifically, students who graduated from high school showed increases in openness (*d* = .20), agreeableness (*d* = .32), and conscientiousness (*d* = .32), and decreases in neuroticism (*d* = -.27).

A second important finding of this study was that individuals' life paths after graduation were distinctively related to their Big Five trait changes. Individuals who took a more vocationally oriented path increased in conscientiousness at a faster rate than their

peers who attended university. In contrast, they showed less pronounced increases in agreeableness than those attending university. The links between life paths and personality trait changes may reflect the idiosyncratic nature of the cognitive, affective, and behavioral experiences associated with these different life paths. For example, people who take a vocational track after school may face a more disciplined schedule that requires them to act conscientiously. Conversely, students who take the university path may face fewer demands to become conscientious, at least compared with those heading to work.

Taken together, these two longitudinal studies found that the transition from school to university or vocational tracks is related to personality maturation (Roberts, Wood, & Caspi, 2008) in the form of increases in openness, agreeableness, and conscientiousness, and decreases in neuroticism. These changes occurred over relatively short time periods and showed distinct relations to particular behaviors and experiences during and after graduation from school. Again, however, it is important to caution that matched comparison groups were not used in these studies, so it is not possible to rule out the idea that pre-existing differences (rather than the event itself) may be responsible for the patterns that were observed.

First Job / New Job

In recent years, a large number of studies have examined the associations between personality trait change and work experiences, such as job satisfaction, job demands, or work investment (e.g., Hudson et al., 2012; Roberts, 1997; Roberts, Caspi, & Moffitt, 2003; Roberts, Walton, Bogg, & Caspi, 2006). One robust finding to emerge from this literature is that work experiences correlate with personality trait changes and—as might be expected—these associations are particularly strong for conscientiousness. This broad interest in personality change in the work context notwithstanding, few studies have examined

whether and how personality traits change during the transition to the first job or a new job. Specht et al. (2011) found that young adults who enter the labor market for the first time (N = 456) show considerable increases in conscientiousness over a period of 4 years (r ~ 0.20). There were no effects on any of the other four Big Five traits.

With a focus on upward job changes, Niess and Zacher (2015) recently used two waves of an Australian panel study to examine whether the transition to a managerial or professional position impacts changes in the Big Five. Specifically, they used propensity score matching techniques to compare the participants who made an upward job change (into managerial or professional positions; N = 247) with participants who did not make such a change (i.e., those who remained in non-managerial and non-professional positions; N = 1,710). Somewhat surprisingly, effects did not emerge for the trait of conscientiousness. Instead, the authors found that, across four years, individuals who experienced upward job changes scored significantly higher in openness than participants who did not experience such changes (d = .21) but not in any of the other Big Five traits.

Overall, there has been limited research on the question whether job transitions have an effect on Big Five personality trait change. The few existing studies provide some evidence to suggest that the entering the labor market is related to an increase in conscientiousness and that the transition to a management or otherwise higher position is related to an increase in openness to experience. Again, however, more studies would be desirable to check the robustness of these effects.

Unemployment

Unemployment has been consistently shown to have a strong and relatively persistent negative effect on well-being (e.g., Lucas, 2007; Luhmann et al., 2012). Based on this finding it has been hypothesized that the experience of unemployment may also affect

broad personality traits; particularly in terms of increases in neuroticism and decreases in conscientiousness (Boyce, Wood, Daly, & Sedikides, 2015).

In their study on personality development in middle adulthood, Costa et al. (2000) contrasted Big Five trait changes in groups of participants who were promoted (*N* = 432) versus fired (N = 91) during a 6-9 year follow-up interval. Results indicated that individuals who were fired indeed exhibited an increase in neuroticism and a decrease in conscientiousness relative to individuals who were promoted.

Using the representative SOEP sample, Specht et al. (2011) found no differences in Big Five trait changes between participants who experienced unemployment (*N* = 860) and those who did not report having experienced a period of unemployment. However, Boyce et al. (2015) used data from the same sample with a different analytic approach to take a closer look at the potential effects of unemployment on personality trait change. In contrast to the analyses by Specht et al., they only used data from participants who were employed at the first measurement occasion and contrasted Big Five trait changes across three different groups: (1) participants who remained employed across the 4-year period (*N* = 6,308), (2) participants who experienced some unemployment but were reemployed by the follow-up assessment (*N* = 251), and (3) participants who experienced unemployment and were still unemployment at the follow-up assessment (*N* = 210). In addition, they tested whether the number of consecutive years spent unemployed between the two personality assessments moderated the effects of unemployment on personality trait change.

Mostly, in accordance with intuitions about the role of work in personality development, this study found that agreeableness, conscientiousness, and openness changed during unemployment relative to employment, with the influence being contingent upon the number of years of unemployment, gender, and reemployment. Specifically,

women tended to show linear decreases in agreeableness across 4 years of unemployment whereas men showed a non-linear pattern with increases during the first 2 years and subsequent decreases during later years. Conscientiousness decreased linearly in men; whereas women showed a nonlinear pattern with increases in the early and late stages of unemployment but decreases in the medium term. Both men and women experienced non-linear changes in openness. While men's openness seemed to slightly increase during the first 2 years of unemployment, they start to decrease with longer time spent unemployed. Women, on the other hand, showed sharp decreases in openness in the second and third years of unemployment but rebounded in the fourth year.

Taking gender and number of years spent unemployed into account, the observed effect sizes were considerably larger than those reported in previous studies, suggesting effects that reach as high as a full standard deviation change in personality. Also, these effects were specific to the relatively small group of individuals who remained unemployed; no differences were found between individuals who were reemployed and those who remained employed during the study period. Again, propensity score matching techniques were not used. In the case of events like the loss of one's job, it is quite possible that the personality changes observed to be linked to long-term unemployment may result from other associated stressors (e.g., housing difficulties) or experiences (e.g., depressive episodes) which, in turn, may affect scores on personality trait measures.

Overall, the current state of research suggests that unemployment may precipitate personality trait changes but that the nature, shape, and degree of such changes are more complex than initially predicted. As highlighted by the study by Boyce et al. (2015), trait changes can be contingent on multiple moderating factors such as gender or the continuity

of the event. Their study furthermore highlights that trait changes in response to life events are at risk to be overlooked if they unfold in a nonlinear way.

Retirement

Retirement may be associated with both costs and benefits (Kim & Moen, 2002; Luhmann et al., 2012). For example, retirees do not face work-related stress and have more time for social and other nonprofessional activities. Yet, retirement is also associated with a loss of roles and work-related activities, reduced income, and less structured days. Due to the multifaceted nature of retirement, the few longitudinal studies that have examined personality trait change in the context of this life event have adopted an exploratory approach with no specific hypotheses concerning changes in particular Big Five traits. However, at least some studies have found a decline in conscientiousness in late life (Donnellan & Lucas, 2008; Lucas & Donnellan, 2011), and it is possible that this decline is related to the shift out of work-related roles.

Loeckenhoff, Terracciano, and Costa (2009) used data from the East Baltimore Epidemiologic Catchment Area Study (ECA, Eaton et al., 1997) to compare the Big Five trajectories of retirees (*N* = 63) and individuals who remained employed (N = 304) across two measurement waves. Compared to participants who remained employed, retirees increased in agreeableness and decreased in activity, a facet of extraversion. The observed effects were medium-sized with observed changes amounting to almost half a standard deviation over the 9-year research period. Specht et al. (2011) found no change in agreeableness or extraversion, but significant changes in conscientiousness. Specifically (and consistent with broader age-related trends found in the same sample by Lucas and Donnellan, 2011), individuals who retired during the 4-year follow-up period showed significant decreases in conscientiousness (*r* ~-.20).

In sum, there is some evidence to suggest that retirement is related to personality trait change. However, the number of studies is too small to draw firm conclusions about the effects of retirement on the extent and shape of change in specific Big Five traits. More research, including studies using multiple measurement waves and matched control groups, is needed to provide a more fine-grained examination of personality trait change as a function of this life event.

Summary: Work and Personality Trait Change

Similar to the literature on love-related events, relatively few prospective studies have addressed the questions of whether and how work-related events lead to personality trait change. One robust finding from this small body of research is that the transition from school to college is associated with rapidly unfolding increases in openness, agreeableness, and conscientiousness, and decreases in neuroticism among young adults. Preliminary evidence also suggests that entering the work force is associated with increased conscientiousness. The few studies that have examined other occupational changes including promotions, unemployment, and retirement provide a less clear picture.

Discussion

In this article, we reviewed the existing prospective research on personality trait change in response to 9 major life events in the broader domains of love and work. We expected that changes in personality traits would occur to the degree that these life events have a strong enough and lasting influence on individuals' thoughts, feelings, and behavior. Moreover, we predicted that love-related life events such as marriage or parenthood would be more strongly related to changes in traits that emphasize affective content and social behavior (i.e. agreeableness, extraversion, and neuroticism) whereas work-related life events would be more likely to lead to change in traits that reflect behavioral or cognitive

content (i.e., conscientiousness and openness). In the following, we will discuss the key findings of our review in more detail, point out important gaps and constraints of previous research, and provide directions for future studies on life events and personality trait change.

Which Life Events Matter the Most?

The current state of research only allows for tentative conclusions concerning the impact of different life events on subsequent personality trait change. On average, we found three prospective studies per life event; most of which included only two assessments and relatively small subsamples of participants who experienced a particular life event.

The most cohesive findings emerged for two life events that typically occur in young adulthood. Specifically, the transitions to the first romantic relationship (increased agreeableness and extraversion) and from school to college / work (increased agreeableness, conscientiousness, openness, and decreased neuroticism) appear to positively influence young adults' personality. There are at least three possible explanations for these findings. First, young adulthood is the period in life when personality traits have been shown to be most open to change (Bleidorn, 2015; Lucas & Donnellan, 2011; Roberts & DelVecchio, 2000; Roberts et al., 2006). Hence, life events that normatively occur at this life stage may be particularly likely to trigger personality change because personality traits are more sensitive to environmental influences in early adulthood than in middle or late adulthood.

Second, these two life events may have a relatively strong influence on young adults' personality because they are normative and relatively universal experiences in Western societies. In contrast to other non-normative or less scripted life events, such as divorce or unemployment, graduation from school and the first partnership are characterized by

transparent behavioral scripts and relatively clear affective reactions and cognitive demands. For example, expectations associated with graduation from school or college include being task- and goal-directed, organized, delaying gratification, and following prescribed norms. To the extent that these behaviors can be translated into trait terms (e.g., increases in conscientiousness), graduation from school should form a strong reward structure for personality trait change (Roberts & Wood, 2006).

Third, the differences between the pattern of results for these life events and others may be due to differences in research designs, including the use of fairly large and homogeneous samples of young adults using longitudinal designs with multiple measurement waves over relatively short time intervals (e.g., Bleidorn, 2012; Neyer & Lehnart, 2007). Statistical power and the use of appropriate time scales to detect changes in personality traits might partly explain the stronger and more cohesive results pattern for these life events.

Which Traits Change The Most?

We hypothesized that life events that fall within the domain of love are more strongly related to changes in traits that emphasize affective and social content, whereas work-related life events are more likely to lead to change in traits that reflect behavioral or cognitive content. The present state of research does not provide clear evidence for the premise that different life events have different effects on different Big Five traits depending on the degree to which the events elicit behavioral, affective, or cognitive content. Although there is some evidence to suggest that work-related life events such as promotion to a managerial position are related to changes in conscientiousness and openness, the effects are small and need to be replicated in future studies with larger samples and more frequent and adequately timed measurement occasions. Similarly, love-related events such as the

transition to the first partnership have been found to be related to both traits that emphasize affective content such as neuroticism and traits that accentuate behavioral content such conscientiousness.

Clearly, more research at the interface of life events and personality trait change would be needed to determine which traits change the most in response to certain life events. In particular, a better understanding of the processes that underlie personality trait change during major life transitions would be required to predict when and how specific traits change in the context of environmental changes. Sociogenomic personality theory (Roberts & Jackson, 2008; this issue) offers a framework to explain how continuous changes in individuals' affective, cognitive, and behavioral states can translate into subsequent personality trait changes. Other accounts have focused on self-regulated personality trait changes and the role of expectations, goals, and self-control (e.g., Denissen, van Aken, Penke, & Wood, 2013; Hennecke et al., 2014). Most recently, Wrzus and Roberts (2016) have proposed a general framework on personality trait change that attributes long-term personality development to repeated short-term sequences of triggering situations, expectancies, states, and reactions through associative and reflective processes.

To better understand how volitional, behavioral, cognitive, and affective short-term processes are linked to long-term changes in personality traits, prospective measurement burst study designs (Nesselroade, 2004) are needed that assess personality traits longitudinally as well as the relevant short-term processes repeatedly during the experience of major life events. To illustrate, a recent longitudinal study on self-esteem development during an academic exchange year has adopted such a design to examine the impact of short-term state changes on long-term trait changes (Hutteman, Nestler, Wagner, Egloff, & Back, 2014). This study found that increases in state self-esteem during one academic

exchange year predicted differential changes in trait self-esteem over one year and that the experience of greater social inclusion prospectively predicted higher state self-esteem and vice versa. Presumably, social inclusion and social activities during the academic exchange year triggered changes in state self-esteem, which, in turn, led to changes in individuals' trait self-esteem. Similar research designs are needed to gain more knowledge about the short-terms processes during major life events and their distinctive effects on long-term changes in different personality traits.

Overcoming Constraints of Previous Research

In this article, we reviewed the findings of prospective studies that examined the impact of specific love- and work-related life events on personality trait change. These studies yielded mixed and sometimes conflicting results concerning the nature and direction of personality trait change in response to life events. The inconclusive nature of the current state of research may be partly explained by the scope and quality of previous studies, many of which were not explicitly designed to test the impact of life events on personality trait change. In the following, we discuss the most important gaps and constraints of previous research and provide directions for future research on life events and personality trait change.

First, most previous studies were restricted by two-wave designs, which limit the analyses to linear-change models. In the case of many life events, however, non-linear or discontinuous change models might be more suited to describe how change in personality traits unfolds before, during, and after a life event (Luhmann et al., 2014). These models require longitudinal data with more than three measurement occasions, a requirement that has been rarely met in previous research on life events on personality trait change. Multiple waves of data would also be needed to examine personality trait changes in the context of

repeated similar events, such as repeated marriages or divorces, repeated unemployment, or re-employment. Such designs would allow researchers to test whether the impact of later events is similar, weaker, or stronger than the impact of the first event (cf., Luhmann & Eid, 2009; van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2016)

Second, a crucial question concerns the timing of personality trait change during major life events (Luhmann et al., 2014). Change in personality traits may already occur before an event occurs. In other words, the critical component of an event may not be reflected in the measure of the event. For example, the critical affective, behavioral, and cognitive changes associated with the dissolution of a marriage may occur long before the legal act of divorce. These processes may have a more transformative influence on personality traits than the canceling or reorganizing of the legal duties and responsibilities of marriage. Similarly, new parents might experience personality trait changes already before the birth of the child, for example, when they are planning to have child or during pregnancy (van Scheppingen et al., 2016). Other events may have delayed effects on personality traits that unfold in a slow and incremental way. Unemployment, for instance, is associated with multiple negative social, economic, and psychological consequences, which may accumulate over time and translate into maladaptive personality trait changes that unfold over longer time periods following the event. Hence, studies that begin shortly before an event and include only one or few follow-ups after the event may mistake pre-event changes for stable pre-existing differences and / or not detect temporally delayed effects. To examine possible pre- and post-event changes and to detect critical periods of change, prospective studies are needed that measure personality multiple times before and after an event occurs.

Third, because experimental designs are not feasible to study the effects of life events on personality trait change, the field must rely on designs that use additional pieces

of information to establish the nature and shape of change while ruling out potential confounds. Recently, studies on life events have begun to include matched control groups who did not experience the event of interest (e.g., Wagner et al., 2015; van Scheppingen et al., 2016). These designs allow researchers to account for the confounding influence of observed control variables. A particularly well-matched control group that would allow to also control for unmeasured influences would consist of monozygotic twin siblings. Monozygotic twins share both a common genotype and a similar rearing environment. Hence, longitudinal co-twin control studies on monozygotic twins who are discordant on exposure to certain life events would combine the advantages of observational studies and experimental designs, because monozygotic twins are matched on a multitude of known and unknown potential confounding factors including their genetic background (Bleidorn, Kandler, & Caspi, 2014; McGue, Osler, & Christensen, 2010). Particularly strong support for the effect of life events on personality trait changed would thus be provided by a prospective co-twin control study showing that monozygotic twins who differ in the experience of specific life events also differ in their personality trait trajectories.

Fourth, in most studies, personality traits were assessed with self-reports which may be prone to biases that distort conclusions regarding the impact of life events on personality trait change. Multimethod approaches using informant reports, behavioral data, or other kinds of assessments might stimulate research on life events and personality trait change (Eid & Diener, 2006). Discontinuities in the patterns observed across assessment methods might also be illuminating (Bornstein, 2012). Also, as outlined above, experience-sampling or event-sampling designs have rarely been used to study personality trait change during the experience of major life events (Wrzus & Roberts, 2016). These approaches, while often still relying on self-report, have the advantage of measuring the underlying short-term processes

of personality trait change as they occur during the experience of life events and may help distinguishing between specific (behavior) vs. generalized (disposition) trait changes (Bleidorn, 2009; Fleeson & Jolley, 2006; Wrzus & Roberts, 2016).

Fifth, as mentioned above, the vast majority of studies have examined the impact of live events on rank-order change or mean-level change in personality traits. These two types of change describe changes in individual personality traits at the population level. However, changes at the population level may not mirror changes at the individual level (Roberts et al., 2008). Future research is needed to examine whether and how life events may influence the configuration of traits within an individual across time (i.e., ipsative personality change). Moreover, little is known about the effects of life events on correlated change in personality traits. Correlated change describes the degree to which changes in one trait are related to changes in other traits. For example, positive correlated change between extraversion and conscientiousness would indicate that the same individuals who show increases in extraversion also increase in conscientious, whereas individuals who decrease in extraversion also decrease in conscientiousness (Klimstra, Bleidorn, Asendorpf, van Aken, & Denissen, 2013). According to Soto and John (2012), the degree of correlated change indicates the extent to which personality development is influenced by broadly acting mechanisms that simultaneously affect multiple traits vs. narrowly acting mechanisms that affect single trait domains in isolation.

Sixth, large sample sizes are needed to test the presumably small effects of life events on personality trait change with adequate statistical power. Many previous studies compared relatively small subsamples of participants who had or had not experienced a particular life event. Until replicated in future studies on larger samples, the results of these studies should be interpreted with caution. Moreover, future research on more culturally

and demographically diverse samples is needed to test whether the observed effects generalize to individuals with different cultural and demographic backgrounds.

Conclusion

Our review of past research provided some evidence that life events can lead to changes in Big Five personality traits and that different life events may be differently related to specific trait domains. The most consistent findings emerged for the transition to the first romantic relationship and the transition from school to college / work, which have been found to be related to positive personality trait changes. However, a more general conclusion emerging from this review is that the evidence for the nature, shape, and timing of personality trait change in response to life events is still at a preliminary stage. Future work should use multimethod assessments to capture multiple assessment waves in large samples with designs capable of ruling out potential confounds. We hope that this review will inspire new longitudinal research that uses such designs to isolate when, how, and why personality trait change occurs in the context of major life events.

Table 1. *Characteristics of Big Five Traits.*

Trait	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
Maturation Trend in Young Adulthood	Increasing	Increasing	Stable/Increasing[a]	Decreasing	Stable
Content Emphasis	Social Behavior	Behavior	Affect/Social Behavior	Affect	Cognition
Expected Life Event Sensitivity	Love and Work	Work	Love and Work	Love	Work
			Preliminary Findings[b]		
Beginning a Relationship	Increase		Increase		
Ending Primary School/Beginning College or Work	Increase	Increase		Decrease	Increase

a. social dominance aspects of extraversion tend to increase whereas social vitality aspects of extraversion tend to be stable during the transition to adulthood (Roberts, Walton, & Viechtbauer, 2006).
b. Reliable findings were not observed for other examined life events including ending a relationship, marriage, divorce, parenthood, widowhood, job loss, or retirement.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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