

Accepted Manuscript

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PII: S0092-6566(12)00082-7

DOI: <http://dx.doi.org/10.1016/j.jrp.2012.05.005>

Reference: YJRPE 3206

To appear in: *Journal of Research in Personality*



Please cite this article as: Yap, S.C.Y., Anusic, I., Lucas, R.E., Does Personality Moderate Reaction and Adaptation to Major Life Events? Evidence from the British Household Panel Survey, *Journal of Research in Personality* (2012), doi: <http://dx.doi.org/10.1016/j.jrp.2012.05.005>

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The data used in this article were made available to us by the U.K. Data Archive. The British Household Panel Survey data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex, Colchester, United Kingdom, now incorporated within the Institute for Social and Economic Research. Neither the original collectors of the data nor the archive bear any responsibility for the analyses or interpretations presented here. This research was supported in part by a SSHRC Doctoral Fellowship awarded to Ivana Anusic and NIA grant AG032001 awarded to Richard E. Lucas.

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Abstract

A nationally representative panel study of British households was used to examine the extent to which Big Five personality traits interact with the experience of major life events (marriage, childbirth, unemployment, and widowhood) to predict increases and decreases in life satisfaction following the event. Results show that major life events are associated with changes in life satisfaction, and some of these changes are very long lasting. Personality traits did not have consistent moderating effects on the association between stressful life events and life satisfaction over time.

Keywords: happiness, subjective well-being, life events, personality, adaptation, British Household Panel Survey

Does Personality Moderate Reaction and Adaptation to Major Life Events?

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Major events play a central role in people's lives. People may work hard to achieve certain life events (like getting married) and invest great effort to avoid experiencing others (like ending a marriage in divorce). Although there are many reasons why people pursue or avoid these experiences, intuition would suggest that at least one reason concerns the effects that these experiences have on happiness and subjective well-being. It would be surprising to find out, for instance, that the things that one has worked so hard for and desired to such a great extent made no lasting difference in that person's self-assessed overall quality of life. Thus, the degree to which one's subjective well-being is affected by the experience of these life events is an important empirical concern.

Life Events and Subjective Well-being

Subjective well-being (SWB) is defined as the subjective evaluation of a person's quality of life from his or her own perspective (Diener, 1984). An important goal for research concerns identifying the factors that are associated with SWB. Somewhat surprisingly, effect sizes linking objective life circumstances to subjective reports of well-being tend to be relatively small (Diener, Suh, Lucas, & Smith, 1999). These small effects have led some to conclude that people adapt to most objective circumstances over time. Specifically, adaptation theories (e.g., Frederick & Loewenstein, 1999) suggest that one's SWB varies around a stable, genetically determined set-point (Diener, Lucas, & Scollon, 2006). These theories predict that individuals may temporarily move away from this set point in response to positive and negative life events, but will inevitably adapt back to baseline levels of SWB within a short period of time.

Initially, much of the research into the causes of SWB consisted of cross-sectional studies that focused on the correlates of individual differences in well-being (for reviews, see Diener, 1984; Wilson, 1967). However, these cross-sectional designs have known and relatively serious limitations. Therefore, in recent years, researchers have turned to more sophisticated designs for assessing the factors that may influence well-being. One such stream of research involves analyzing large, nationally representative panel studies to see whether changes in life circumstances are associated with changes in SWB (see Lucas, 2007a, for a review). These studies can often provide more information about the nature of the associations between life circumstance variables and SWB outcomes than can simpler cross-sectional designs. Past empirical research that has used this type of panel data to examine the effect of life events on SWB suggests that experiencing major positive and negative life events may have substantial effects on an individual's life satisfaction (e.g., Lucas, 2007a). However, the precise nature of these effects appears to vary across different events. For instance, research using the German Socio-Economic Panel (GSOEP) shows that individuals typically do react to major life events (like marriage, divorce, disability, childbirth, widowhood, and unemployment), but the length of time that these reactions last varies across events (Lucas, 2007a). Past research suggests that people adapt relatively quickly to marriage and childbirth, more slowly to widowhood, and that adaptation is not complete for unemployment and the onset of disability (Lucas, 2007a; Lucas, Clark, Georgellis, & Diener, 2003; 2004; Dyrda & Lucas, in press).

Person-Environment Interactions

It is clear from the body of literature reviewed here that the experience of major positive and negative life events can result in substantial changes in individuals' subjective well-being. However, existing research also indicates that substantial variability exists between individuals

in the reaction and adaptation that occurs as a consequence of life events. Therefore, the experience of a particular life event will not be associated with changes in life satisfaction for all individuals (Lucas, 2005, 2007b; Lucas et al., 2003, 2004; also see Bonanno, 2004; Bonanno & Kaltman, 2001; Bonanno & Keltner, 1997). These studies suggest that although some individuals suffer large decreases in well-being following traumatic events, some individuals are resilient in the face of adversity and show little disruptions in normal functioning (Bonanno, 2004).

Despite the clear evidence for individual variability in reaction and adaptation events, relatively little empirical work has been done to explain why individuals show such marked variation. One possibility is that this variability may be accounted for by individual differences in personality traits. That is, personality traits may moderate the extent to which people are affected by positive and negative life events, an idea referred to as a “person-environment interaction”.

Research has established clear links between personality traits and subjective well-being. For example, Neuroticism and Extraversion are two Big Five traits that have shown robust associations with well-being (e.g., Headey, 2008; Rammstedt, 2007; Steel, Schmidt, & Shultz, 2008). Individual characteristics such as positive emotions, hardiness and self-enhancement have also been associated with more resilience following major traumatic life events (Bonanno, 2004; Bonanno & Keltner, 1997). This work suggests that individual differences in personality may account for the variability in reaction and adaptation to life events.

The Big Five (McCrae & Costa, 1987; Goldberg, 1990) is a simple organizing framework for the study of personality where five broad traits (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness) independently influence a diverse range of feelings, thoughts, and behaviors. Past research indicates that the Big Five are associated with differential sensitivity to aversive and rewarding stimuli. For instance, laboratory based mood

induction studies suggest that Neuroticism is associated with greater responsiveness to negative mood induction procedures (e.g., Gross, Sutton, and Ketelaar, 1998; Larsen & Ketelaar, 1989; 1991). Generally, these studies indicate that people with high Neuroticism levels tend to report more negative affect than people with low Neuroticism levels in response to negative stimuli. Similarly, experience sampling studies, in which people report on a variety of experiences on daily basis, have also offered some evidence for differential sensitivity to environmental stimuli as a function of personality. For example, these studies have shown that people high in Neuroticism and Agreeableness tend to react more negatively to interpersonal conflict (Bolger & Schilling, 1991; Suls, Martin, & David, 1998).

Overall, individual differences in the Big Five provide a potential explanation for the variability in individuals' reaction and adaptation to life events. Exploring the possibility that personality interacts with the experience of stressful life events to predict life satisfaction is of central concern in this study. The current study aims not only to expand our knowledge of the ways in which positive and negative stressors affect our subjective well-being, but also offers a way to empirically examine whether personality interacts with the experience of stressful life events to predict life satisfaction. Given the consistent effects of Neuroticism on reactivity to negative stimuli in past research (e.g., Gross et al., 1999; Larsen & Ketelaar, 1989; 1991), we expected that individuals higher in Neuroticism would react more strongly to negative life events. In contrast, evidence regarding Extraversion and reactivity from laboratory based studies and experience sampling studies has been mixed, with some studies suggesting that extraverts are more sensitive to positive stimuli, and others failing to find evidence for such effects (see Lucas & Baird, 2004). A study by Pai and Carr (2010) also showed that Extraversion buffered individuals against depressive symptoms associated with late-life spousal loss if the individuals

expected the death to occur. Thus, although one could expect that individuals higher in Extraversion would react more strongly to positive life events and react less negatively to negative events, our expectations regarding the moderating role of Extraversion in individuals' reactions to life events are more tentative given the mixed evidence in this literature.

Relatively little work has examined the role of the remaining three Big Five personality traits (Agreeableness, Conscientiousness and Openness to Experience) in emotional reactivity. However, based on the content of these traits, we can speculate about possible ways that they may moderate the impact of life events on life satisfaction. Because Agreeableness is associated with characteristics like kindness, sympathy, affection and cooperative behaviors, it is reasonable to expect that Agreeableness may be especially important for the experience of life events that involve others, such as marriage and childbirth. A recent study by Boyce and Wood (2011) also suggests that Agreeableness is associated with more complete adaptation to the negative effects of disability on life satisfaction.

Other research has linked Conscientiousness with various work outcomes, which suggests that this trait may also moderate the impact of work-related life events such as unemployment (Hurtz & Donovan, 2000). Indeed, there is some evidence that Conscientiousness is associated with greater decreases in life satisfaction following unemployment in the GSOEP (Boyce, Wood, & Brown, 2010). Conscientious individuals could be particularly affected by bouts of unemployment because unemployment may violate a core aspect of a conscientious person's identity, the motivation to avoid failure (Boyce et al., 2010). However, Conscientious individuals could also be less negatively affected by unemployment because they are hard-working, organized, and presumably could find employment again easier (Uysal & Pohlmeier, 2011). Coupled with the finding that Conscientiousness protects individuals from depressive symptoms

associated with other negative life events (Pai & Carr, 2010), one could also theorize that Conscientiousness may be a protective factor against unemployment. Overall, there are mixed findings regarding the moderating role of Conscientiousness on individuals' reactions to life events, and our expectations regarding the moderating effect of Conscientiousness on the effects of life events are more tentative.

Finally, given the conceptual link between Openness to Experience and positivity towards novel experiences (McCrae & Costa, 1997), it would make theoretical sense that Openness to Experience moderates the impact of these novel life events on life satisfaction. It may be the case that people high in Openness to Experience would be more receptive to change in general, and be able to better deal with life transitions. This prediction would also be consistent with findings by Dyrdal and Lucas (in press) in the GSOEP that fathers who were higher in Openness to Experience reacted particularly positively to childbirth and had higher long-term life satisfaction levels in the years following birth of their first child.

The Current Study

Overall, the purpose of this study was twofold. First, we examined the degree to which major positive and negative life events affect individuals' life satisfaction following experience of such environmental stressors in a prospective longitudinal study of British households.

The second major goal of this study was to examine the degree to which individual differences in personality traits account for the variability in the trajectory of individuals' life-satisfaction following major life events. That is, does personality moderate the influence of stressful life events on individuals' life satisfaction?

Method

Sample characteristics

The data in this study are drawn from waves 1 through 18 of the British Household Panel Survey (BHPS), a longitudinal study of individuals residing in Great Britain that began collecting data annually in 1991, with the latest wave of data included in this analysis being collected in 2008 (Institute for Social and Economic Research, University of Essex, 2010; Taylor, Brice, Buck, & Prentice-Lane, 2009). The BHPS sampled households using a multistage clustered probability design and systematic sampling (see Taylor et al., 2009 for further details regarding household sampling procedures). Each member of sampled households age 16 or over was asked to participate. Over the course of the study, some attrition occurred in the sample and new subsamples of participating households were added. Overall, the BHPS includes over 30,000 individuals that participated in at least one wave. We selected four samples, each of which included individuals who experienced a life event during their participation in the study. Next, we describe details of sample selection.

Marriage. To examine the effect of marriage on well-being, we selected a sample of individuals who reported that they had never been married at the start of the study, got married at some point during the study, and stayed married for the remainder of their participation in the study. In order to obtain more accurate estimates of within-person change in life satisfaction, we further restricted our sample to individuals who rated their life satisfaction in at least one wave before and one wave after marriage. The final sample included 1,366 individuals (52.2% women, 47.4% men, 0.4% did not report gender), who were married at an average age of 29.8 years ($SD = 6.1$ years). On average, participants provided life satisfaction data for 3.9 waves prior to marriage and 4.6 waves of marriage.

Childbirth. A total of 1,742 individuals (57.2% women, 42.6% men, 0.2% did not report gender) indicated that they had their first child at some point during their participation in the

study, and also provided life satisfaction data in at least one wave before and one wave after childbirth. Participants in this sample were on average 29.3 years old ($SD = 6.4$ years) when their first child was born. They provided an average of 3.7 waves of data before and 4.9 waves of data after becoming a parent.

Widowhood. We selected a sample of individuals who were married when life satisfaction data collection began, became widowed, and did not remarry during the duration of the study. We further constrained the sample to individuals who rated their life satisfaction at least once before and once after the loss of spouse. In order to obtain the most accurate baseline estimate of life satisfaction before widowhood, we excluded any individuals who were separated or divorced since 1996. The final sample consisted of 562 individuals (65.0% women, 34.2% men, 0.9% did not report gender), who became widowed at an average age of 71.1 years ($SD = 11.4$ years). Participants in our sample provided life satisfaction data for an average of 4.5 years prior and 4.3 years after death of their spouse.

Unemployment. The unemployment sample consisted of individuals who were not unemployed in the first wave of life satisfaction data collection, and who experienced at least one bout of unemployment during the remainder of their participation. The final sample comprised 1,458 individuals (53.5% women, 46.1% men, 0.4% did not report gender) who reported their life satisfaction for at least one wave before, during, and after an unemployment bout. Average age at unemployment was 35.4 years ($SD = 14.2$ years). On average, participants in our sample provided 3.2 years of data prior to becoming unemployed and 4.3 waves of data after the unemployment bout ended. The average unemployment period lasted 1.2 years.

Control samples. We also selected four samples of people who did not experience one of the above life events to serve as control samples. The marriage control sample included

individuals who began the study single and remained single for the duration of the study. The control group for the childbirth sample was selected to include only individuals who reported having no children during their participation in the study. The widowhood control sample was composed of people who were married when life satisfaction data collection began and stayed married for the remainder of the study. The unemployment control sample comprised people who did not report being unemployed at any point in the study, beginning with the first wave of life satisfaction collection.

Next, we matched individuals from the control samples to individuals in the event samples using propensity score matching (Gelman & Hill, 2009). A propensity score for each person was estimated using logistic regression that predicted whether the person experienced the life event or not from sex, age, age squared, household income (transformed using natural logarithm), and education. The matching function of the *arm* package (Gelman et al., 2011) of the R Statistical Software (R Development Core Team, 2010) was used to match each person in the event group to a person in the control group with closest propensity score. This strategy ensures that the two groups will be on average similar on the demographic characteristics used in matching. The characteristics of the final event and control groups are presented in Table 1.

Measures.

Life Satisfaction. Life satisfaction was measured in each analysis using a single question that asked participants to rate how dissatisfied or satisfied they were with their life overall on a Likert scale from 1 (not satisfied at all) to 7 (completely satisfied). This construct was assessed from 1996 to present, excluding 2001. As such, our analyses included data from 11 waves of data collection, taken over 12 years (1996-2007, omitting 2001). Lucas and Donnellan (2011) showed that the reliability of this measure in this sample is about .70.

To provide a common metric of life satisfaction change across the four life events we examined in this paper, we first estimated an intercept-only multilevel model using all available life satisfaction data ($N = 26,641$). This model estimates only the overall mean and the within- and between-person standard deviations of life satisfaction. The estimated mean life satisfaction was 5.22, the within-person standard deviation was 0.91, and the between-person standard deviation was 0.94. In all analyses we refer to this between-person standard deviation as a metric for evaluating the magnitude of life satisfaction change.

Big Five. The Big Five personality traits were assessed in 2005 using a 15-item version of the BFI (John, Naumann, & Soto, 2008). Three items were used to assess each of the five dimensions¹. Participants made their responses on a 1 (*does not apply*) to 7 (*applies perfectly*) scale. Appropriate items were reverse coded and scores were averaged within each 3-item subscale to create a composite score for each dimension. Scores were computed such that higher scores indicated higher levels of the personality dimension. Cronbach's alphas for Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness were .68, .54, .67, .53, and .51, respectively. Although these reliability coefficients may appear low by traditional standards, past research suggests that these alpha coefficients underestimate the actual reliability of these scales due to their brevity (Donnellan & Lucas, 2008; Lucas & Donnellan, 2011).

Analytic Approach

Our aim was to examine three questions about the effect that life events may have on well-being. First, we wished to examine whether people are more or less happy after the experience of the event compared to how happy they were before the event. Our second aim was to account for normative changes in well-being over time and to test whether people's happiness

¹ BFI items used in this study are available from the BHPS online documentation (<http://www.iser.essex.ac.uk/>)

levels after the event are different from where they would have been if they did not experience the event. Finally, we examined the extent to which people's personality may explain some of the variation in well-being changes that are associated with experience of life events.

We first inspected mean life satisfaction over the years prior to and after the experience of the event. The means suggested that changes in well-being that surround major life events follow a nonlinear trajectory. Life satisfaction begins to change in the years before the event as people begin to anticipate the event, peaks in the year of the event, and then gradually returns to some stable level in the years after the event. Given enough data, it is possible to model such changes using nonlinear models in the multilevel framework that is required for longitudinal data. Thus, we were able to use nonlinear models in the BHPS data to examine the first question of whether well-being levels after the event are different than the pre-event levels.

Although the above approach can identify differences in pre- and post-event well-being levels, it is not able to separate different factors that may cause these differences. Happiness levels may change as a result of a major life event, or they may change over time due to normative, developmental processes (Baird, Lucas, & Donnellan, 2010; Blanchflower & Oswald, 2008; Deaton, 2008). Thus, it is important to separate changes in well-being that are due to aging effects from changes that are due to the experience of a life event. For example, people may be less happy after becoming widowed than before widowhood (e.g., Lucas et al., 2003), but it is unclear whether this decline is due to widowhood itself or aging declines in well-being. Indeed, a study by Yap, Anusic, and Lucas (2012) using data from the Swiss Household Panel (SHP) suggests that at least some of the drop in life satisfaction after widowhood can be explained by age-related declines in well-being. To separate these two influences, one approach is to include a control group that experiences the same aging effects on well-being but does not experience the

event. Simply put, any changes over time in the control group can be attributed to aging, and once these changes are accounted for in the event group, any remaining change can be attributed to the experience of a major life event.

For the analysis of personality, we were most interested in the moderating effects that prior personality has on future life events. Past research suggests that major life events are associated with subsequent changes in personality traits (Löckenhoff, Terracciano, Patriciu, Eaton, & Costa, 2009; Mroczek & Spiro, 2003; Roberts, Caspi, & Moffit, 2003; Roberts, Walton, Bogg, & Caspi, 2006; Specht, Egloff, & Schmukle, 2011; Vaidya, Gray, Haig, & Watson, 2002). Thus, associations between post-event personality and life satisfaction may reflect the tendency of individuals who are most affected by the life event to experience the most personality change. For this reason, we focus on exploring the moderating effects of personality prior to the event on the reaction and adaptation to subsequent events. The major implication of this for our analyses is that the subsamples of people who completed the personality measure prior to the event were much smaller and included a maximum of three post-event waves because personality was measured only in wave 15 of the study. The number of participants that completed personality before each life event was 328 in the marriage sample, 389 in the childbirth sample, 130 in the widowhood sample, and 197 in the unemployment sample. For these samples it was not possible to fit the nonlinear models or the simplified model we used when making comparisons with the control groups. Instead, we used a model that provided an estimate of baseline life satisfaction, life satisfaction in the year of the event, and life satisfaction the remaining two years after the event. Nonetheless, this model allowed us to examine the extent to which different personality traits moderated both immediate changes in life satisfaction and more long-term levels of life satisfaction following life events.

For all three types of analyses, we specified a mixed model for each life event using the lme4 package (Bates & Maechler, 2010) of the R Statistical Software (R Development Core Team, 2010). This package allowed us to specify within-person changes in life satisfaction around the time of the event, and between-person variation in the extent to which a person may be affected by the event. We discuss each of the three types of models in more detail below.

Basic nonlinear models. In past work, we have estimated trajectories before and after life events by modeling linear and quadratic change (Lucas, 2005; Lucas et al., 2003; Lucas et al., 2004). However, models that incorporate (or at least allow for) relatively rapid change close the time of the event, along with more stable asymptotes long before and after the event, probably provide a closer fit to ideas about how adaptation likely occurs. Thus, rather than including linear and quadratic change, the nonlinear model estimates five fixed parameters at the within-person level. The first parameter of interest is the Baseline Asymptote, which reflects a person's pre-event level of life satisfaction. The second important parameter is the Peak Change at the time of the event, which is estimated as the difference in life satisfaction in the year of the event from the baseline life satisfaction. This difference can be positive if people reported that their happiness increased in the year of the event or negative if people reported that their happiness declined. Third, the Asymptote Change parameter is estimated as the difference between the post-event asymptote level of life satisfaction from the pre-event asymptote. Again, this difference will be positive if the event had lasting positive effects on people's well-being, and negative if their long-term levels of well-being suffered after the experience of the event.

There are two additional parameters that model the rate of change in life satisfaction before and after the event. In both cases, rate of change is modeled as nonlinear, with slower changes occurring farther away from the event and faster changes occurring closer to the year of

the event. The interpretation of the rate-of-change parameters is less important than the interpretation of the other parameters because these rate-of-change parameters must be interpreted relative to the difference between the each asymptote and the level of life satisfaction during the event year. In short, pre-/post-event rate of change can be directly interpreted as the proportion of total change in life satisfaction that occurs in the year before/after the event. More generally, it also indicates the proportion of the remaining change (i.e., difference between the pre-/post-event asymptote and the current year) that occurs in the previous/following year.

This model can provide us with two critical tests to test adaptation theories of well-being. First, we can test whether people react to the event by testing whether the change in life satisfaction from the baseline asymptote level to the level in the year of the event is significantly different from zero. Second, we can test whether people adapt to the event in the long-term, relative to their baselines, by testing whether the difference between the pre-event asymptote and the post-event asymptote is different from zero².

Nonlinear models with normative changes. In order to separate changes in well-being due to experience of major life events from normative changes in well-being, we included control groups of individuals who did not experience the life event, but presumably did experience similar normative changes in well-being. The main assumption here is that any changes common to both groups can be attributed to normative changes, whereas any unique changes in the event groups would be attributable to the experience of the event.

The model used in these analyses included seven parameters. The first parameter was Yearly Change, a linear term common to both event and control groups, which reflects any age-related changes in life satisfaction. Yearly change is estimated using the number of years of

² The equation for this model and the R-script used to estimate the model are available as online supplemental material (see also Bates, 2011).

participation in the study as the time variable, because this variable was available in both event and control groups (in contrast, number of years from the event, which is used to estimate other nonlinear model parameters, is only available in the event groups). The analyses also included a Group effect, which reflects any pre-existing differences between the groups (i.e., differences that may exist even before the people who go on to experience a life event actually experience that event). These differences may arise due to selection effects (e.g., happier people tend to get married), or they may reflect the expectation effects of the event on well-being (e.g., people may be happier even years before marriage because they find themselves in a committed relationship that will eventually lead to marriage). Because we coded group as 0 for people who experienced the event and 1 for people who did not experience the event, the group estimate indicates how much, on average, people in the control group are more or less happy than people in the event group at baseline. Another parameter in the model is the First Year parameter, which can be somewhat more difficult to interpret. This parameter reflects what the predicted life satisfaction in the first year of study in the event group would be if the event had not yet started producing changes in life satisfaction. That is, if the baseline asymptote is within the timeframe of the study, then the first year estimate reflects the average life satisfaction in the event group in the first year of their participation in the study. However, sometimes the pre-event asymptote needs to be extrapolated beyond the available data because the changes in life satisfaction in the years leading up to the event are fairly slow. In this case, the first year estimates what the average life satisfaction of the event group would have been if the event group was not yet affected by the event, but experienced same age-related changes in life satisfaction and had the same pre-existing differences from the control group.

The most important parameters in this model are the Peak Change and Asymptote Difference parameters, which can be interpreted in a similar way as in the above model which did not include control groups. The main difference is that, rather than interpreting the differences as relative to the pre-event baseline, now the differences are relative to where the event group would be if they did not experience the event. Thus, the peak change parameter reflects the difference between average life satisfaction of the event group and the predicted life satisfaction of that group if they had not experienced an event in the year of the event. Similarly, the asymptote difference parameter reflects the difference between the average long-term stable levels of life satisfaction of people who experienced the event and their predicted life satisfaction had they not experienced the event, but continued to experience same age-related changes in life satisfaction as the control group. The final two parameters of the model are Pre-Event Change and Post-Event Change, whose interpretation is again similar as in the model without control group, and less important for the purpose of our paper.

To obtain these estimates we constructed a two-level linear model for each life event. At the within-person level, we defined life satisfaction to be a function of the seven parameters described above (first year, yearly change, group, pre-event change, peak change, post-event change, and asymptote difference). At the between-person level, we also included a random term for the first year, peak change, and asymptote difference variables, to allow for between-person variability in baseline life satisfaction and life satisfaction changes that may occur with time.³⁴

³ The equation and the R-script for this model are available as online supplemental material.

⁴ Gelman & Hill (2009) recommend including all variables used in matching as covariates in the final model. However, given the complexity of the nonlinear models, it was not possible to include the covariates in our final analyses. Further analyses with simpler models (i.e., those used by Yap et al., 2012) that did include covariates produced identical conclusions. Thus, the omission of covariates from the final nonlinear models seems appropriate in this case.

Models involving personality moderators. For models that included personality moderators, we used simpler two-level linear models because there were only three waves available after the assessment of the personality measures. At the within-person level we specified that life satisfaction was a function of the intercept (pre-event baseline level), change from baseline in the year of the event (event year change), and change from baseline in the post-event years (post-event change). We coded the event year change variable as 1 in the year of the event and 0 otherwise. Post-event change variable was coded as 1 for the two years after the event, and 0 otherwise.

At the between-person level, we included a random term for the intercept, event year change, and post-event change variables to allow for variability in pre-event life satisfaction, and changes in life satisfaction in the year of the event and in the subsequent years. For each event we estimated five models, each of which included one of the Big Five personality traits (grand-mean centered) as the moderator of the intercept, event year change, and post-event parameters at the between person level. This allowed us to examine whether personality moderated changes in life satisfaction that were evident immediately in the year of the event and in the years that followed.

Results

Our presentation of results proceeds in three steps. First, we discuss the overall trends in life satisfaction before, during, and after the experience of the four major life events. These analyses allow us to examine the replicability of previous research on adaptation to major life events, which has primarily used just one sample – the GSOEP. Second, we present our analyses that involved control groups and separate normative, age-related changes in life satisfaction from changes that are associated with the experience of the event itself. These analyses allow us to

compare long-term trajectories of individuals who experienced the event to their predicted life satisfaction trajectories had they not experienced the event, while allowing for pre-existing differences between control and event groups. Third, we present the results for the personality moderators, with an emphasis on highlighting consistencies across events.

Basic nonlinear models. Figure 1 shows the average life satisfaction trajectories for the four life events that we examined. Specifically, each figure shows the plot of raw means in the years surrounding the event. In addition, the dark line shows the estimates from the nonlinear models. Full results of the nonlinear models are shown in Table 2.

In broad strokes, these results show the following. First, people reacted positively to marriage, but this effect was short-lived. People reported a significant boost of 0.31 points (which is a change of approximately 0.33 standard deviations) in the year of the event, but their long-term post-event life satisfaction was not significantly higher than their initial baseline level. Thus, it appears that adaptation to marriage is relatively complete relative to one's pre-marriage levels of well-being.

Second, people on average reacted positively to the birth of their first child, reporting an increase in life satisfaction of 0.24 points (0.26 standard deviations change from baseline) in the year of childbirth. However, this boost was not long-lasting, as evidenced by the asymptote change estimate which was not significantly different from zero, indicating that long-term life satisfaction levels were not significantly different from baseline.

Third, our results showed that widowhood is associated with declines in well-being in the years surrounding the death of a spouse, as well as lower long-term levels of life satisfaction. Our results showed that widowed individuals reported an average decline of life satisfaction of 0.81 points (a drop of 0.86 standard deviations from their baseline levels) in the year their spouse

died, and that they remained 0.40 points (0.43 standard deviations) below their baseline levels in the following years. Thus, widowed individuals do not appear to completely adapt to the loss of the spouse. It is important to acknowledge that the long-term level of life satisfaction for widows and widowers after the loss of the spouse is not that different from that of married individuals in the adaptation phase, even though those who lost a spouse exhibited a relatively large drop from baseline. This is due to relatively high baseline level for these individuals. The differences in baseline for this group are likely due to the widely documented age effect in the BHPS where older adults are more satisfied than middle-age adults (Baird et al., 2010).

Finally, we found that unemployment was associated with lower long-term well-being levels. In our sample, life satisfaction scores of people who became unemployed dropped by 0.40 points (0.43 standard deviations) during unemployment. Moreover, people did not fully adapt to the experience of unemployment, as their life satisfaction scores remained 0.14 points (0.15 standard deviations) below the baseline level even after the unemployment period ended.

Nonlinear models with normative changes. One novel aspect of our study is that we compared well-being trajectories of people who experienced some of the major life events to the predicted trajectories that they would have experienced had they not experienced these events. To do so, in each analyses we included a control group of people who did not experience an event in order to estimate normative or age-related changes in life satisfaction over time. Assuming that people in the event groups also experienced the same normative changes, we were able to separate changes in life satisfaction due to normative influences from changes due to life events. Table 3 and Figure 1 show the results of these analyses.

The yearly change estimate reflects the normative changes in life satisfaction that are common to both event and control groups and are thus not associated with the experience of the

event. This estimate was consistent across the events with a range from -0.01 to -0.02. Thus, life satisfaction declined by 0.01 to 0.02 points per year of participation in the study. The group estimate tells us about the pre-existing differences between people who went on to experience a life event and those who did not. In this study, we found no evidence that people who went on to get married, have a child, or become widowed were any more or less happy before the event than those who stayed single, childless, or did not lose a spouse during the study. However, we found that people who did not become unemployed during the study reported life satisfaction that was 0.20 points (0.21 standard deviations) higher than life satisfaction of people who later became unemployed.

The most important model estimates for our purpose are peak change and asymptote change. The peak change estimate tells us the extent to which people who experienced a life event reported their life satisfaction higher or lower than it would have been if they had not experienced an event (but still showed same normative changes in well-being, and still had same pre-existing differences from the control group). Similarly, the asymptote change estimate reflects how much higher or lower long-term life satisfaction levels are post-event, compared to what they would be if the event did not occur. The results of these analyses were at times different than of the initial analyses that did not take into account normative changes in well-being, illustrating the importance of separating over-time changes due to aging from those due to the experience of the event.

In the year of marriage, people's life satisfaction was 0.48 points (0.51 standard deviations) higher than their predicted life satisfaction if they remained single. Moreover, the change in life satisfaction associated with marriage remained significant in the years after marriage. That is, married people's life satisfaction was 0.28 points (0.30 standard deviations)

higher in the years after marriage than what it would have been had they remained single. Thus, although our previous analyses showed that people were no more happier after marriage than before marriage, these results suggest that married people are indeed happier than they would have been if they did not get married. This is because if they did not get married their life satisfaction would have decreased even more due to normative declines in life satisfaction common to both married and single groups.

People also reported higher life satisfaction in the year in which their first child was born compared to where their life satisfaction would be if they remained childless—a difference of 0.32 points or 0.34 standard deviations. However, this boost was short-lived, as long-term levels were not different from the levels that are predicted by the model if they had not had a child. Thus, birth of a first child seems to be associated with only a short-term boost in life satisfaction. Widowhood was associated with a large short-term drop in life satisfaction in the year of widowhood – life satisfaction of people who lost their spouse was 0.69 points (0.73 standard deviations) lower relative to their predicted levels if they did not experience the loss. Long-term life satisfaction levels were also lower by 0.19 points (0.20 standard deviations) than where they were predicted to be if the spouse was still alive. These results suggest that, although some of the drop in life satisfaction over time can be attributed to normative changes, widowhood is also uniquely associated with long-term declines in well-being.

During unemployment people reported life satisfaction levels that were 0.35 points (0.37 standard deviations) lower than if they had not experienced unemployment. However, most of the long-term drop in life satisfaction seems to reflect age-related declines. Our results indicate that people were no less happy in the years after the unemployment bout than they would be if they did not experience unemployment.

In combination with the results of the first models that did not include normative trends in life satisfaction, these findings suggest that (1) people react positively to marriage and childbirth and negatively to widowhood and unemployment, and these short-term changes do not simply reflect normative changes in life satisfaction, (2) marriage is not associated with increases in long-term happiness, but people who get married are happier in the long run than if they had remained single, (3) parents are no happier in the years after the birth of their first child than they were before, nor are they happier than people who do not have children, (4) widowhood has lasting negative effects on well-being above and beyond normative age-related changes, and (5) unemployment does not appear to be associated with lasting negative changes in well-being – the observed decline in well-being relative to baseline levels seems to simply reflect normative changes in life satisfaction over time.

Personality moderators. The final part of our analyses concerns the moderating effects of personality. Descriptive statistics about personality variables are presented in Table 4, and the results of the analyses that examined personality traits as moderators of life satisfaction change are shown in Table 5. For each of the four life events we estimated an intercept and a moderating effect of personality for the baseline, event year change, and post-event change parameters. In each model the intercept estimates reflect the overall average effects for the associated parameter (for individuals with an average personality score). The intercept for the baseline parameter reflects the overall average level of life satisfaction in the years before the event occurred. The event year change intercept represents the average change from baseline in the year of the event. Finally, the post-event change intercept represents the average change from baseline in the subsequent years. The personality moderator coefficients show the effects of personality traits on these parameters. A significant moderating effect on baseline would indicate that people higher

or lower on the personality trait have higher or lower pre-event baseline levels of life satisfaction. Because event year change and post-event change parameters can be thought of as change scores, significant moderation would mean that those who are higher on a specific personality trait exhibit significantly more or significantly less change than those who are lower on that trait. In our description of results, we first focus on the associations with baseline levels. Then we describe the associations between each personality trait and the two change parameters – change in life satisfaction in the event year, and post-event life satisfaction change.

Personality effects at baseline were generally consistent across the life events and with the existing literature on personality and well-being (Headey, 2008; Rammstedt, 2007; Steel et al., 2008). Neuroticism was most consistently associated with lower well-being; Extraversion, Agreeableness, and Conscientiousness were associated with higher well-being in some samples. Namely, Extraversion was related to baseline well-being in childbirth and unemployment samples, Conscientiousness was related to baseline well-being in marriage and childbirth samples, and Agreeableness was related to well-being at baseline in marriage, childbirth, and widowhood samples.

In terms of moderating effects of personality on change in life satisfaction around the time of the event, we generally found no associations that were consistent across the events or consistent with existing theories or past research on person-environment interactions. Previous studies have found that Neuroticism moderates reactivity to negative stimuli, leading us to predict that people high in Neuroticism would be more negatively affected by undesirable events such as widowhood and unemployment. We did not find such associations between personality and change in life satisfaction. On the contrary, we found that Neuroticism positively moderated post-event change to childbirth and reaction to widowhood. This counterintuitive finding is

likely due to the fact that people high in Neuroticism had lower baseline life satisfaction levels and therefore did not have as far to drop as people low in Neuroticism.

Past research has also suggested that Extraverted individuals may experience positive events more positively and negative events less negatively. In contrast to these predictions, we found no moderating effects of Extraversion across the four life events we examined. This lack of significant associations between Extraversion and change likely reflects true lack of personality effects rather than lack of power because the moderation estimates were virtually zero across the events.

People high in Openness reported more increases in life satisfaction in the year of birth of their first child. However, this association seems to be particular to the first year of parenthood, as we observed no association between Openness and post-event change for childbirth. We found no moderating effects of Openness on experience of other life events.

Based on previous theories about Agreeableness and Conscientiousness, we predicted that Agreeableness may play a particularly important role in the experience of events that involve other people, such as marriage and childbirth, whereas Conscientiousness may moderate reactions to unemployment. For Agreeableness, we found an association with adaptation to marriage that was in the direction opposite of what we predicted: people high in Agreeableness were less happy in the years following marriage than people low in Agreeableness. In addition, we found an unexpected association between Agreeableness and reaction to unemployment, such that people high in this trait initially reacted less negatively to unemployment, but were no different in the long run from people low in Agreeableness. Regarding Conscientiousness, we found no significant associations between this personality trait and experience of unemployment or any other event we examined.

Discussion

The current study used a nationally representative sample of British households to examine the degree to which the Big Five personality traits account for individual variability in respondents' life satisfaction trajectories following life events. The results of this study clearly replicate several past studies (e.g., Dyrdal & Lucas, in press; Lucas et al., 2003; 2004; Yap et al., 2012) and demonstrate that major life events are associated with changes in life satisfaction, some of which persist for many years following the event. For instance, after getting married, participants reported increased life satisfaction in the reaction period surrounding the event, but that this increase in life satisfaction did not persist. Although these results are consistent previous findings that in the years following marriage, individuals' life satisfaction adapts back to pre-marriage baseline levels (Lucas et al., 2003; Yap et al., 2012), the results of our study also suggest that married people are in the long run happier than those who remained unmarried even when controlling for any pre-existing differences between married and unmarried individuals. These latter findings are consistent other research using the Swiss Household Panel Study (Yap et al., 2012) Of course, those who eventually marry may differ in significant ways from those who do not, and even these analyses with an important control group must be interpreted cautiously. However, these additional analyses provide an important interpretational context for the full adaptation that is typically found when adaptation to marriage is examined.

Indeed, conclusions about the effects of other events depended on whether control groups were compared in the analyses. For instance, as in other studies by Lucas et al. (2004) and Yap et al. (2012) that used the GSOEP and the SHP, individuals experienced what appeared to be permanent decreases in life satisfaction following unemployment. However, comparisons with control-group suggest that this long term decrease might reflect normative changes in life

satisfaction that have occurred even if unemployment had not been experienced, replicating the results of Yap et al., (2012). In contrast, the widowhood results indicate that the loss of a spouse is associated with a strong negative effect that largely persists even after accounting for normative changes in well-being. Although this finding differs from the results reported in other research by Yap et al. (2012), we should note that the pattern of the results is the same in both studies, and the SHP sample in Yap et al.'s (2012) study was relatively small (120 widowed individuals), resulting in low power to detect true differences between predicted and actual long-term life satisfaction levels. Indeed, both of these studies suggest that at least some of the well-being change after widowhood can be attributed to normative changes, but that some of the change seems to be uniquely due to the experience of widowhood. This study extends past research by examining the degree to which the long term change in life satisfaction associated with the experience of a life event differs from normative, age related changes one would observe in similar individuals who did not experience the event. These findings have important implications, not only for the interpretation of the present findings, but for the interpretation of past findings as well. It is possible that similar findings would have shown in past studies examining marriage and well being in the GSOEP (e.g., Lucas et al., 2003) and may have changed the conclusions one draws from the results of these studies. However, it is important to note that past research finds that there is little age related change in life satisfaction in the GSOEP until late adulthood (Baird et al., 2010), suggesting that normative changes in life satisfaction likely do not account for the marriage adaptation effects in the GSEOP. Overall, accounting for these normative changes in life satisfaction over time is useful and important to examining the question of whether marriage and other life events have long term effects on subjective well-being.

Personality Moderators

The final major contribution of this study is that it suggests that Big Five traits are not consistently associated with differences in the extent to which individuals react and adapt to the experience of stressful life events.

For instance, we failed to replicate the findings of some past studies that have examined the moderating role of personality on reaction and adaptation to life events. Our data did not show that Conscientiousness moderated the association between unemployment and life satisfaction, which is inconsistent with past research by Boyce and colleagues (2010) using the GSOEP. We also failed to find any moderating effect of Extraversion on the association between widowhood and life satisfaction, which is inconsistent with the results of past research by Pai and Carr (2010). Overall, the only moderation effect that replicates findings from past research was our observation that Openness to Experience positively moderated the association between childbirth and life satisfaction, replicating the findings of Dyrdal and Lucas (in press) using the GSOEP. However, even this result was not an exact replication, as in this sample moderation only emerged for initial reactions, whereas in the Dyrdal and Lucas study, moderation emerged in the long-term differences, and in men alone.

There are several potential reasons for why we failed to replicate some of these past findings. First, failure to replicate past findings in the GSOEP this may be due to subtle cultural differences among the German and the British in the processes through which life events relate to life satisfaction, and the particular role that personality plays in this relationship may simply differ among these two cultural groups. It is possible that among the British, the Big Five simply may not influence how individuals react to positive and negative life events. There may also be simple differences in methodology and the way in which variables of interest are measured and

operationalized across various datasets, and these differences may account for the differences in results, even when examining the same constructs and events (though it is important to note that the same Big Five measure was included in both studies).

Because personality was assessed in one of the last waves of available data (2005; wave 15), it is also possible that our failure to replicate past personality moderation effects could be attributable to the lack of available data following the assessment of personality (there were only 3 years of available data following wave 15). For example, it is possible that moderating effects of personality on adaptation to life events are not manifested until several years following an event and would not be detectable in the available data. However, past studies using the GSOEP to examine the moderating effects of personality (e.g., Boyce & Wood, 2011; Boyce et al., 2010) examined these questions using 3 to 4 waves of data, which is similar to the time span in the data available for our moderation analyses.

It is also important to note that there were slight differences in this study's analytic method compared to the methods used in past research using the GSOEP, both in terms of the demographic controls that included in our model (Boyce and Wood [2011] included marital status and employment status) and in how reaction and adaptation to life events was modeled to examine the relationship between personality, life events and well-being. Although it is possible that these analytic differences account for our failure to replicate past findings, it is unlikely that analytic differences alone explain the differences between our results and those found in the GSOEP.

This study also extends the research in this area with respect to the fact that the moderating effects of personality on reactions to positive and negative events has largely been investigated in the context of minor daily events assessed in experience sampling studies (e.g.,

Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; Gunthert, Cohen, & Armeli, 1999; Marco & Suls, 1993; Suls et al., 1998) or artificial negative stimuli presented in the context of experimental laboratory studies (e.g., Gomez et al, 2000; Gross et al., 1999; Larsen & Ketelaar, 1989; 1991). These past studies provide useful insights into the role that personality traits play in how individuals respond to negative laboratory stimuli and everyday life stressors, but do not speak to the role of personality in reaction to relatively rare, major life events. Thus, this study makes important advances over past laboratory and experience sampling studies because it examines whether personality traits moderate reactions to important real-life stressors such as marriage, childbirth, unemployment, and the death of a spouse.

Limitations

Although there are many advantages of using large scale, longitudinal studies such as the BHPS, such methodology is not without limitations. First, because this was a longitudinal study, selective attrition may be a concern as it is possible that there are important differences between individuals that participated in the BHPS for long periods of time versus those who dropped out. Although selective attrition cannot account for our results given that the results reported here reflect within-person effects, it remains possible that the within-person effects for the individuals that dropped out of the BHPS differ from the pattern of within-person effects of those who remained in the study for longer periods.

Another potential limitation of this study involves the selection of control groups for each sample. It is difficult to determine how to define and select an appropriate control group as a basis for comparison for each sample. Although our analyses take age related changes into account, other variables may have been relevant, but not accounted for in our control samples. Given that accounting for normative changes had important implications on the interpretation

and conclusions one could draw from these findings regarding the long term impact of marriage and unemployment, future research would likely benefit from exploring alternate ways one could define an appropriate control sample and alternate analytic methods to examine normative changes in the overall sample.

Although we present a novel method for modeling change in life satisfaction associated with important life events, a major limitation of using these complex nonlinear models is that it is difficult to examine potential moderators such as age and gender in these models. When these moderators are added to the analyses, these models become too complex and estimating slopes within these models is too demanding of the available data. Thus, it is clear that there are trade-offs associated with using these types of complex statistical models. On one hand, use of these nonlinear models may be a more accurate representation of the trajectory of life satisfaction in the time surrounding a major life event. On the other hand, use of these nonlinear models limit our ability to examine potential moderators of this trajectory that would be relatively easy to examine in simpler models that have been used in the past (e.g., Lucas et al., 2003).

Conclusion

This study used a large scale, nationally representative panel study to explore how various positive and negative stressful life events affected individuals' subsequent life satisfaction. Replicating past research findings using the GSOEP, our results indicate that people react to highly desirable events such as the birth of a child and marriage positively, and react to highly undesirable events such as unemployment and widowhood negatively. However, our results also indicate that personality does not moderate the impact of life events on life satisfaction, which is inconsistent with the results of past research using data from other nations such as the GSOEP. These findings provide further insight into the role of personality for the

implications of major life events on well-being and suggest that even when using large, nationally representative panel studies, there can be marked differences in findings between studies.

References

- Baird, B. M., Lucas, R. E., & Donnellan, M. B. (2010). Life satisfaction across the life span: Findings from two nationally representative panel studies. *Social Indicators Research*, 99, 183-203.
- Bates, D. (2011). Mixed models in R using the lme4 package. Part 6: Nonlinear mixed models [Online document]. Retrieved from <http://lme4.r-forge.r-project.org/slides/2011-01-11-Madison/6NLMMH.pdf>
- Bates, D., & Maechler, M. (2010). *lme4: Linear mixed-effects models using Eigen and Eigen++*. R package version 0.999375-35. <http://CRAN.R-project.org/package=lme4>.
- Blanchflower, D. G., & Oswald, A. J. (2008). Is well-being U-shaped over the life cycle? *Social Science & Medicine*, 66, 1733-1749.
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events. *American Psychologist*, 59, 20-28
- Bonanno, G. A., & Kaltman, S. (2001). The varieties of grief experience. *Clinical Psychology Review*, 21, 705-734.
- Bonanno, G. A., & Keltner, D. (1997). Facial expressions of emotion and the course of conjugal bereavement. *Journal of Abnormal Psychology*, 106, 126-137.
- Bolger, N., & Schilling, E. A. (1991) Personality and the problems of everyday life: The Role of Neuroticism in exposure and reactivity to daily stressors. *Journal of Personality*, 59, 355-386.
- Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, 69, 890-902.

- Boyce, C. J., Wood, A. M., & Brown, G. D. A. (2010) The dark side of conscientiousness: Conscientious people experience greater drops in life satisfaction following unemployment. *Journal of Research in Personality, 44*, 535-539.
- Boyce, C. J. & Wood, A. M. (2011). Personality prior to disability determines adaptation: Agreeable individuals recover lost life satisfaction faster and more completely. *Psychological Science, 22*, 1397-1402.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.
- Caspi, A., McClay, J., Moffitt, T.E., Mill, J., Martin, J., Craig, I.W., Taylor, A., & Poulton, R. (2002). Role of genotype in the cycle of violence in maltreated children. *Science, 297*, 851–853.
- Caspi, A., Sugden, K., Moffitt, T.E., Taylor, A., Craig, I., Harrington, H., McClay, J., Mill, J., Martin, J., Braithwaite, A., & Poulton, R.(2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science, 301*, 386–389.
- Deaton, A. (2008). Income, health and well-being around the world: Evidence from the Gallup World Poll. *Journal of Economic Perspectives, 22*, 53-72.
- Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*, 542-575.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment, 49*, 71-75.
- Diener, E., Larsen, R. J., & Emmons, R. A. (1984). Person x situation interactions: Choice of situations and congruence response models. *Journal of Personality and Social Psychology, 47*, 580–592.

- Diener, E., Lucas, R. E., & Scollon, C. N. (2006). Beyond the Hedonic Treadmill: Revising the Adaptation Theory of Well-Being. *American Psychologist*, *61*(4), 305-314.
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin*, *125*, 276-302.
- Donnellan, M. B., & Lucas, R. E. (2008). Age differences in the Big Five across the life span: Evidence from two national samples. *Psychology and Aging*, *23*, 558-566.
- Dyrdal, G. M., & Lucas, R. E. (in press). Reaction and adaptation to the birth of a child: A couple level analysis. *Developmental Psychology*.
- Eysenck, H. J., & Eysenck, M. W. (1985). *Personality and individual differences: A natural science approach*. New York: Plenum Press.
- Frederick, S., & Loewenstein, G. (1999). Hedonic adaptation. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 302-329). New York: Russell Sage Foundation.
- Frey, B. S., & Stutzer, A. (2004). *Happiness and economics: How the economy and institutions affect human well-being*. Princeton, NJ: Princeton University Press.
- Gable, S. L., Reis, H. T., & Elliot, A. J. (2000). Behavioral activation and inhibition in everyday life. *Journal of Personality and Social Psychology*, *78*, 1135-1149.
- Galatzer-Levy, I. R., Bonanno, G. A., & Mancini, A. D. (2010). From Marienthal to Latent Growth Mixture Modeling: A return to the exploration of individual differences in response to unemployment. *Journal of Neuroscience, Psychology, and Economics*, *3*, 116-125.
- Gelman, A., & Hill, J. (2009). *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York; Cambridge University Press.

- Gelman, A., Su, Y., Yajima, J., Hill, J., Pittau, M. G., Kerman, J., & Zheng, T. (2011). *arm: Data analysis using regression and multilevel hierarchical models*. R package version 1.4-14. <http://cran.r-project.org/web/packages/arm/arm.pdf>
- Gomez, R., Cooper, A., Gomez, A. (2000). Susceptibility to positive and negative mood states: Test of Eysenck's, Gray's and Newman's models. *Personality and Individual Differences*, 29, 351-365.
- Goldberg, L. R. (1990). An alternative "Description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology*, 59, 1216-1229.
- Grabe, H.J., Lange, M., Voßlze, H., Lucht, M., Freyberger, H.J., John, U., & Cascorbi, I. (2005). Mental and physical distress is modulated by a polymorphism in the 5-HT transporter gene interacting with social stressors and chronic disease burden. *Molecular Psychiatry*, 10, 220–224.
- Gross, J.J., Sutton, S.K., & Ketelaar, T. (1998). Relations between affect and personality: Support for the affect-level and affective-reactivity views. *Personality and Social Psychology Bulletin*, 24, 279-288.
- Gunthert, K. C., Cohen, L. H., & Armeli, S. (1999). Role of neuroticism in daily stress and coping. *Journal of Personality and Social Psychology*, 77, 1087-1100.
- Headey, B. (2008): Life goals matter to happiness: A revision of set-point theory. *Social Indicators Research*, 86, 213-231.
- Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, 11, 213-218.
- Hurtz, G. M., & Donovan, J. J. (2000). Personality and job performance: The Big Five revisited. *Journal of Applied Psychology*, 85, 869-879.

- Institute for Social and Economic Research, University of Essex. (2010). *British Household Panel Survey: Waves 1–19, 1991–2009* [computer file]. Colchester, England: UK Data Archive [distributor].
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm Shift to the Integrative Big-Five Trait Taxonomy: History, Measurement, and Conceptual Issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114-158). New York, NY: Guilford Press.
- Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. *Journal of Personality and Social Psychology*, *61*, 132- 140.
- Löckenhoff, C. E., Terracciano, A., Patriciu, N. S., Eaton, W. W., & Costa, P. T. (2009). Self-reported extremely adverse life events and longitudinal changes in five-factor model personality traits in an urban sample. *Journal of Traumatic Stress*, *22*, 53-59.
- Lucas, R. E. (2005). Time does not heal all wounds: A longitudinal study of reaction and adaptation to divorce. *Psychological Science*, *16*(12), 945-950.
- Lucas, R. E. (2007a). Adaptation and the set-point model of subjective well-being: Does happiness change after major life events? *Current Directions in Psychological Science*, *16*(2), 75-79.
- Lucas, R. E. (2007b). Long-term disability is associated with lasting changes in subjective well-being: Evidence from two nationally representative longitudinal studies. *Journal of Personality and Social Psychology*, *92*(4), 717-730.
- Lucas, R. E. (2008). Personality and subjective well-being. In R. J. Larsen & M. Eid (Eds.), *The science of subjective well-being* (pp. 171-194). New York: Guilford Press.

- Lucas, R. E. & Baird, B. M. (2004). Extraversion and emotional reactivity. *Journal of Personality and Social Psychology, 86*, 473-485.
- Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: Reactions to changes in marital status. *Journal of Personality and Social Psychology, 84*(3), 527-539.
- Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2004). Unemployment Alters the Set Point for Life Satisfaction. *Psychological Science, 15*(1), 8-13.
- Lucas, R. E. & Diener, E. (2008). Personality and subjective well-being. In M. Eid & R. J. Larsen. *The science of subjective well-being* (pp. 171-194). New York, Guilford Press.
- Lucas, R. E. & Donnellan, M. B. (in press). Estimating the reliability of single-item life satisfaction measures: Results from four national panel studies. *Social Indicators Research*.
- Lucas, R. E. & Donnellan, M. B. (2011). Personality development across the life span: Longitudinal analyses with a national sample from Germany. *Journal of Personality and Social Psychology, 101*, 847-861.
- Lucas, R. E., Le, K., & Dyrenforth, P. E. (2008). Explaining the extraversion/positive affect relation: Sociability cannot account for extraverts' greater happiness. *Journal of Personality, 76*, 385-414.
- Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology, 9*, 111-131.
- Magnus, K., Diener, E., Fujita, F., & Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis. *Journal of Personality and Social Psychology, 65*, 1046-1053.

- Marco, C. A., & Suls, J. (1993). Daily stress and the trajectory of mood: Spillover, response assimilation, contrast, and chronic negative affectivity. *Journal of Personality and Social Psychology, 64*, 1053-1063.
- McCrae, R. R., & Costa, P. T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81-90.
- McCrae, R. R., & Costa, P. T. (1997). Conceptions and correlates of openness to experience. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of Personality Psychology* (pp. 825-847). San Diego: Academic Press.
- Monroe, S. M., & Reid, M. W. (2008). Gene-environment interactions in depression: Genetic polymorphisms and life stress polyprocedures. *Psychological Science, 19*, 947-956.
- Morrone, J. V., Depue, R. A., Scherer, A. J., & White, T. L. (2000). Film-induced incentive motivation and positive activation in relation to agentic and affiliative components of extraversion. *Personality and Individual Differences, 29*, 199-216.
- Mroczek, D. K., & Spiro, A., III (2003). Modeling intraindividual change in personality traits: Findings from the normative aging study. *Journal of Gerontology: Psychological Sciences, 58*, 153-165.
- Muris, P., Roelofs, J., Rassin, E., Franken, I., & Mayer, B. (2005). Mediating effects of rumination and worry on the links between neuroticism, anxiety and depression. *Personality and Individual Differences, 39*, 1105-1111.
- Pai, M., & Carr, D. (2010). Do personality traits moderate the effect of late-life spousal loss on psychological distress? *Journal of Health and Social Behavior, 51*, 183-199.

Pavot, W., Diener, E., & Fujita, F. (1990). Extraversion & happiness, *Personality and Individual Differences*, 11, 1299-1306.

R Development Core Team (2010). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria.

Rammstedt, B. (2007). Who worries and who is happy? Explaining individual differences in worries and satisfaction by personality. *Personality and Individual Differences*, 43, 1627-1634.

Risch, N., Herrell, R., Lehner, T., Liang, K. Y., Eaves, L., Hoh, J., Griem, A., Kovacs, M., Ott, J., & Merikangas, K. R. (2009). Interaction between the serotonin transporter gene (5-HTTLPR), stressful life events, and risk of depression: A meta-analysis. *Journal of the American Medical Association*, 301, 2462-2471.

Roberts, J. E., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy and Research*, 22, 401-423.

Roberts, B. W., Caspi, A., & Moffit, T. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology*, 84, 582-593.

Roberts, B. W., Walton, K., Bogg, T., & Caspi, A. (2006). De-investment in work and non-normative personality trait change in young adulthood. *European Journal of Personality*, 20, 461-474.

Rusting, C. L., & Larsen, R. J. (1997). Extraversion, neuroticism, and susceptibility to positive and negative affect: A test of two theoretical models. *Personality and Individual Differences*, 22, 607-612.

- Smith, D.M., Schwarz, N., Roberts, T. R., & Ubel, P. A. (2006). Why are you calling me? How survey introductions change response patterns. *Quality of Life Research, 15*, 621-630.
- Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the Big Five. *Journal of Personality and Social Psychology, 101*, 862-882.
- Steel, P., Schmidt, J., & Shultz, J. (2008). Refining the relationship between personality and subjective well-being. *Psychological Bulletin, 134*, 138-135.
- Suls, J., Martin, R., & David, J. P. (1998). Person-environment fit and its limits: Agreeableness, neuroticism, and emotional reactivity to interpersonal conflict. *Personality and Social Psychology Bulletin, 24*, 88-98.
- Taylor, M. F., Brice, J., Buck, N., & Prentice-Lane, E. (2010). *British Household Panel Survey user manual: Volume A. Introduction, technical report, and appendices*. Colchester, England: University of Essex.
- Uysal, S. D., & Pohlmeier, W. (2011). Unemployment duration and personality. *Journal of Economic Psychology, 32*, 980-992.
- Vaidya, J. G., Gray, E. K., Haig, J., & Watson, D. (2002). On the temporal stability of personality: Evidence for differential stability and the role of life experiences. *Journal of Personality and Social Psychology, 83*, 1469-1484.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin, 96*, 465-490.
- Wilson, W. (1967). Correlates of avowed happiness. *Psychological Bulletin, 67*, 294-306.
- Zelenski, J. M., & Larsen, R. J. (1999). Susceptibility to affect: A comparison of three personality taxonomies. *Journal of Personality, 67*, 761-791.

Table 1. Demographics for event & control groups. Means (and standard deviations) for age and household income.

	Event	Control
Marriage		
Gender (% women)	52%	48%
Age	25.4 (6.4)	29.5 (8.1)
Education		
None	5%	11%
Elementary	6%	4%
Basic vocational	6%	9%
Intermediate general	19%	8%
Intermediate vocational	6%	7%
Full general	11%	12%
Full vocational	9%	11%
Lower tertiary	18%	18%
Higher tertiary	20%	21%
Household income	29,467 (24,988)	29,787 (29,265)
N	1331	1331
Childbirth		
Gender (% women)	56%	47%
Age	25.2 (6.4)	29.6 (8.0)
Education		
None	5%	7%
Elementary	6%	11%
Basic vocational	5%	6%
Intermediate general	23%	8%
Intermediate vocational	6%	6%
Full general	10%	14%
Full vocational	8%	9%
Lower tertiary	18%	17%
Higher tertiary	19%	22%
Household income	29,775 (23,910)	31,346 (27,648)
N	1687	1687
Widowhood		
Gender (% women)	66%	67%
Age	65.8 (11.4)	66.7 (11.6)
Education		
None	50%	51%

Elementary	1%	0%
Basic vocational	13%	13%
Intermediate general	9%	8%
Intermediate vocational	4%	3%
Full general	2%	2%
Full vocational	2%	2%
Lower tertiary	16%	18%
Higher tertiary	4%	4%
Household income	17,924 (15,130)	21,095 (16,185)
N	556	556
Unemployment		
Gender (% women)	54%	52%
Age	32.8 (13.6)	35.6 (13.4)
Education		
None	20%	25%
Elementary	8%	13%
Basic vocational	9%	13%
Intermediate general	27%	12%
Intermediate vocational	5%	5%
Full general	7%	6%
Full vocational	5%	5%
Lower tertiary	13%	15%
Higher tertiary	6%	7%
Household income	25,018 (23,983)	25,323 (21,765)
N	1364	1364

Table 2. *Fixed effects estimates from the basic nonlinear model.*

	Marriage	Childbirth	Widowhood	Unemployment
Baseline asymptote	5.25* (0.04)	5.30* (0.05)	5.66* (0.05)	5.06* (0.04)
Pre-event change	0.29* (0.07)	0.26* (0.09)	0.60* (0.04)	0.45* (0.04)
Peak change	0.31* (0.04)	0.24* (0.04)	-0.81* (0.07)	-0.40* (0.04)
Post-event change	0.18* (0.05)	0.54* (0.08)	0.63* (0.09)	0.45* (0.04)
Asymptote difference	-0.03 (0.07)	-0.05 (0.05)	-0.40* (0.06)	-0.14* (0.04)
N (people)	1,366	1,742	562	1,458
N (waves)	11,574	15,098	4,977	12,625

Note. * $p < .05$

Table 3. *Fixed effects estimates from the nonlinear models with normative changes. Group: 0 = event, 1 = control.*

	Marriage	Childbirth	Widowhood	Unemployment
First year	5.11* (0.08)	5.24* (0.08)	5.65* (0.05)	5.05* (0.04)
Group	0.06 (0.09)	0.01 (0.08)	-0.05 (0.07)	0.20* (0.04)
Yearly change	-0.01* (0.00)	-0.01* (0.00)	-0.02* (0.00)	-0.01* (0.00)
Pre-event change	0.17* (0.04)	0.20* (0.08)	0.69* (0.05)	0.43* (0.04)
Peak change	0.48* (0.08)	0.32* (0.07)	-0.69* (0.07)	-0.35* (0.04)
Post-event change	0.18* (0.06)	0.59* (0.11)	0.53* (0.08)	0.42* (0.04)
Asymptote difference	0.28* (0.11)	0.08 (0.09)	-0.19* (0.07)	-0.06 (0.05)
N (people)	2,662	3,374	1,112	2,728
N (waves)	18,309	23,382	9,124	20,772

Note. * $p < .05$

Table 4. *Correlations among the Big Five personality traits in the overall sample, and means and standard deviations in the overall sample, and each of the four event samples.*

	1	2	3	4	5
1. Neuroticism	-				
2. Extraversion	-.15	-			
3. Openness	-.08	.30	-		
4. Agreeableness	-.06	.14	.19	-	
5. Conscientiousness	-.15	.18	.24	.40	-
Sample size	14,252	14,253	14,243	14,260	14,253
Overall <i>M (SD)</i>	3.67 (1.33)	4.49 (1.19)	4.44 (1.24)	5.45 (1.02)	5.25 (1.11)
Marriage <i>M (SD)</i>	3.73 (1.25)	4.80 (1.10)	4.76 (1.04)	5.51 (0.96)	5.32 (0.99)
Childbirth <i>M (SD)</i>	3.70 (1.26)	4.78 (1.07)	4.69 (1.09)	5.41 (0.94)	5.19 (0.99)
Widowhood <i>M (SD)</i>	3.48 (1.39)	4.06 (1.20)	3.98 (1.40)	5.47 (1.12)	5.18 (1.19)
Unemployment <i>M (SD)</i>	3.83 (1.34)	4.65 (1.18)	4.66 (0.99)	5.38 (1.01)	5.02 (1.16)

Table 5. *Estimated parameters from the reaction-adaptation models with personality moderators.*

N = Neuroticism, *E* = Extraversion, *O* = Openness to Experience, *A* = Agreeableness, *C* = Conscientiousness.

	N	E	O	A	C
Marriage					
Baseline					
Intercept	5.39* (0.04)	5.39* (0.04)	5.39* (0.04)	5.39* (0.04)	5.40* (0.04)
Personality	-0.19* (0.03)	0.06 (0.04)	0.02 (0.04)	0.19* (0.04)	0.21* (0.04)
Event year change					
Intercept	0.22* (0.05)	0.22* (0.05)	0.23* (0.05)	0.22* (0.05)	0.21* (0.05)
Personality	0.03 (0.04)	0.01 (0.05)	-0.05 (0.05)	-0.07 (0.05)	-0.09 (0.05)
Post-event change					
Intercept	0.12* (0.05)	0.11* (0.05)	0.11* (0.05)	0.12* (0.05)	0.11* (0.05)
Personality	-0.03 (0.04)	0.01 (0.05)	0.04 (0.05)	-0.14* (0.05)	-0.07 (0.05)
<i>N</i> (people)	328	328	328	328	328
<i>N</i> (waves)	2,638	2,638	2,638	2,638	2,638
Childbirth					
Baseline					
Intercept	5.39* (0.04)	5.38* (0.04)	5.39* (0.04)	5.39* (0.04)	5.41* (0.04)
Personality	-0.16* (0.03)	0.13* (0.04)	0.04 (0.04)	0.17* (0.04)	0.20* (0.04)

(table continues)

Table 5 continued

	N	E	O	A	C
Event year change					
Intercept	0.22* (0.05)	0.22* (0.05)	0.21* (0.05)	0.21* (0.05)	0.22* (0.05)
Personality	0.08 (0.04)	-0.08 (0.05)	0.11* (0.05)	-0.01 (0.05)	-0.02 (0.05)
Post-event change					
Intercept	0.03 (0.06)	0.04 (0.06)	0.03 (0.06)	0.03 (0.06)	0.02 (0.06)
Personality	0.12* (0.04)	-0.07 (0.05)	-0.01 (0.05)	-0.12 (0.06)	-0.07 (0.06)
<i>N</i> (people)	389	389	389	389	389
<i>N</i> (waves)	3,089	3,089	3,089	3,089	3,089
Widowhood					
Baseline					
Intercept	5.58* (0.08)	5.62* (0.08)	5.59* (0.09)	5.61* (0.08)	5.58* (0.09)
Personality	-0.26* (0.06)	0.04 (0.07)	-0.06 (0.06)	0.16* (0.08)	0.13 (0.07)
Event year change					
Intercept	-0.90* (0.12)	-0.89* (0.12)	-0.9* (0.12)	-0.88* (0.12)	-0.91* (0.12)
Personality	0.18* (0.08)	-0.02 (0.10)	0.12 (0.08)	0.08 (0.10)	0.10 (0.10)
Post-event change					
Intercept	-0.44* (0.10)	-0.42* (0.10)	-0.41* (0.10)	-0.39* (0.10)	-0.40* (0.10)
Personality	-0.05 (0.08)	-0.01 (0.09)	0.00 (0.08)	0.06 (0.09)	-0.07 (0.09)
<i>N</i> (people)	129	128	129	130	129
<i>N</i> (waves)	1,253	1,245	1,253	1,265	1,253

(table continues)

Table 5 continued

	N	E	O	A	C
Unemployment					
Baseline					
Intercept	4.95* (0.07)	4.94* (0.07)	4.94* (0.07)	4.95* (0.07)	4.96* (0.07)
Personality	-0.23* (0.05)	0.15* (0.06)	0.06 (0.07)	0.01 (0.07)	0.11 (0.06)
Event year change					
Intercept	-0.37* (0.09)	-0.37* (0.09)	-0.39* (0.09)	-0.38* (0.09)	-0.36* (0.09)
Personality	0.07 (0.07)	-0.02 (0.07)	0.10 (0.09)	0.18* (0.09)	0.03 (0.08)
Post-event change					
Intercept	-0.04 (0.08)	-0.04 (0.08)	-0.04 (0.08)	-0.04 (0.08)	-0.05 (0.08)
Personality	-0.01 (0.06)	-0.01 (0.06)	-0.02 (0.08)	-0.02 (0.08)	-0.11 (0.07)
<i>N</i> (people)	197	197	197	197	197
<i>N</i> (waves)	1,582	1,582	1,582	1,582	1,582

Note. * $p < .05$

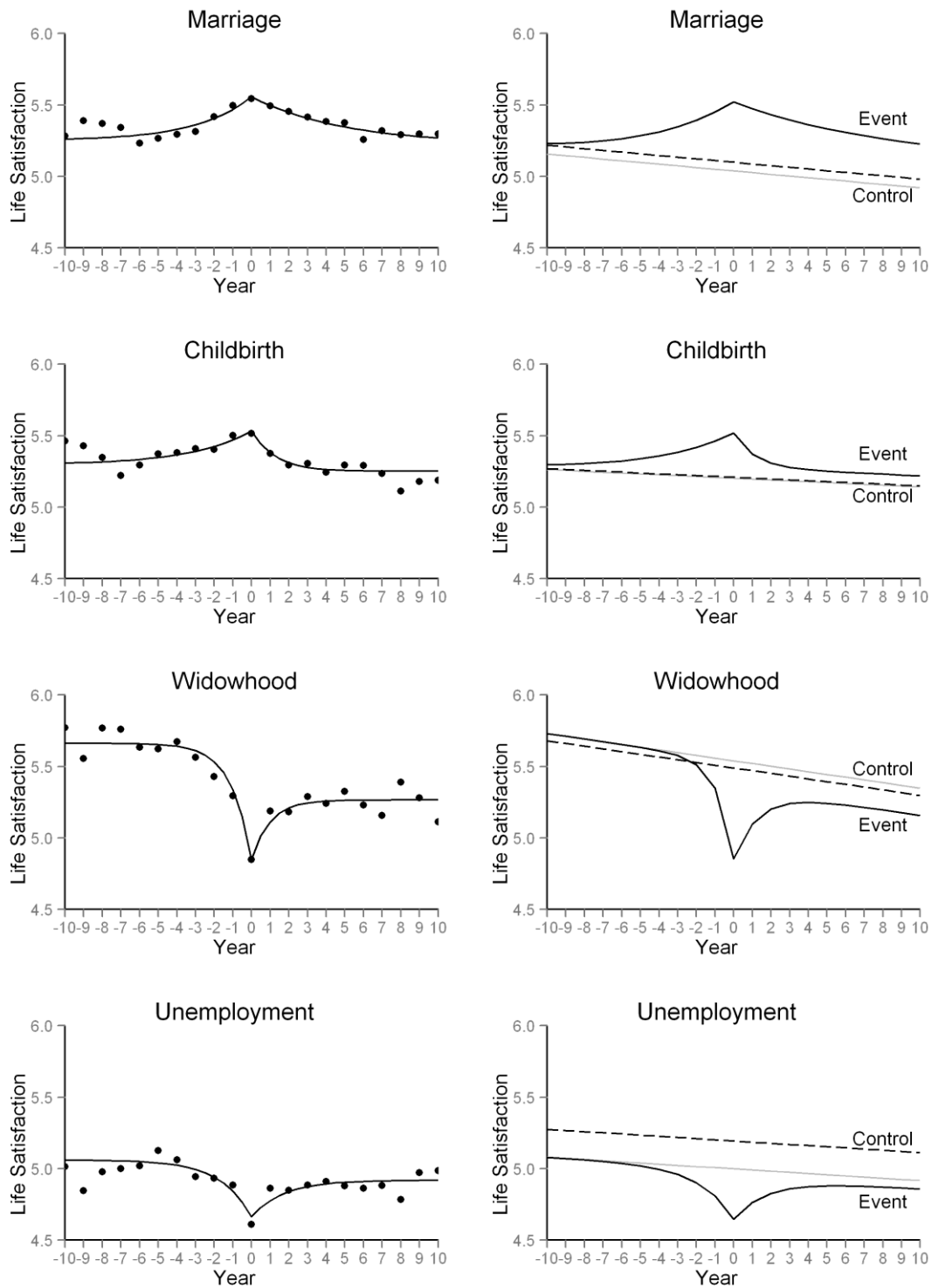


Figure 1. Estimated life satisfaction trajectories from the models that did not include normative change in life satisfaction (on left) and models that did (on right) for the four life events are

shown as dark solid lines. Points indicate mean life satisfaction in the groups that experienced an event. Dashed lines show estimated life satisfaction trajectories in the groups that did not experience the event. Lighter lines show predicted life satisfaction trajectories in the event groups if they did not experience the event, but had same initial levels of life satisfaction and experienced same normative changes.

Paper Highlights:

- Marriage, childbirth, unemployment, and widowhood are related with changes in life satisfaction.
- Some events associated with long lasting changes in life satisfaction.
- Personality does not consistently moderate the impact of life events on life satisfaction.

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