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Till death do us part: Transactions between losing one's spouse and the Big Five personality traits

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Death of spouse and personality changes

Abstract

Objective: Although losing one's spouse is one of the worst experiences that can occur in life, it has not been resolved yet how this experience relates to personality development. **Method:** In the German Socio-Economic Panel study (SOEP), information on the death of a spouse was assessed yearly from 1985 to 2017 and personality was measured repeatedly in 2005, 2009, 2013, and 2017 with the BFI-S. We used multilevel analyses to simultaneously model whether personality differed between individuals who did or did not lose their spouse and whether personality changed prior to and after this experience. **Results:** Compared to controls without the event, individuals who lost their spouse at a later point of time were more conscientious (β=0.21) and more extraverted (β=0.17). They became gradually more extraverted in the three years prior to the event (β=0.25), but were less extraverted thereafter (β=-0.27). Moreover, they gradually increased in emotional stability in the three years after this experience (β=0.30). These changes were primarily driven by women and middle-aged individuals. Men whose spouse died were less open in the first year after the event (β=-0.47). **Conclusions:** Losing one's spouse relates to changes in extraversion and emotional stability, especially in women and middle-aged adults.

Keywords: Big Five; personality trait change; spousal bereavement; grief; widowhood.

Introduction

Losing one's spouse constitutes a dramatic turning point in life having a huge impact on every day life. It is followed by a large decline in life satisfaction (Anusic & Lucas, 2014; Infurna et al., 2017; Lucas, 2007; Lucas, Clark, Georgellis, & Diener, 2003; Luhmann, Hofmann, Eid, & Lucas, 2012; Specht, Egloff, & Schmukle, 2011a) and a higher risk of experiencing unfavorable outcomes such as prolonged grief, depressive symptomatology, and increased mortality (Bonanno et al., 2002; Bonanno, Wortman, & Nesse, 2004; Stahl, Arnold, Chen, Anderson, & Schulz, 2016; Ytterstad & Brenn, 2015). Individuals who lose their spouse have to cope with grief, overcome their loss, restructure their life, and adjust to major changes in social roles. Previous research suggests that personality may affect how individuals adjust to these changes (Pai & Carr, 2010; Specht et al., 2011a). Nonetheless, facing the death of a spouse may as well impact the way individuals feel, think, and behave - that is, their personality. Longitudinal studies that investigated personality changes in the years prior to and after this event are rare and provide mixed results. In particular, additional studies with multiple waves of assessment are needed to examine different types of short- and long-term change trajectories prior to and after this experience. Using data from the German Socio-Economic Panel Study (SOEP), the aim of this study was to investigate transactions between losing one's spouse and the Big Five personality traits in general as well as separately in women, men, and different age groups.

Research on transactions between the death of a spouse and personality

Personality changes across the entire life span (Donnellan, Hill, & Roberts, 2015; Roberts, Walton, & Viechtbauer, 2006; Specht, Egloff, & Schmukle, 2011b). Theoretical models

and previous research suggest that major life events that are associated with changes in daily routines, social roles, and behavioral expectations constitute important factors that drive personality development (Denissen, Luhmann, Chung, & Bleidorn, 2018; Roberts & Wood, 2006; Specht et al., 2014; Specht et al., 2011b). Losing one's spouse constitutes one of the most stressful life events that can occur in life and relates to many challenges and changes (Carr, 2012). According to Set-Point Theory (Lykken & Tellegen, 1996) and previous findings from the wellbeing literature (Lucas, 2007; Lucas et al., 2003; Luhmann et al., 2012), individuals losing their spouse experience a huge decline in wellbeing, but usually recover in large parts in the following years.

Few previous longitudinal studies, however, examined transactions between the death of a spouse and the Big Five personality traits (Chopik, 2016; Denissen et al., 2018; Hoerger et al., 2014; Mroczek & Spiro, 2003; Specht et al., 2011b). Chopik (2016) compared Big Five personality changes over two waves spaced four years apart among middle-aged and older individuals who did or did not lose their spouse. Compared to controls, individuals whose spouse died until follow-up increased in emotional stability over time. In another sample of older adults, the author compared Big Five personality changes across three waves: prior to the event (or a comparable time point in controls) as well as 1,5 and four years thereafter (Chopik, 2016). Compared to controls, individuals who lost their spouse were more emotionally stable and more strongly increased in emotional stability from wave one to wave two. While controls became slightly more open, individuals whose spouse died became less open from wave one to wave two. Long-term personality changes from wave two to wave three or from wave one to wave three did not differ between both groups.

Death of spouse and personality changes

Using data from the SOEP, a large nationally representative household panel study covering the entire adult lifespan, Specht and colleagues (2011b) also examined Big Five personality changes over two waves spaced four years apart. Compared to controls without the event, women whose spouse died decreased, whereas men whose spouse died increased in conscientiousness over the follow-up period.

Mroczek and Spiro (2003) studied changes in extraversion and emotional stability over a period of twelve years (five waves) in middle-aged and older men. They found that men whose wife had died in the year prior to baseline were less emotionally stable at baseline, but more strongly increased in emotional stability until follow-up.

Hoerger and colleagues (2014) revealed that middle-aged and older individuals who lost their spouse more strongly increased in dependability, sociability, and prosocial orientation than controls without the event (over two waves, spaced 1,5 years apart). Recent research, however, found no evidence for transactions between this experience and the Big Five personality traits (Denissen et al., 2018).

In summary, these previous studies suggest that individuals who lose their spouse might be more or less emotionally stable than controls without this experience, become more emotionally stable, or change in openness, conscientiousness, extraversion, or agreeableness over time.. However, personality was often assessed at two or three time points only, or personality changes before and after the event were not clearly distinguished. This impedes studying complex developmental trajectories, including anticipation and socialization effects as well as immediate short- and enduring long-term personality changes in the aftermath of this tragic turning point in life.

The role of gender

Moreover, potential gender differences need to be taken into account. There is evidence that women experience a less pronounced decrease in wellbeing after losing their spouse than men (Carr, 2004; Næss, Blekesaune, & Jakobsson, 2015) - possibly because they often have more intimate social ties beyond their partner or more actively cope with their loss (Stroebe, 2001). Other research found that depressive symptoms after losing one's spouse did not differ between both genders (Kristiansen, Kjær, Hjorth, Andersen, & Prina, 2019; Sasson & Umberson, 2013; Schaan, 2013) or were more pronounced in women (Lee & DeMaris, 2007). However, although higher wellbeing and lower depressive symptoms are closely related to higher emotional stability, whether changes in emotional stability and other Big Five traits in the context of this experience vary in women and men remains largely unresolved so far.

The role of age

In addition, potential age differences need to be considered. In young adulthood, death might more often occur unexpectedly and constitutes a rather non-normative event. Younger individuals facing the death of their spouse lose a higher proportion of years they could have spent with their partner and potentially have to raise common children on their own (Infurna & Luthar, 2017). At the same time, they might be more flexible and socially active than older individuals (Brandtstädter & Renner, 1990; Heyl, Wahl, & Mollenkopf, 2007), thus being able to better adjust on the long run. In contrast, older individuals might be more likely to have already dealt with ageing, illness, and transience, anticipated their spouse's death and developed potentially useful emotion-focused coping strategies (Carstensen, Fung, & Charles, 2003; Infurna & Luthar, 2017). In previous research, younger individuals experienced a weaker decline

in life satisfaction before their spouse died, a sharper decline shortly before and after the event, and a faster recovery thereafter (Infurna et al., 2017). Nonetheless, whether and how transactions between losing one's spouse and the Big Five personality traits vary by age has not been resolved yet. Additional research hereon promises to largely contribute to the field and to enhance theory development.

The present study

This study aims to investigate transactions between losing one's spouse and the Big Five personality traits in general as well as separately in women, men, and different age groups. We used data from the SOEP ($N = 40\ 998$), a large nationally representative household panel study from Germany with ongoing yearly assessments since 1984. In the SOEP, whether a spouse has died was assessed from 1985 to 2017 and personality was measured repeatedly in 2005, 2009, 2013, and 2017. Similar to Denissen and colleagues (2018), we used multilevel analyses to simultaneously model personality differences between individuals who did or did not lose their spouse and different types of personality changes prior to and after this experience.

More specifically, we modeled *selection effects* to examine personality differences between individuals who lost their spouse at a later point of time and controls without the event. Doing so is essential, given that personality has been linked to an altered probability of experiencing specific events. For example, individuals who lost their spouse were more or less emotionally stable than controls without this experience (Chopik, 2016; Mroczek & Spiro, 2003).

We further modeled *linear anticipation and socialization effects* to indicate gradual personality changes in the three years before and after the event, respectively. Such a distinction

is particularly important. For instance, affected individuals might anticipate the death of their spouse and become less emotionally stable beforehand, but manage to recover and become more emotionally stable thereafter. In this case, ignoring anticipatory changes could falsely suggest that this tragic experience makes people more emotionally stable, although bereaved individuals might have simply bounced back to their baseline levels after some time.

In addition, we analyzed *post-event effects* to examine long-term personality changes after the event and *post-event year effects* to investigate short-term personality changes in the first year after the event. Considering such discontinuous short- and long-term changes is crucial (Denissen, Aken, Penke, & Wood, 2013; Luhmann, Orth, Specht, Kandler, & Lucas, 2014). For example, in line with Set-Point Theory (Lykken & Tellegen, 1996) and additional findings (Lucas, 2007; Lucas et al., 2003; Luhmann et al., 2012), individuals who lose their spouse might become less emotionally stable shortly thereafter, but recover in the following years.

Hypotheses

We hypothesized that emotional stability should decrease in the three years prior to the event (anticipation effect), be lower shortly thereafter (post-event year effect), and increase in the following years (socialization effect). We expected the anticipation effects to be weaker in younger and stronger in older individuals, the post-event year effects to be stronger in younger and weaker in older individuals, and the socialization effects to be stronger in younger and weaker in older individuals. We further explored transactions with other Big Five personality traits and possible gender differences.

Materials and methods

Study sample

Our data come from the German Socio-Economic Panel Study (SOEP), a nationally representative private household panel study from Germany with multistage probability sampling (here, data from version 34, doi: 10.5684/soep.v34, were used). The sample is socio-demographically diverse, covering the entire adult life span from young adulthood to old age. More detailed information has been previously presented (Goebel et al., 2019). Data in the SOEP are assessed yearly since 1984 (ongoing) and mostly stem from face-to-face interviews with all adult members of the chosen households. The study design with information on when the occurrence of life events and personality were assessed is visualized in Figure 1.

Insert Figure 1

Assessment of the death of a spouse

Since 1985, participants were yearly asked whether and when they had lost their spouse in the current or previous year (in years and months), providing us with information on the event from 1984 to 2017.

Assessment of personality

The Big Five personality traits openness, conscientiousness, extraversion, agreeableness, and emotional stability were assessed in 2005, 2009, 2013, and 2017 using the BFI-S, a short version of the Big Five Inventory (BFI) (John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008; Lang, John, Lüdtke, Schupp, & Wagner, 2011). The BFI-S contains 15 items (3 items per trait), labeled from 1 (strongly disagree) to 7 (strongly agree). To maximize the validity

of this short scale, heterogeneous items were selected per trait, which explains moderate internal consistencies (Lang et al., 2011). Cronbach's alphas in the SOEP were $\alpha = .61$ for openness, $\alpha = .60$ for conscientiousness, $\alpha = .66$ for extraversion, $\alpha = .50$ for agreeableness, and $\alpha = .61$ for emotional stability (averaged across all four waves). Measurement invariance of the BFI-S across three different modes of assessment in the SOEP (face-to-face interview, telephone interview, and self-administered questionnaire) was high (Lang et al., 2011). The test-retest reliability, convergent validity (compared to the full BFI and NEO-PI-R), and discriminant validity (as compared to other validity criteria) were acceptable (Donnellan & Lucas, 2008; Gerlitz & Schupp, 2005; Hahn, Gottschling, & Spinath, 2012; Lang, 2005).

Statistical analysis

Sample set-up

We used Stata 14 (StataCorp, 2015) for the analyses and considered individuals who provided data on at least one BFI-S item in 2005, 2009, 2013, or 2017 ($N = 49\ 933$). Based on these data, we modeled personality changes from three years before until three years after the death of a spouse. From our perspective, this six-year period is an adequate time span to model short- and long-term personality changes that at the same time are not too far from the actual event. Because personality was assessed in 2005 for the first time, we built two groups (see also Figure 1): (1) Individuals who lost their spouse in or after 2002 (three years prior to the first personality assessment in 2005) for the first time (transition sample, $N = 1\ 168$) and (2) individuals without this experience throughout the entire study from 1984 to 2017 (control sample, $N = 48\ 272$). Individuals having experienced the event already prior to 2002 (more than

three years prior to the first personality assessment in 2005) were excluded from the analyses (N = 493).

Because death rarely occurs early in life, the transition sample did not contain individuals who were younger than 23, 27, 31, and 27 years during the first, second, third, and fourth personality assessment, respectively. To ensure a similar age range in the transition and control sample, we excluded controls who were younger than individuals of the transition sample during these time points (N = 8 442), resulting in 39 830 individuals of the remaining control sample. That is, the final sample (N = 40 998) contained 1 168 (2.85 %) individuals whose spouse died and 39 830 (97.15 %) controls.

Sample characteristics

The grand-mean age across all four personality assessments was M = 52.88 (SD = 15.13; range: 23 - 103) years in the total sample, M = 68.74 (SD = 11.97; range: 23 - 103) years in the transition sample, and M = 52.20 (SD = 14.88; range: 23 - 102) years in the control sample. Individuals of the transition sample were older than controls, $t(76\ 708)$ = -61.83, $p < .001$.

There were 21 384 (52.16 %) women and 19 614 (47.84 %) men in the total sample, 834 (71.40 %) women and 334 (28.60 %) men in the transition sample, as well as 20 550 (51.59 %) women and 19 280 (48.41 %) men in the control sample. As evidenced by Fisher's exact tests, a higher proportion of the transition than of the control sample was female ($p < .001$).

Frequencies and percentages of individuals who participated in the respective personality assessment in 2005, 2009, 2013, and 2017 as well as means and standard deviations for the overall number of personality assessments in the total, transition, and control sample are presented in Table 1. As evidenced by Fisher's exact tests, a higher proportion of the transition

than of the control sample provided information on personality in 2005 ($p < .001$), 2009 ($p < .001$), and 2013 ($p < .001$). Both samples did not differ in their probability of providing information on personality in 2017. Means and standard deviations for the Big Five personality traits in the total, transition, and control sample are presented in Table 2. Correlations between these traits are shown in Table 3.

Insert Table 1, 2, and 3

Analytical approach

Similar to Denissen and colleagues (2018), we used multilevel analyses with measurement occasions (Level 1) nested within persons (Level 2) nested within households (Level 3). We included the household level, since individuals of the same household (e.g., couples) might have been more similar to each other than individuals of two different households. We simultaneously regressed the standardized scores of the Big Five personality traits on gender, linear, quadratic, and cubic age, a testing variable, and four event-related predictors. These event-related predictors coded whether individuals were part of the transition or control sample and how the event (in the transition sample) was temporarily related to the respective personality assessment in 2005, 2009, 2013, or 2017. Table 4 summarizes how each predictor was defined and coded. Examples hereon are presented in Table 5. We built separate models per trait and modeled the effects as fixed effects. Because each analysis refers to another research question, we did not adjust for multiple testing (Savitz & Olshan, 1995). However, we set the alpha level at .01.

Insert Table 4 and 5

Gender and age differences

To examine gender differences, we built separate models in women (N = 21 384, including 834 (3.90 %) women whose spouse died and 20 550 (96.10 %) female controls) and men (N = 19 614, including 334 (1.70 %) men whose spouse died and 19 280 (98.30 %) male controls).

To account for age differences, we split the transition sample into three different groups: Younger individuals who were younger than 58 years when their spouse died (19.95 %), middle-aged individuals who were aged between 58 and 78 years during the event (62.33 %), and older individuals who were older than 78 years during the event (17.72 %). We split these groups based on percentiles. That is, the younger group was in the first and second percentile and the older group was in the ninth and tenth percentile of the age range of the transition sample during the event. We did so, because we were primarily interested in whether the effects in particularly young and old individuals differed from those in middle-aged individuals, respectively. Subsequently, we divided the control sample into the same age groups (younger than 58 years, 72.67 %; aged between 58 and 78 years, 24.35 %; and older than 78 years, 2.98 %). Because controls had not experienced the event, we referred to their age at the first participated personality assessment. Afterwards, we built separate models in younger individuals (N = 29 176, including 233 (0.80 %) individuals whose spouse died and 28 943 (99.20 %) controls), middle-aged individuals (N = 10 427, including 728 (6.98 %) individuals whose spouse died and 9 699 (93.02 %) controls), and older individuals (N = 1 395, including 207 (14.84 %) individuals whose spouse died and 1 188 (85.16 %) controls).

Results

Transactions between the death of a spouse and personality in the total sample

Findings in the total sample are presented in Table 6. Individuals who lost their spouse at a later point of time were more conscientious (selection effect: $\beta = 0.21$) and more extraverted (selection effect: $\beta = 0.17$) than controls without the event. They became gradually more extraverted in the three years before the event (linear anticipation effect: $\beta = 0.25$), but were less extraverted after than prior to this experience (post-event effect: $\beta = -0.27$). Moreover, they became gradually more emotionally stable in the first three years after losing their spouse (linear socialization effect: $\beta = 0.30$). Respective changes in extraversion and emotional stability are presented in Figure 2.

There were ten individuals who lost more than one spouse from 2002 to 2017. In these cases, we referred to their earliest loss. In addition, we repeated the analyses whilst excluding these cases, leading to highly similar findings. In these models, however, individuals who lost their spouse at a later point of time were more agreeable (selection effect: $\beta = 0.17$, 99 % CI: 0.01, 0.33, $p = .006$) and less emotionally stable (selection effect: $\beta = -0.16$, 99 % CI: -0.31, -0.01, $p = .008$) than controls without the event.

We further repeated the analyses whilst including random effects for the linear age, selection, post-event, post-event year, linear anticipation, and linear socialization effect. Because it was virtually impossible to estimate these multiple random effects simultaneously, we included one random effect at a time. In these models, our findings reported above remained unchanged.

Insert Table 6 and Figure 2

Transactions between the death of a spouse and personality in women and men

To account for gender differences, we built separate models in women and men (Table 7). In women, there was no evidence that personality differed between those who lost their spouse at a later point of time and controls without the event (no selection effects). All other findings in women were similar to those in the total sample: Women who lost their spouse became gradually more extraverted in the three years before the event (linear anticipation effect: $\beta = 0.30$), but were less extraverted after than prior to this experience (post-event effect: $\beta = -0.31$). Moreover, they became gradually more emotionally stable in the first three years after losing their spouse (linear socialization effect: $\beta = 0.47$) (Supplemental Figure 1).

In men, merely the post-event year effect on openness reached statistical significance ($\beta = -0.47$). That is, men whose spouse died were less open within the first year thereafter as compared to all other years in the transition sample and controls (Figure 3).

Insert Table 7 and Figure 3

Transactions between the death of a spouse and personality in different age groups

To account for age differences, we built separate models in younger, middle-aged, and older individuals (Table 8). In younger and older individuals, none of the effects reached statistical significance. That is, personality in younger and older individuals who lost their spouse did neither differ from controls without the event nor change before or after this experience.

Our findings in middle-aged individuals were similar to those in the total sample and women. More specifically, middle-aged individuals who lost their spouse at a later point of time were more extraverted (selection effect: $\beta = 0.21$) than controls without the event. They became

gradually more extraverted in the three years before the event (linear anticipation effect: $\beta = 0.27$), but were less extraverted after than prior to this experience (post-event effect: $\beta = -0.39$). Furthermore, they became more emotionally stable in the first three years after their spouse had died (linear socialization effect: $\beta = 0.44$) (Supplemental Figure 2).

Insert Table 8

Discussion

Using data from a large nationally representative household panel study, this study examined transactions between losing one's spouse and personality, including gender and age differences. Our core findings are as follows: Compared to controls without the event, individuals who lost their spouse at a later point of time were more conscientious and more extraverted. They gradually increased in extraversion before the event, but were less extraverted thereafter. Moreover, they became gradually more emotionally stable after their spouse had died. These effects were driven by women and middle-aged individuals. Men were less open in the first year after losing their spouse.

We found that individuals who subsequently lost their spouse were more conscientious than controls. When excluding individuals who repeatedly experienced the event from the analysis, we also found that those whose spouse died at a later point of time were more agreeable and less emotionally stable than controls. This is partially consistent with previous research that individuals who experienced the event became more conscientious (Specht et al., 2011) or more agreeable (Hoerger et al., 2014) or were less emotionally stable (Mroczek & Spiro, 2003). Our findings might be explained by the possibility that many affected individuals had to care for their spouse in the end of life and therefore been particularly reliable, thoughtful, considerate and empathic, but at the same time burdened and distressed by these experiences (Hoerger et al., 2014).

Moreover, affected individuals might have often had to communicate with many others (e.g., doctors, nurses, and relatives), strived to spend as much time as possible with their partner, and sought for social support from family and friends before their spouse died (Hoerger et al., 2014; Ownsworth, Henderson, & Chambers, 2010; Rodakowski, Skidmore, Rogers, & Schulz,

2012). This might explain why they were more extraverted than controls and became gradually more extraverted as they approached the death of their spouse. These results are consistent with previous findings that spousal caregivers whose partner died more strongly increased in sociability (Hoerger et al., 2014) and considerably extend this research: We clearly distinguished between personality changes before and after the event and could demonstrate that affected individuals only increased in extraversion before they lost their spouse, but were less extraverted thereafter. Many of them might have actively grieved and withdrawn after their loss, thus explaining these effects (Bonanno & Kaltman, 2001). Besides, they might have simply had fewer opportunities to socialize with others after their presumably most important interaction partner had died (Breen & O'connor, 2011).

In line with our hypotheses and previous research (Chopik, 2016; Mroczek & Spiro, 2003), we further found that individuals who lost their spouse became gradually more emotionally stable thereafter. These results considerably add to the existing literature, as we modeled both anticipation and socialization effects and could demonstrate that emotional stability was lowest at the time point of death and increased thereafter. Affected individuals might have been most desperate when their spouse actually died, but been able to successively cope with their loss on the long run (Bonanno et al., 2004; Lucas, 2007; Lucas et al., 2003; Luhmann et al., 2012). However, our hypothesis that emotional stability should decrease before the event was not supported. Possibly, many affected individuals did not expect losing their spouse at a specific point of time or were so busy with potential nursing and other activities that they fully realized the meaning and consequences of their loss for the first time after it had actually occurred (Bass & Bowman, 1990).

Death of spouse and personality changes

The role of gender

Studying the role of gender revealed that changes in extraversion and emotional stability before and after the event were primarily driven by women. In this regard, our hypotheses on gender differences were partially confirmed, since women but not men became more emotionally stable after losing their spouse. Women might have more directly sought for social support before losing their spouse (Walen & Lachman, 2000) and more actively grieved thereafter (Doka & Martin, 2014; Stroebe, 2001), thus being able to better adjust on the long run. In contrast, men might often have had fewer social ties beyond their partner and thus been challenged with restructuring their social life after her or his death (Stroebe, 2001). This might explain why men were less open in the first year after losing their spouse as compared to all other years.

The role of age

Moreover, studying age differences revealed that our findings in the total sample were primarily driven by middle-aged, but neither younger nor older individuals. This is surprising and contradicts our hypotheses. One might speculate whether personality changes prior to and after losing one's spouse in younger and older individuals are less systematic and vary more strongly as a function of the circumstances of death (e.g., death after severe illness or an unexpected accident) and additional factors (Chopik, 2016). In young adulthood, especially the relationship length and quality as well as current family, job, and financial situation (e.g., existence of common children) might influence whether and how personality changes before and after losing one's spouse. In old age, the health status of the deceased spouse and her or his partner might be important factors to consider (Wagner, Ram, Smith, & Gerstorf, 2016).

Strengths and limitations

Our data comes from a large household panel study conducted in a nationally representative and socio-demographically diverse sample from Germany covering the entire adult life span from young adulthood to old age. Whether a spouse had died was assessed yearly over a time period of more than three decades and personality was measured repeatedly at four time points. This allowed us simultaneously modeling selection effects as well as different types of personality changes before and after losing one's spouse. Previous studies in the field are limited, provided mixed results, and were often characterized by methodological challenges (e.g., small or selective samples, two or three personality assessments only, or no clear distinctions between changes before and after the event). Therefore, our findings considerably extend previous research. Especially our findings on gender and age differences are noteworthy, given the fact that these factors have rarely been considered so far.

However, our study is not without limitations: First, our study was embedded in a large-scaled panel study with the primary scope to examine socio-economic changes. For this reason, the Big Five traits were assessed with a short scale only. Due to its shortness, the BFI-S is less reliable than other, more comprehensive measures, which impedes to distinguish between measurement errors and true changes over time.

Second, beyond selection effects, we considered linear anticipation and socialization effects as well as short- and long-term personality changes after losing one's spouse. To avoid potential overfitting, we refrained from modeling other non-linear changes such as quadratic or cubic effects. Additional studies hereon are needed in case of theoretically plausible assumptions of such effects.

Third, transactions between losing one's spouse and personality might not only depend on gender and age, but also on other individual, social, and environmental factors. Such factors might include the circumstances of death (e.g., after severe illness or unexpectedly), relationship characteristics (e.g., length and quality), and family situation (e.g., existence of common children), (c) social support from other relatives and friends, preexisting personality traits (e.g. control beliefs) (Specht et al., 2011a), and so on. For instance, one might speculate whether a sudden, unexpected death (e.g. due to an accident) differently affects personality development than a natural or predictable death after severe illness. Though, preliminary research suggest that caregiving status as well as the suddenness of death play only a marginal role for personality development after spousal bereavement (Chopik, 2016). Detailed information on the cause of death, health status, and illness history of the deceased spouse was assessed only in recent waves of the SOEP. Therefore, these effects were not modeled herein.

Conclusions

Our findings highlight the role of losing one's spouse for personality development: Individuals who experience this dramatic turning point in the upcoming years are more conscientious and more extraverted as well as increase in extraversion beforehand. Afterwards, they are less extraverted and become more emotionally stable over time. These effects are primarily driven by women and middle-aged individuals, whereas men are less open in the first year after losing their spouse. Additional studies are needed to examine the concrete mechanisms that might explain short- and long-term personality changes among bereaved individuals. Observational studies (including, for example, ecological momentary assessments and wearable technologies) promise to be particularly useful in this regard.

Declaration of conflicting interests

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Table 1

Frequencies and percentages of individuals who participated in the respective personality assessment in 2005, 2009, 2013, and 2017 as well as means and standard deviations for the overall number of personality assessments in the total, transition, and control sample

| | Personality assessment | | | | | | | | Number of personality assessments | |
| | 2005 | | 2009 | | 2013 | | 2017 | | | |
Sample	N	%	N	%	N	%	N	%	M	SD
Total sample (N = 40 998)	18634	45.45	17854	43.55	16042	39.13	24258	59.17	1.87	1.12
Control sample (N = 39 830)	17785	44.65	16991	42.66	15237	38.26	23586	59.22	1.85	1.11
Transition sample (N = 1 168)	849	72.69	863	73.89	805	68.92	672	57.53	2.73	1.13
Death of spouse in 2002 (N = 60)	60	100.00	38	63.33	24	40.00	18	30.00	2.33	1.20
Death of spouse in 2003 (N = 65)	65	100.00	48	73.85	30	46.15	22	33.85	2.54	1.21
Death of spouse in 2004 (N = 77)	76	98.70	47	61.04	34	44.16	20	25.97	2.30	1.20
Death of spouse in 2005 (N = 85)	75	88.24	72	84.71	43	50.59	26	30.59	2.54	1.03
Death of spouse in 2006 (N = 61)	55	90.16	51	83.61	40	65.57	33	54.10	2.93	1.17
Death of spouse in 2007 (N = 81)	73	90.12	74	91.36	52	64.20	43	53.09	2.99	1.03
Death of spouse in 2008 (N = 86)	66	76.74	83	96.51	49	56.98	37	43.02	2.73	1.15
Death of spouse in 2009 (N = 83)	64	77.11	81	97.59	52	62.65	40	48.19	2.86	1.14
Death of spouse in 2010 (N = 90)	53	58.89	66	73.33	70	77.78	42	46.67	2.57	1.02
Death of spouse in 2011 (N = 78)	40	51.28	54	69.23	66	84.62	53	67.95	2.73	1.02
Death of spouse in 2012 (N = 73)	45	61.64	52	71.23	70	95.89	51	69.86	2.99	1.02
Death of spouse in 2013 (N = 65)	43	66.15	46	70.77	58	89.23	48	73.85	3.00	1.06
Death of spouse in 2014 (N = 91)	48	52.75	50	54.95	75	82.42	72	79.12	2.69	1.15
Death of spouse in 2015 (N = 79)	46	58.23	54	68.35	72	91.14	73	92.41	3.10	1.06
Death of spouse in 2016 (N = 72)	30	41.67	36	50.00	57	79.17	72	100.00	2.71	1.19
Death of spouse in 2017 (N = 22)	10	45.45	11	50.00	13	59.09	22	100.00	2.55	1.44

Note. M = Mean. SD = Standard Deviation.

Table 2

Means and standard deviations for the Big Five personality traits in the total, transition, and control sample

Big Five personality trait	2005		2009		2013		2017		Grand-mean	
	M	SD	M	SD	M	SD	M	SD	M	SD
Openness										
Total sample	4.48	1.22	4.38	1.23	4.57	1.20	4.73	1.23	4.55	1.23
Control sample	4.49	1.22	4.39	1.23	4.58	1.19	4.74	1.23	4.56	1.22
Transition sample	4.27	1.29	4.15	1.24	4.41	1.24	4.39	1.23	4.30	1.26
Conscientiousness										
Total sample	5.96	0.91	5.88	0.92	5.90	0.89	5.88	0.92	5.90	0.91
Control sample	5.96	0.91	5.88	0.92	5.90	0.89	5.88	0.92	5.90	0.91
Transition sample	6.04	0.92	5.88	0.92	5.96	0.89	5.81	0.97	5.93	0.93
Extraversion										
Total sample	4.81	1.13	4.75	1.14	4.83	1.11	4.95	1.14	4.84	1.13
Control sample	4.82	1.13	4.75	1.14	4.83	1.11	4.95	1.14	4.85	1.13
Transition sample	4.75	1.12	4.64	1.09	4.80	1.06	4.75	1.07	4.73	1.09
Agreeableness										
Total sample	5.46	0.98	5.35	0.99	5.40	0.97	5.50	1.00	5.43	0.99
Control sample	5.45	0.98	5.34	0.99	5.39	0.97	5.49	1.00	5.42	0.99
Transition sample	5.65	0.98	5.58	0.95	5.67	0.94	5.70	0.91	5.65	0.95
Emotional stability										
Total sample	4.03	1.23	4.16	1.22	4.23	1.23	4.24	1.24	4.17	1.23
Control sample	4.03	1.22	4.17	1.22	4.24	1.22	4.24	1.24	4.18	1.23
Transition sample	3.87	1.26	4.02	1.25	4.15	1.26	4.16	1.24	4.04	1.26

Note. M = Mean. SD = Standard Deviation.

Table 3

Correlations between the Big Five personality traits across all four waves

Big Five personality trait	Openness r	Conscientiousness r	Extraversion r	Agreeableness r
Openness				
Conscientiousness	0.18			
Extraversion	0.37	0.22		
Agreeableness	0.14	0.31	0.10	
Emotional stability	0.07	0.11	0.16	0.12

Table 4

Description and coding of the included predictors

Predictor	Description	Coding
Gender	• Gender effects	• Coded with 0 for females • Coded with 1 for males • Centered
Linear age	• Linear age effects	• Age at the respective personality assessment (divided by 3 [a]) • Centered
Quadratic age	• Quadratic age effects	• Linear age variable ^{2}
Cubic age	• Cubic age effects	• Linear age variable ^{3}
Testing	• Effects due to repeated personality assessments	• Coded with 0 for the first personality assessment • Coded with 1 for the second personality assessment • Coded with 2 for the third personality assessment • Coded with 3 for the fourth personality assessment
Selection/ post-event	• 1 versus 0: Personality differences between individuals of the transition sample who lost their spouse at a later point of time and controls without this experience (indicating selection effects) • 2 versus 1: Personality differences between individuals of the transition sample who had already lost their spouse and lost their spouse at a later point of time (indicating long-term personality changes after the event)	• Coded with 0 for personality assessments in controls • Coded with 1 for personality assessments prior to the event in the transition sample • Coded with 2 for personality assessments in the year of or after the event in the transition sample
Post-event-year	• Personality differences between the first year after losing one's spouse and all other years (indicating short-term personality changes in the first year after the event)	• Coded with 0 for personality assessments in controls and personality assessments prior to or more than one year after the event in the transition sample • Coded with 1 for personality assessments within one year after the event in the transition sample
Linear anticipation	• Gradual personality changes in the three years prior to losing one's spouse	• Coded with 0 for personality assessments in controls and personality assessments after the event in the transition sample • Coded with the time span between the respective personality assessment and the event for personality assessments in the three years prior to the event in the transition sample (in years and months, divided by 3 [a]) • Coded with -1 for personality assessments more than three years prior to the event in the transition sample [b]

Linear socialization	• Gradual personality changes in the three years after losing one's spouse	• Coded with 0 for personality assessments in controls and personality assessments prior to the event in the transition sample [b]
		• Coded with the time span between the respective personality assessment and the event for personality assessments in the three years after the event in the transition sample (in years and months, divided by 3 [a])
		• Coded with 1 for personality assessments more than three years after the event in the transition sample [c]

Note: [a] We used a 3-year metric for these predictors (where a difference of 1 indicates a time span of 3 years). [b] We coded these values with -1 because we only modeled anticipation effects in the three years prior to the event. [c] We coded these values with 1 because we only modeled socialization effects in the three years after the event.

Table 5

Examples on how the event-related predictors were coded

| | Personality assessment | | | | | | | | | | | | | | | |
| | 2005 | | | | 2009 | | | | 2013 | | | | 2017 | | | |
Sample	Select/ post-event	Post-event year	Lin ant	Lin soc	Select/ post-event	Post-event year	Lin ant	Lin soc	Select/ post-event	Post-event year	Lin ant	Lin soc	Select/ post-event	Post-event year	Lin ant	Lin soc
Control sample (N = 39 830)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transition sample (N = 1 168)																
Death of spouse in 2002 (N = 60)	2	0	0	3/3	2	0	0	1	2	0	0	1	2	0	0	1
Death of spouse in 2003 (N = 65)	2	0	0	2/3	2	0	0	1	2	0	0	1	2	0	0	1
Death of spouse in 2004 (N = 77)	2	1	0	1/3	2	0	0	1	2	0	0	1	2	0	0	1
Death of spouse in 2005 (N = 85)	2	0	0	0	2	0	0	1	2	0	0	1	2	0	0	1
Death of spouse in 2006 (N = 61)	1	0	-1/3	0	2	0	0	3/3	2	0	0	1	2	0	0	1
Death of spouse in 2007 (N = 81)	1	0	-2/3	0	2	0	0	2/3	2	0	0	1	2	0	0	1
Death of spouse in 2008 (N = 86)	1	0	-3/3	0	2	1	0	1/3	2	0	0	1	2	0	0	1
Death of spouse in 2009 (N = 83)	1	0	-1	0	2	0	0	0	2	0	0	1	2	0	0	1
Death of spouse in 2010 (N = 90)	1	0	-1	0	1	0	-1/3	0	2	0	0	3/3	2	0	0	1
Death of spouse in 2011 (N = 78)	1	0	-1	0	1	0	-2/3	0	2	0	0	2/3	2	0	0	1
Death of spouse in 2012 (N = 73)	1	0	-1	0	1	0	-3/3	0	2	1	0	1/3	2	0	0	1
Death of spouse in 2013 (N = 65)	1	0	-1	0	1	0	-1	0	2	0	0	0	2	0	0	1
Death of spouse in 2014 (N = 91)	1	0	-1	0	1	0	-1	0	1	0	-1/3	0	2	0	0	3/3
Death of spouse in 2015 (N = 79)	1	0	-1	0	1	0	-1	0	1	0	-2/3	0	2	0	0	2/3
Death of spouse in 2016 (N = 72)	1	0	-1	0	1	0	-1	0	1	0	-3/3	0	2	1	0	1/3
Death of spouse in 2017 (N = 22)	1	0	-1	0	1	0	-1	0	1	0	-1	0	2	0	0	0

Note. Select = Selection. Lin ant = Linear anticipation. Lin soc = Linear socialization. Examples are given for full years only. The

analyses were based on more fine-grained information (on years and months). That is, time spans were calculated and coded in

monthly increments.

Table 6

Transactions between losing one's spouse and personality in the total sample (N = 40 998) [1]

Fixed effects	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	0.05	0.04	0.07	<.001	0.10	0.09	0.12	<.001	0.03	0.02	0.05	<.001	0.03	0.01	0.04	<.001	-0.01	-0.03	0.00	.025
Gender	-0.10	-0.13	-0.08	<.001	-0.11	-0.13	-0.09	<.001	-0.15	-0.18	-0.13	<.001	-0.30	-0.32	-0.27	<.001	0.41	0.38	0.43	<.001
Age	-0.01	-0.01	0.00	<.001	0.00	-0.01	0.00	.022	-0.02	-0.03	-0.02	<.001	0.00	-0.01	0.00	.396	-0.01	-0.01	-0.01	<.001
Age^2	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.020	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.033
Age^3	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.002	0.00	0.00	0.00	.731	0.00	0.00	0.00	.001	0.00	0.00	0.00	.002
Testing	0.01	0.00	0.02	.001	-0.07	-0.07	-0.06	<.001	0.00	-0.01	0.01	.698	-0.05	-0.06	-0.04	<.001	0.04	0.03	0.05	<.001
Selection	-0.08	-0.23	0.06	.143	0.21	0.05	0.37	.001	0.17	0.02	0.31	.004	0.10	-0.06	0.25	.111	-0.05	-0.20	0.10	.421
Post-event	-0.04	-0.31	0.22	.661	-0.11	-0.40	0.17	.300	-0.27	-0.52	-0.01	.007	0.10	-0.18	0.38	.372	-0.15	-0.42	0.12	.156
Post-event year	-0.08	-0.29	0.14	.347	0.02	-0.21	0.25	.792	-0.08	-0.29	0.13	.326	0.03	-0.20	0.26	.750	-0.01	-0.23	0.21	.903
Linear anticipation	0.06	-0.11	0.22	.369	0.11	-0.07	0.29	.128	0.25	0.09	0.42	<.001	0.03	-0.15	0.21	.625	-0.01	-0.18	0.16	.844
Linear socialization	0.04	-0.21	0.28	.709	-0.03	-0.30	0.23	.738	0.13	-0.11	0.37	.154	-0.02	-0.28	0.24	.841	0.30	0.05	0.55	.002
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	.27	.25	.39		.23	.21	.24		.07	.06	.09		.19	.17	.21		.10	.08	.12	
Person (intercept)	.34	.33	.36		.29	.27	.31		.54	.52	.56		.31	.30	.33		.45	.43	.47	
Person (residual)	.40	.39	.40		.48	.47	.49		.38	.37	.38		.48	.47	.49		.42	.41	.43	

Note. β = standardized β-coefficient from multilevel mixed-effect models. CI = Confidence Interval. [1] 1 168 (2.85 %) individuals whose spouse died and 39 830 (97.15 %) controls.

Table 7

Transactions between losing one's spouse and personality in women (N = 21 384) [1] and men (N = 19 614) [2]

Women	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Fixed effects	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	0.06	0.03	0.08	<.001	0.10	0.08	0.12	<.001	0.03	0.01	0.05	<.001	0.03	0.01	0.05	<.001	0.01	-0.02	0.03	.543
Age	-0.01	-0.01	0.00	.006	0.00	-0.01	0.00	.502	-0.02	-0.03	-0.02	<.001	0.01	0.00	0.01	<.001	-0.01	-0.01	0.00	<.001
Age^2	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001
Age^3	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.448	0.00	0.00	0.00	.557	0.00	0.00	0.00	.603	0.00	0.00	0.00	<.001
Testing	0.01	0.00	0.02	.030	-0.05	-0.07	-0.04	<.001	0.01	-0.01	0.02	.171	-0.07	-0.08	-0.05	<.001	0.04	0.03	0.05	<.001
Selection	-0.13	-0.31	0.04	.050	0.16	-0.03	0.35	.030	0.17	0.00	0.35	.011	0.06	-0.13	0.25	.451	-0.07	-0.25	0.11	.324
Post-event	-0.18	-0.49	0.13	.135	-0.20	-0.54	0.14	.124	-0.31	-0.61	0.00	.009	0.14	-0.20	0.48	.295	-0.30	-0.62	0.02	.015
Post-event year	0.06	-0.20	0.31	.564	0.07	-0.20	0.35	.488	-0.08	-0.33	0.16	.380	0.06	-0.21	0.34	.559	0.04	-0.22	0.30	.691
Linear anticipation	0.05	-0.14	0.25	.487	0.10	-0.12	0.31	.240	0.30	0.10	0.49	<.001	0.02	-0.19	0.24	.796	0.03	-0.17	0.24	.698
Linear socialization	0.18	-0.11	0.46	.112	0.05	-0.27	0.36	.697	0.15	-0.13	0.43	.171	-0.06	-0.37	0.25	.616	0.47	0.17	0.76	<.001
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	23	17	32		15	10	23		15	09	24		19	13	27		17	11	28	
Person (intercept)	.37	.31	.46		.35	.29	.42		.47	.40	.54		.31	.25	.38		.39	.32	.48	
Person (residual)	.39	.38	.41		.50	.49	.51		.38	.37	.39		.50	.49	.51		.44	.42	.45	

Men	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Fixed effects	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	0.04	0.02	0.06	<.001	0.10	0.08	0.13	<.001	0.03	0.01	0.05	.001	0.01	-0.01	0.03	.326	-0.04	-0.06	-0.01	<.001
Age	-0.01	-0.01	0.00	.006	-0.01	-0.01	0.00	.004	-0.02	-0.03	-0.02	<.001	-0.01	-0.02	-0.01	<.001	-0.01	-0.02	0.00	<.001
Age^2	0.00	0.00	0.00	.626	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.217	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.081
Age^3	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.897	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.599
Testing	0.00	-0.01	0.01	.857	-0.08	-0.09	-0.07	<.001	-0.01	-0.02	0.00	.015	-0.05	-0.06	-0.03	<.001	0.05	0.04	0.06	<.001
Selection	-0.13	-0.42	0.16	.247	0.19	-0.11	0.49	.110	0.14	-0.14	0.42	.211	0.09	-0.22	0.39	.454	-0.06	-0.36	0.23	.576
Post-event	0.38	-0.13	0.88	.054	0.19	-0.35	0.73	.362	-0.17	-0.66	0.32	.381	0.07	-0.47	0.61	.731	0.24	-0.28	0.76	.237
Post-event year	-0.47	-0.88	-0.06	.003	-0.16	-0.59	0.27	.343	-0.08	-0.48	0.32	.620	-0.06	-0.49	0.38	.745	-0.16	-0.58	0.27	.343
Linear anticipation	0.07	-0.25	0.40	.550	0.08	-0.26	0.42	.554	0.15	-0.16	0.46	.214	0.05	-0.29	0.39	.709	-0.10	-0.43	0.24	.458
Linear socialization	-0.35	-0.81	0.12	.053	-0.31	-0.81	0.18	.102	0.08	-0.37	0.54	.631	0.05	-0.44	0.55	.777	-0.10	-0.58	0.38	.580
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	.30	.24	.37		.16	.11	.24		.14	.08	.23		.18	.12	.26		.13	.08	.24	

Person (intercept)	.31	.25	.38		.36	.30	.44		.48	.41	.56		.34	.28	.42		.43	.36	.52
Person (residual)	.40	.39	.42		.47	.46	.49		.38	.37	.39		.48	.47	.50		.44	.43	.45

Note. β = standardized β-coefficient from multilevel mixed-effect models. CI = Confidence Interval. [1] 834 (3.90 %) females whose spouse died and 20 550 (96.10 %) female controls. [2] 334 (1.70 %) males whose spouse died and 19 280 (98.30 %) male controls.

Table 8

Transactions between losing one's spouse and personality in younger (N = 29 176) [1], middle-aged (N = 10 427) [2], and older individuals (N = 1 395) [3]

Younger individuals	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Fixed effects	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	0.04	0.02	0.06	<.001	0.09	0.07	0.11	<.001	0.04	0.02	0.06	<.001	0.07	0.05	0.08	<.001	-0.01	-0.03	0.01	.222
Gender	-0.12	-0.15	-0.09	<.001	-0.12	-0.14	-0.09	<.001	-0.16	-0.19	-0.14	<.001	-0.27	-0.30	-0.25	<.001	0.40	0.37	0.43	<.001
Age	-0.01	-0.02	0.00	.001	0.00	0.00	0.01	.272	-0.03	-0.03	-0.02	<.001	-0.01	-0.02	0.00	<.001	-0.01	-0.02	0.00	<.001
Age²	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.315	0.00	0.00	0.00	.122	0.00	0.00	0.00	.007
Age³	0.00	0.00	0.00	.376	0.00	0.00	0.00	<.001	0.00	0.00	0.00	<.001	0.00	0.00	0.00	.001	0.00	0.00	0.00	.004
Testing	-0.01	-0.02	0.00	.021	-0.06	-0.08	-0.05	<.001	-0.01	-0.02	0.00	.096	-0.05	-0.07	-0.04	<.001	0.04	0.03	0.06	<.001
Selection	-0.28	-0.65	0.10	.060	0.19	-0.21	0.60	.212	-0.06	-0.43	0.31	.672	0.04	-0.36	0.44	.792	0.26	-0.12	0.65	.080
Post-event	0.35	-0.26	0.95	.142	-0.27	-0.93	0.38	.277	0.15	-0.43	0.74	.503	0.08	-0.57	0.73	.756	-0.40	-1.02	0.22	.096
Post-event year	-0.38	-0.86	0.09	.035	0.17	-0.33	0.67	.382	-0.38	-0.83	0.08	.032	0.26	-0.24	0.76	.185	-0.21	-0.69	0.27	.259
Linear anticipation	0.00	-0.44	0.43	.990	0.22	-0.25	0.69	.228	0.22	-0.20	0.64	.180	0.05	-0.42	0.52	.778	0.35	-0.10	0.79	.045
Linear socialization	-0.24	-0.76	0.28	.238	0.15	-0.41	0.72	.477	-0.16	-0.67	0.34	.402	-0.05	-0.61	0.51	.817	0.21	-0.33	0.74	.318
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	.24	.22	.26		.22	.20	.24		.07	.05	.10		.19	.17	.21		.10	.08	.12	
Person (intercept)	.38	.36	.40		.31	.29	.33		.56	.53	.59		.33	.31	.36		.46	.43	.49	
Person (residual)	.39	.38	.40		.47	.46	.48		.36	.35	.37		.47	.46	.48		.41	.40	.42	

Middle-aged individuals	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Fixed effects	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	-0.01	-0.04	0.02	.344	0.03	0.00	0.06	.016	0.00	-0.04	0.03	.693	0.01	-0.02	0.04	.275	-0.02	-0.05	0.01	.113
Gender	-0.09	-0.13	-0.05	<.001	-0.10	-0.14	-0.06	<.001	-0.14	-0.18	-0.09	<.001	-0.36	-0.40	-0.32	<.001	0.42	0.38	0.46	<.001
Age	-0.05	-0.06	-0.03	<.001	0.00	-0.02	0.01	.685	-0.03	-0.04	-0.01	<.001	0.03	0.02	0.05	<.001	-0.01	-0.03	0.00	.035
Age²	0.00	-0.01	0.00	<.001	0.00	0.00	0.00	.142	0.00	0.00	0.00	.645	0.01	0.00	0.01	<.001	0.00	-0.01	0.00	.001
Age³	0.00	0.00	0.00	.551	0.00	0.00	0.00	.007	0.00	0.00	0.00	.465	0.00	0.00	0.00	.301	0.00	0.00	0.00	.477
Testing	0.05	0.03	0.07	<.001	-0.08	-0.10	-0.06	<.001	0.01	-0.01	0.03	.393	-0.06	-0.09	-0.04	<.001	0.05	0.03	0.07	<.001
Selection	-0.09	-0.27	0.10	.226	0.16	-0.03	0.36	.031	0.21	0.02	0.39	.004	0.18	-0.02	0.37	.020	-0.13	-0.32	0.05	.068
Post-event	-0.03	-0.36	0.30	.810	-0.05	-0.41	0.31	.731	-0.39	-0.72	-0.06	.003	0.02	-0.34	0.38	.888	-0.15	-0.49	0.19	.259
Post-event year	-0.07	-0.34	0.20	.510	0.02	-0.27	0.32	.835	0.00	-0.27	0.28	.978	0.07	-0.23	0.36	.563	0.15	-0.13	0.42	.179

Death of spouse and personality changes

	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Linear anticipation	0.05	-0.15	0.26	.524	0.12	-0.11	0.34	.182	0.27	0.07	0.48	.001	0.16	-0.06	0.38	.067	-0.12	-0.33	0.09	.148
Linear socialization	0.01	-0.30	0.32	.954	-0.08	-0.41	0.26	.551	0.24	-0.07	0.55	.044	0.02	-0.32	0.35	.886	0.44	0.12	0.75	<.001
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	.34	.30	.38		.27	.24	.31		.07	.04	.12		.20	.17	.24		.09	.06	.14	
Person (intercept)	.26	.23	.30		.23	.20	.27		.52	.48	.57		.27	.24	.30		.43	.39	.48	
Person (residual)	.41	.40	.42		.50	.49	.52		.42	.40	.43		.50	.48	.52		.43	.42	.45	

Older individuals	Openness				Conscientiousness				Extraversion				Agreeableness				Emotional stability			
Fixed effects	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p	β	99%CI		p
Intercept	0.02	-0.06	0.10	.559	-0.01	-0.09	0.07	.633	0.01	-0.07	0.09	.657	0.04	-0.04	0.12	.238	0.00	-0.08	0.08	.946
Gender	0.04	-0.08	0.15	.407	0.00	-0.12	0.12	.974	-0.09	-0.22	0.03	.058	-0.31	-0.43	-0.20	<.001	0.43	0.31	0.56	<.001
Age	-0.04	-0.10	0.02	.068	-0.06	-0.11	0.00	.015	0.01	-0.05	0.07	.650	0.04	-0.01	0.10	.050	0.03	-0.02	0.09	.135
Age^2	0.00	-0.01	0.01	.754	0.00	-0.02	0.01	.700	-0.01	-0.02	0.01	.196	0.00	-0.02	0.01	.466	0.01	0.00	0.02	.100
Age^3	0.00	0.00	0.01	.165	0.00	0.00	0.00	.824	0.00	0.00	0.00	.847	0.00	0.00	0.00	.999	0.00	0.00	0.00	.717
Testing	-0.08	-0.16	0.00	.014	-0.08	-0.17	0.00	.011	-0.06	-0.15	0.02	.047	-0.12	-0.20	-0.04	<.001	-0.01	-0.09	0.08	.866
Selection	0.18	-0.20	0.57	.219	0.38	-0.03	0.80	.018	0.28	-0.14	0.69	.089	-0.15	-0.56	0.26	.332	0.03	-0.36	0.43	.836
Post-event	-0.43	-1.11	0.26	.107	-0.20	-0.95	0.54	.484	-0.23	-0.97	0.51	.425	0.48	-0.26	1.21	.093	0.00	-0.70	0.70	.989
Post-event year	0.18	-0.37	0.72	.408	-0.10	-0.70	0.49	.655	-0.04	-0.62	0.55	.876	-0.36	-0.95	0.22	.111	-0.32	-0.88	0.24	.141
Linear anticipation	0.14	-0.31	0.59	.432	0.19	-0.31	0.68	.331	0.16	-0.33	0.65	.409	-0.31	-0.80	0.18	.101	0.12	-0.34	0.58	.508
Linear socialization	0.32	-0.34	0.99	.212	-0.04	-0.77	0.69	.893	0.04	-0.68	0.76	.897	-0.18	-0.89	0.54	.527	-0.08	-0.76	0.61	.775
Random effects	Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI			Var	99%CI		
Household (intercept)	.45	.35	.59		.23	.12	.44		.07	.01	.50		.27	.16	.46		.16	.06	.40	
Person (intercept)	.12	.05	.28		.23	.12	.45		.41	.28	.61		.16	.07	.38		.34	.22	.54	
Person (residual)	.44	.39	.49		.55	.49	.62		.53	.47	.59		.54	.48	.60		.46	.41	.52	

Note. β = standardized β-coefficient from multilevel mixed-effect models. CI = Confidence Interval. [1] 233 (0.80 %) older individuals whose spouse died and 28 943 (99.20 %) older controls. [2] 728 (6.98 %) middle-aged individuals whose spouse died and 9 699 (93.02 %) middle-aged controls. [3] 207 (14.84 %) older individuals whose spouse died and 1 188 (85.16 %) older controls.
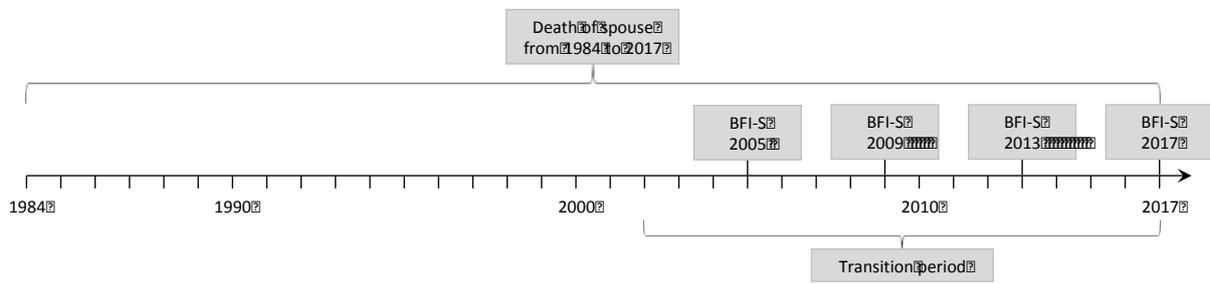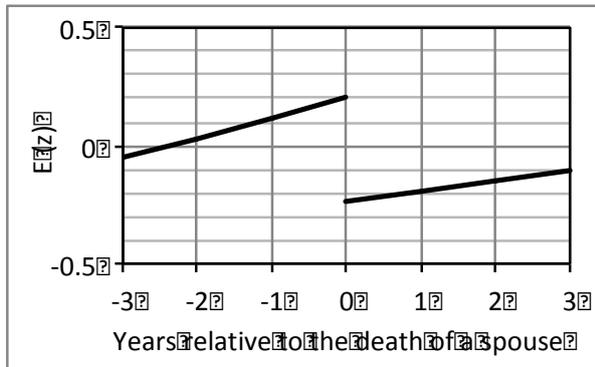
Figure 1: Study design with information on when the death of a spouse and personality were assessed.
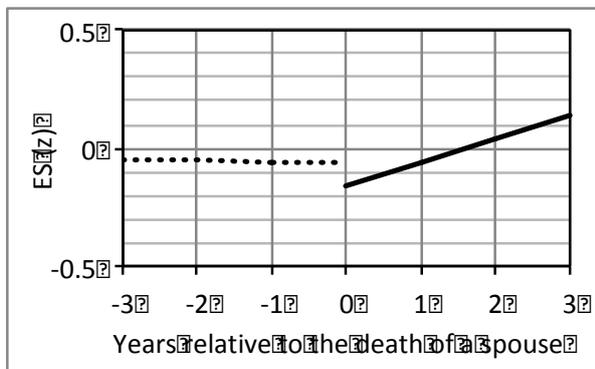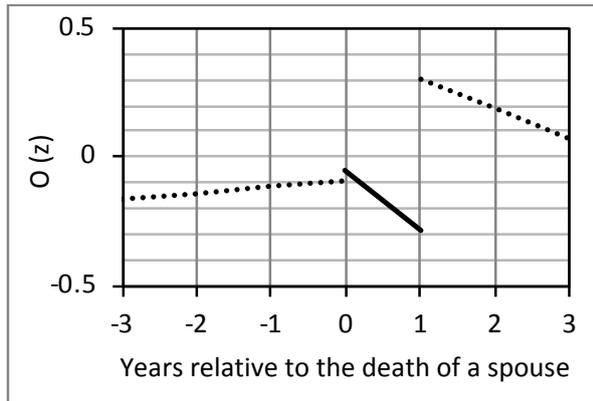
(a)

(b)

Figure 2: Changes in (a) extraversion and (b) emotional stability in the three years prior to and after losing one's spouse in the total sample.

Note. E = Extraversion. ES = Emotional Stability. The first line indicates personality changes in the three years before losing one's spouse. It is based on the sum of the coefficients of the intercept, selection, and linear anticipation variables, multiplied by their values within three years prior to the event. The second line indicates personality changes in the three years after losing one's spouse. It is based on the sum of the coefficients of the intercept, post-event, and linear socialization variables, multiplied by their values within three years after the event. For extraversion, both lines are continuous because the linear anticipation and post-event effect were

significant. For emotional stability, only the second line is continuous because only the linear socialization effect was significant.
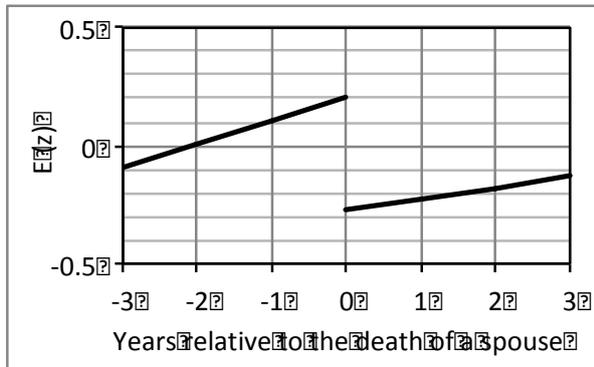
Figure 3: Changes in openness in the three years prior to and after losing one's spouse in men.
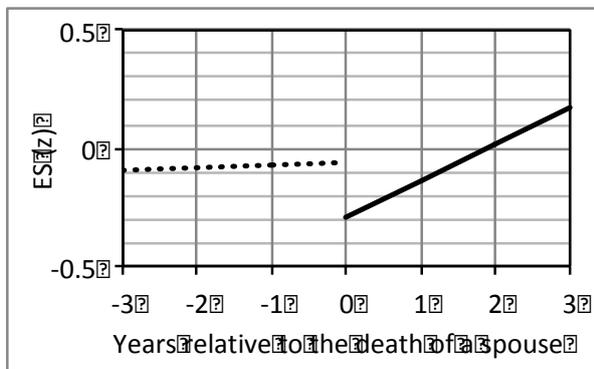
Note. O = Openness. The second, continuous line (based on the sum of the coefficients of the intercept, post-event, post-event year, and linear socialization variables, multiplied by their values within one year after the event) visualizes the significant post-event year effect on openness. See Figure 1 for more information on how the other lines were built.

(a)

(b)

Supplemental Figure 1: Changes in (a) extraversion and (b) emotional stability in the three years prior to and after losing one's spouse in women.
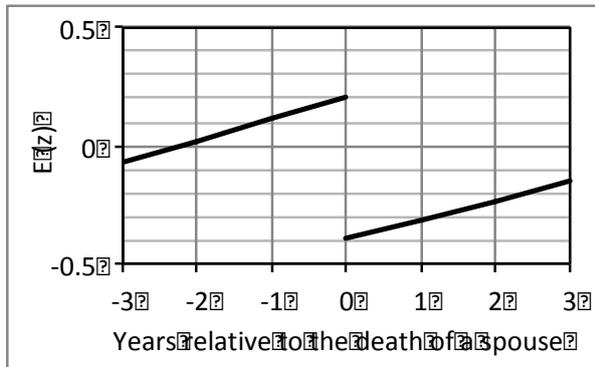
Note. E = Extraversion. ES = Emotional Stability. The first line indicates personality changes in the three years before losing one's spouse. It is based on the sum of the coefficients of the intercept, selection, and linear anticipation variables, multiplied by their values within three years prior to the event. The second line indicates personality changes in the three years after losing one's spouse. It is based on the sum of the coefficients of the intercept, post-event, and linear socialization variables, multiplied by their values within three years after the event. For extraversion, both lines are continuous because the linear anticipation and post-event effect were
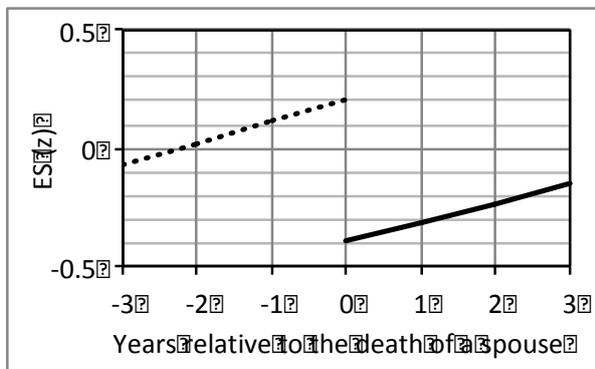
significant. For emotional stability, only the second line is continuous because only the linear

socialization effect was significant.

(a)

(b)

Supplemental Figure 2: Changes in (a) extraversion and (b) emotional stability in the three years prior to and after losing one's spouse in middle-aged individuals.

Note. E = Extraversion. ES = Emotional Stability. The first line indicates personality changes in the three years before losing one's spouse. It is based on the sum of the coefficients of the intercept, selection, and linear anticipation variables, multiplied by their values within three years prior to the event. The second line indicates personality changes in the three years after losing one's spouse. It is based on the sum of the coefficients of the intercept, post-event, and linear socialization variables, multiplied by their values within three years after the event. For extraversion, both lines are continuous because the linear anticipation and post-event effect were

significant. For emotional stability, only the second line is continuous because only the linear socialization effect was significant.