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Self-Esteem is Relatively Stable Late in Life: The Role of Resources in the Health, Self-Regulation, and Social Domains

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Abstract

A large body of research has documented changes in self-esteem across adulthood and individual-difference correlates thereof. However, little is known about whether people maintain their self-esteem until the end of life and what role key risk factors in the health, cognitive, self-regulatory, and social domains play. To examine these questions, we apply growth modeling to 13-year longitudinal data obtained from by now deceased participants of the Berlin Aging Study (BASE, $N = 462$; age 70 – 103, $M = 86.3$ yrs., $SD = 8.3$; 51% male). Results revealed that self-esteem, on average, does decline in very old age and close to death, but the amount of typical decline is minor. Health-related constraints and disabilities as well as lower control beliefs and higher loneliness were each associated with lower self-esteem late in life. We obtained initial evidence that some of these associations were stronger among the oldest-old participants. Our results corroborate and extend initial reports that self-esteem is, on average, fairly stable into the last years of life. We discuss possible pathways by which common and often severe late-life challenges may undermine an otherwise relatively robust self-esteem system.

Keywords

self-esteem trajectories; age-related and mortality-related; late life; longitudinal data; resources

A large body of research has documented changes in self-esteem across adulthood and individual-difference therein. For example, self-esteem, typically defined as the general evaluation and appraisal of one's worth (Leary & Baumeister, 2000; Orth et al., 2011), has been shown to increase when people transition into young adulthood (Erol & Orth, 2011; Wagner, Lüdtke, Jonkemann, & Trautwein, 2013), then reaches a relatively stable plateau by midlife, and eventually starts declining at about age 65 (Orth, Trzesniewski, & Robins, 2010; Robins, Trzesniewski, Tracy, Gosling & Potter, 2002). However, there is also

evidence that self-esteem is, on average, relatively stable after age 60 (Huang, 2010; Pullmann, Allik, & Realo, 2009; Wagner, Gerstorf, Hoppmann, & Luszcz, 2013). Over and above these typical developmental trends, there are often pronounced individual differences in self-esteem that have been linked to key variables in other domains of functioning. For example, several studies report that a sense of mastery and personal control relates to higher self-esteem both in young adulthood and old age (Erol & Orth, 2011; Wagner, Gerstorf et al., 2013). In our study, we extend very initial insights reported from our own work using data from the Australian Longitudinal Study of Ageing (ALSA; Wagner, Gerstorf et al., 2013) by exploring developmental trends and individual differences in levels and rates of change in self-esteem in the oldest old using 13-year longitudinal data obtained from by now deceased participants in the Berlin Aging Study.

Typical Self-Esteem Late in Life

Drawing from life-span theoretical notions, capacities of the self are expected to be relatively robust well into old age (Brandtstädter & Renner, 1990; Brickman & Campbell, 1971; Charles & Carstensen, 2010). At the same time, the capacity to adapt to losses and unattainable goals (see Heckhausen & Schulz, 1995) has been shown to reach its limits late in life (Baltes & Smith, 2003; Gerstorf & Ram, 2009, 2012). In fact, the mere frequency as well as the severity of critical life events (e.g., bereavement) and losses (e.g., decrease in physical mobility) may push self-evaluative capacities over the edge. Hence, one possible scenario would be that self-evaluative capacities are relatively preserved into old age, but that they do increasingly fall apart when people are confronted with the challenges that accompany impending death.

Self-esteem is often regarded one key indicator of such self-evaluative capacities (Leary & Baumeister, 2000). Being considered a fundamental human concern (Bushman, Moeller, & Crocker, 2011; Sheldon, Elliot, Kim, & Kasser, 2001), self-esteem has long been a scientific interest (for review, see Baumeister, 1987). However, average developmental trajectories of self-esteem late in life have been examined only recently and empirical findings are fairly inconsistent. To illustrate, some studies report average stability into old age (Huang, 2010; Pullmann et al., 2009; Wagner, Lang, Neyer, & Wagner, 2014), whereas others report steep average declines amounting to $d = -0.68$ between ages of 60 and 97 (Orth, Trzesniewski, & Robins, 2010; see also Robins et al., 2002; Shaw, et al., 2010). Many of these studies, however, have very few participants and thus data points available for very old age and the end of life (Huang, 2010; Trzesniewski et al., 2003). In our own work, we have gained initial insights into the phenomenon by making use of the ALSA study with a considerable portion of observations obtained from people in their late 70s and early 80s (Wagner, Gerstorf et al., 2013). These initial results demonstrate that self-esteem is, on average, indeed declining in advanced ages and at the very end of life, but the amount of decline is rather limited (average linear mortality-related decline: 0.3 *SD* units in the last 10 years of life).

Why would we expect self-esteem to change in late life? We argue that self-esteem trajectories may be intimately tied to individual and contextual characteristics or sources (Wagner et al., 2014). Changes in these characteristics may drive self-esteem development

in the long-run. Embedded in such a lifespan perspective, specifically in very old age and close to death several of these individual characteristics are prone to change. For instance, increasing health constraints are expected to not only challenge the general process of successful aging (Pruchno & Wilson-Genderson, 2014), but also affect the way people evaluate themselves (e.g., Orth, et al., 2010). As another example, perceived control has been related to better adjustment and higher self-esteem (Tangney, Baumeister, & Boone, 2004), but at the same time, control perceptions are known to decline in late life (Heckhausen & Schulz, 1995). Disentangling such differential effects of individual characteristics on self-esteem trajectories may increase our understanding of the developmental dynamics late in life and in the context of impending death.

Correlates of Self-Esteem Change in Late Life

One important aspect that has been revealed by previous studies relates to the substantial individual differences in both levels of and changes in self-esteem across the life span and, particularly so, in old age (Pullmann et al., 2009; Trzesniewski et al., 2003). Correlates related to self-esteem have been identified in a variety of different domains, including socio-demographics, physical health characteristics, cognitive abilities, self-regulation, and social inclusion.

First, in young and mid-adulthood but not necessarily in late life, men often report higher self-esteem compared to women (McMullin & Cairney, 2004; Robins et al., 2002; Wagner, Gerstorf et al., 2013; Wagner, Lüdtke et al., 2013), probably because of different structural power relations (e.g., men are typically in more powerful positions) but also different role expectations (McMullin & Cairney, 2004).

Second, health variables have been considered important predictors of self-esteem (Orth, et al., 2010; Reitzes & Mutran, 2006; Shaw, et al., 2010) because health risk factors challenge successful aging and thus, positive self-evaluation. For example, reduced mobility due to walking constraints might decrease the mere possibility to pursue life goals and also decreases the possibility to go out and live an independent life. Such restrictions can strongly affect the worth a person attributes to his- or herself. Interestingly, however, in the ALSA we did not find associations between health and self-esteem, probably because only self-report measures of health were available (Wagner, Gerstorf et al., 2013). Because associations between self-rated and objective health indicators were shown to decline with age (Baltes & Smith, 2003; Pinguat, 2001), specifically in late life objective health is expected to add important additional information on health and functional status (Galenkamp et al., 2013). That is, part of the adjustment process that underlies self-esteem is possibly also part of the subjective health measure, but not the objective indicator.

Third, preserved cognitive abilities have previously been reported as correlates of higher self-esteem levels as well as shallower age-related and mortality-related declines in late-life self-esteem (Wagner, Gerstorf et al., 2013). Such findings corroborate assumptions that cognitive resources are important in self-regulatory and self-evaluative contexts (Muraven & Baumeister, 2000). Because cognitive resources are known to often be highly sensitive to change throughout adulthood (Anstey, Hofer, & Luszcz, 2003; Gerstorf, Ram,

Lindenberger, & Smith, 2013), fewer and fewer resources might be available for the self to operate in an efficient and adaptive manner. Such reduced resources may compromise people's capacity to adapt to daily challenges, to protect the self against self-discrepant evidence, and, thus, to maintain a positive picture of one's self with advancing age (Brandtstädter & Greve, 1994; Stinson et al., 2010).

Fourth, aspects of perceived control have been linked to higher self-esteem in young and late adulthood (Erol & Orth, 2011; Tangney, Baumeister, & Boone, 2004; Wagner, Gerstorf et al., 2013), supporting conceptual notions that highlights the role of perceived control for successful development and aging (Brandtstädter & Lerner, 1999; Heckhausen & Schulz, 1995). That is, a sense of manageability to adapt to the unavoidable and negative changes of late life appears to be important in maintaining one's self-esteem. Importantly, perceived others' control has been found to have detrimental effects on affect in later life (Kunzmann, Little, & Smith, 2002). Despite its high probability in late life, perceptions of increased dependency on others may evoke unpleasant feelings and thus, possibly relate detrimentally to self-esteem.

Finally, social relationships and positive social interactions are important throughout adulthood (Lang & Carstensen, 2002; Wrzus et al., 2013) and can thus be expected to be prime sources of self-esteem for young and old alike (Leary & Baumeister, 2000). Specifically, feelings of social inclusion and positive interactions have been reported to be associated with self-esteem (Denissen et al., 2008; Leary et al., 1995). However, support for the conceptual links has only been provided by some studies (e.g., Kinnunen, Feld, Kinnunen, & Pulkkinen, 2008), whereas other studies have not found empirical evidence for such a link (Orth et al., 2010; Wagner, Gerstorf et al., 2013), probably because social indicators were differently assessed. For instance, Orth and colleagues (2010) concentrated on spousal support, or Wagner, Gerstorf et al. (2013) used a very brief loneliness measure. In contrast, Kinnunen and colleagues (Kinnunen et al., 2008) assessed general social support satisfaction. Thus, possibly more general measures of social relationship indicators are better suited to capture the dynamic relationship with self-esteem trajectories. In sum, key indicators of health, cognition and control are known to decline late in life (Gerstorf, Ram, et al., 2013; Heckhausen Wrosch, & Schulz, 2013) and can thus be regarded as both resources people draw from (if preserved) or risk factors that compromise (if impaired), thereby contributing to late-life developmental trajectories of self-esteem.

The Present Study

Taken together, in this study, we examined whether and how people are able to maintain their self-esteem until the end of life and what role key risk factors of functioning in the health, cognitive, self-regulatory, and social domains play for self-esteem trajectories late in life. We specifically aim at modeling self-esteem trajectories over time examining age-related and mortality-related differences as well as possible age- and mortality-related moderation effects in associations with these key risk factors. To do so, we apply growth models to long-term longitudinal data over time from 462 old and very old participants in the BASE study who have now died. As an extension of previous studies, we examine self-esteem change when people are in their mid-to-late 80s and 90s and when being relatively

close to death. We hypothesize that self-esteem is, on average, relatively stable over time with only minor decrements appearing very late in life. That is, only subsamples of individuals who are at the very oldest ages and/or close to death are expected to exhibit self-esteem decline. We additionally expect that individuals with greater health, cognitive, self-regulatory, and social inclusion resources will exhibit relatively more stable (i.e., less decline of) self-esteem development late in life.

With this outline and available data, the current study builds on and extends previous theoretical and empirical research in several ways: To begin with, rather than considering an overall construct of perceived control, we now distinguish perceived personal control from perceived others' control. This distinction will give a more differentiated view on possible sources or agents of perceived control (self versus others) and their possible effect on self-evaluation. Second, relative to the earlier ALSA report, the BASE study provides for a more comprehensive assessment of various aspects of social embedding. For instance, because we made use of a measure of general social participation, we extend longitudinal findings that capitalized on information about the spousal relationship only and that addressed general social support effects only in middle adulthood. Third, health indicators used in BASE were not solely based on self-reports, but also capitalized on information determined via clinical examination and supported by additional blood and saliva laboratory assessments. In particular, our measure of comorbidities was indexed by the number of physician-observed medical diagnoses of moderate to severe chronic illnesses, including cardiovascular (e.g., coronary heart disease, stroke) and metabolic diseases (e.g., diabetes mellitus), according to the International Classification of Diseases–9 (World Health Organization, 1992; for details, see Steinhagen-Thiessen & Borchelt, 1999). These physician-ratings probably not only add further information over and above the subjective measure (Galenkamp et al., 2013; Pinquart, 2001), but also reduce measurement overlap with our self-esteem outcome relative to the earlier used subjective health ratings. Fourth, we use an independent sample to corroborate the initial average pattern of relative stability of self-esteem trajectories late in life. Plus, our study is probably even better equipped to address these questions because the BASE sample (average age across all 824 observations = 85.6 years and average time-to-death = 5.8 years¹) is considerably older and closer to death than the earlier used ALSA sample (average age across all 2,435 observations = 81.0 years and average time-to-death = 7.4 years). Fifth, we opted for a slightly different methodological approach (Sliwinski, Hoffman, & Hofer, 2010). Specifically, we approached the accelerated longitudinal study design and modeling of self-esteem trajectories in a manner that allowed us to examine age-related and mortality-related differences in within-person change over time. Going this route permitted us to empirically test, rather than a-priori theoretically assume, age convergence (i.e., that the younger individuals would turn into the older individuals in the sample), and time-to-death convergence so as to accommodate birth cohort differences and selection effects. This is important because especially late in life, death-related selection effects may overshadow developmental trajectories (cf., Morack et al., 2013; REF).

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¹Reported means represent the average age and time-to-death in the long-format of our selected sample of deceased participants, whereas the means that we will use for centering in our analyses represent standard means when using the BASE sample (cf., Gerstorf et al., 2013).

Method

This report is based on six waves of data obtained from deceased participants of the interdisciplinary BASE sample. Longitudinal data were collected over 13 years. Most of the variables used in this study have been extensively introduced in previous papers (Baltes & Mayer, 1999; Smith & Delius, 2003; Smith et al., 2002). Below, we will provide only a brief overview.

Participants and Procedure

At baseline in 1990, the BASE sample comprised 516 participants stratified by age and gender into six age brackets (70–74 years, 75–79 years, 80–84 years, 85–89 years, 90–94 years, and 95+ years; age: $M = 84.92$, $SD = 8.66$, range = 70 – 103). Based on updates in city registries, $n = 462$ (89.5% of the original sample) were known to have died by October 2012. This is the subsample used in this report. At baseline, these participants were, on average, 86.3 years old ($SD = 8.3$, 51% male), and about 29% were married.

For our analyses we use up to six waves of self-esteem spanning up to 13 years. As is common in studies of very old age, sample attrition was primarily due to mortality and needs to be considered sizeable. Specifically, the sample of the current paper consisted of the following numbers: at baseline between 1990–1993 $n = 462$, at T3 in 1995–1996 $n = 173$, at T4 in 1997–1998 $n = 104$, at T5 in 2000 $n = 59$, and at T6 in 2004–2005 $n = 26$. Self-esteem was not assessed at T2. Across the six waves, the 462 participants provided 824 observations of self-esteem. The average number of participation was 1.92 ($SD = 1.24$) occasions. To quantify longitudinal selectivity, we describe how individuals who survived and participated longitudinally differed from the remaining participants of the original BASE sample at T1 (for details, see Lindenberger, Singer, & Baltes, 2002). For example, comparing the 96 deceased participants who provided data for three or more occasions with the remaining 420 BASE participants showed that the first group was more likely female ($d = 0.08$), slightly more educated ($d = 0.08$), younger ($d = 0.70$), was diagnosed with fewer chronic illnesses ($d = 0.31$), reported fewer disabilities ($d = 0.17$), had better cognitive abilities ($d = 0.64$), had indicated higher internal control ($d = 0.24$), was more socially active ($d = 0.73$), had reported lower loneliness ($d = 0.38$), and had indicated higher self-esteem ($d = 0.27$) at baseline. The pattern of selectivity can be regarded as expected for a very old sample and indicates that participants who provided the most change (i.e., longitudinal) information represent a positively selected subset of the initial sample.

Measures

Self-esteem—One item from the neuroticism subscale of the NEO-Personality Questionnaire (Costa & McCrae, 1985) represents a common measure of self-esteem (“Sometimes I feel totally worthless.”). Participants rated the degree to which the item described them on a five-point Likert-scale ranging from 1 “almost always true” to 5 “never true”. The item has been reverse coded such that higher scores indicate higher self-esteem. We note that the item used shows high face validity, and is similar to items from the standard Rosenberg scale of self-esteem (1965; Example items: “I think I am no good at all.” or “I feel that I’m a person of worth.”). Correlations with other key constructs (e.g.,

gender: $r = .11$, $p < .05$; social participation: $r = .22$, $p < .05$; see also first row of Table A1) are highly similar to what is reported in studies using other standard self-esteem measures (Robins et al., 2002; Wagner, Gerstorf et al., 2013).

Correlates—A variety of demographics were examined as correlates of self-esteem, including participants' age (years since birth), time to death (years to live), gender, marital status (married vs. not married), and years of education. In addition, we examined health, cognitive, self-regulatory, and social constructs as correlates of late-life changes in self-esteem (see Table A1 for descriptive statistics).

Health was based on objective and functional health indices. First, *comorbidities* were assessed by the number of current physician-observed diagnoses (based on a clinical observation as well as blood and saliva laboratory assessments) of moderate to severe chronic illnesses (for details, see Steinhagen-Thiessen & Borchelt, 1999). Second, *disability* was based on whether or not the participant reported needing assistance to carry out Activities of Daily Living (e.g., getting up, getting dressed, eating; see Lawton & Brody, 1969) at any time throughout the course of the study.

Cognitive ability was proxied by a measure of psychomotor speed, as assessed with the Digit Letter test (for details, see Lindenberger & Baltes, 1997). Similar to the Digit Symbol Substitution test (Wechsler, 1981), participants had to substitute letters corresponding to digits from 1 to 9 as rapidly as possible into a randomly ordered array. We used the number of correct responses in 3 min. The test illustrates high reliability ($\alpha = .96$).

Self-regulation resources were operationally defined by perceptions of control, as measured with seven items; three items assessing personal control (e.g., “*I can make sure that good things come my way.*”) and four items assessing perceived others' control (e.g., “*The good things in my life are determined by other people.*”) that were all responded to using a 5-point Likert-scale ranging from 1 “does not apply to me at all” to 5 “applies very well to me” (for details, see Gerstorf et al., 2013; Kunzmann, Little, & Smith, 2002). The items of the two subscales are averaged and included in the same model. Higher scores indicate perceiving either more personal control or more control through others. The reliability of the two subscales was satisfactory (Cronbach's $\alpha_{\text{personal}} = .64$; $\alpha_{\text{other}} = .78$).

Social inclusion resources were measured using by two indicators: *Social participation* was assessed combining two instruments, first, the Yesterday Interview (Moss & Lawton, 1982) assessing the type, frequency and duration of social activities, and second, the Activity List measuring social activities outside the private domain of participants (Mayer, Maas, & Wagner, 1999). The two instruments were then combined to form a unit-weight composite measure of social participation (see M. M. Baltes, Maas, Wilms, Borchelt, & Little, 1998; Lövdén, Ghisletta, & Lindenberger, 2005, for more detailed statistical descriptions). To index *loneliness*, the BASE study included four items from the UCLA Loneliness Scale (Russel, Cutrona, Rose, & Yurko, 1984: “*I feel isolated from others.*”). Participants were asked to indicate how well these items described them based on a 5-point Likert-scale labeled as 1 “does not apply to me at all” to 5 “applies very well to me”. The reliability was

satisfactory (Cronbach's $\alpha = .70$). The Appendix provides descriptive statistics and correlations of all variables.

Data Preparation and Statistical Procedure

Table 1 illustrates the layout of our data, including descriptive statistics of self-esteem over chronological age, i.e. number of years since birth, and time-to-death, i.e. number of years remaining in an individual's life. We note that observations of participants in their 80s constitute nearly half of the assessments ($n = 367$, 44.5%) and another one quarter of data were obtained from participants in their 90s ($n = 235$, 28.5%). Similarly, considerable portions of the data were obtained at the end of life, with 84.5% of the assessments obtained in the last 10 years and 48.5% obtained in the last 5 years. Thus, the available data enable us to examine typical self-esteem trajectories during those last phases of life with respect to both age and time-to-death time metrics. For statistical analyses, chronological age and time-to-death (at the middle of each person's repeated measures series) were used as between-person moderators of self-esteem change, and $time_{ti}$ was centered at the middle of each person's repeated measures series (see Hueluer et al., in press). All other measures were standardized to a T metric ($M = 50$, $SD = 10$) based on the original $N = 516$ BASE sample as a reference group of older people.

Using these data, we conducted separate multilevel/latent growth models over time including either chronological age or time-to-death (Raudenbush & Bryk, 2002; Ram & Grimm, 2007; Singer & Willet, 2003). These models took the following form

$$self-esteem_{ti} = \beta_{0i} + \beta_{1i}(time_{ti}) + e_{ti},$$

where person i 's self-esteem at time t , $self-esteem_{ti}$, is a combination of an individual-specific intercept parameter, β_{0i} , individual-specific linear slope parameter, β_{1i} , that illustrates the linear rates of change per year of time in the study, and a residual error, e_{ti} . At the individual level (or Level 2), the intercept, β_{0i} , and slope parameter, β_{1i} , were modeled as

$$\begin{aligned}\beta_{0i} &= \gamma_{00} + \gamma_{01}(age_i \text{ or } time-to-death_i) + u_{0i}, \text{ and} \\ \beta_{1i} &= \gamma_{10} + \gamma_{11}(age_i \text{ or } time-to-death_i) + u_{1i},\end{aligned}$$

where γ_{00} and γ_{10} are sample means of the self-esteem intercept and the linear slope across time in the study, γ_{01} and γ_{11} reflect sample-level associations of between-person differences of age (or time-to-death) and differences in person-specific intercepts and rates of change, and u_{0i} and u_{1i} are individual deviations unrelated to age (or time-to-death) that are assumed to be multivariate normally distributed, correlated with each other, and uncorrelated with time-specific residual errors, e_{ti} . We also tested for quadratic effects of time, but they were not reliably different from zero and thus not included in the final models.

In a final step, we included socio-demographic, health, cognitive, self-regulatory, and social variables into the model at Level 2 as predictors of the between-person differences in self-

esteem trajectories. In addition, to examine the moderating effect of age (and time-to-death), all interaction terms were added as predictors in both Level 2 equations, with non-significant terms of the second equation ($p > .05$) being removed. The models were fit to the data using SAS (Proc Mixed; Little, Miliken, Stroup, & Wolfinger, 1996). The age time metric was centered at 85 years and time-to-death at two years prior to death because these represent average age and time-to-death of the original BASE sample and thus provide for more stable parameter estimates in the middle of the data (Gerstorf et al., 2013). Thus, the intercept means, intercept variances, intercept-slope covariance, as well as the effects of the correlates indicate effects at age 85 years and at two years prior to death, respectively.

Results

Based on an unconditional model, the first step of analyses estimated the proportion of between-person and within-person variance (intraclass correlation) embedded in the repeated assessments of self-esteem. The model showed that the intraclass correlation was .45, suggesting that 45% of the total variation in self-esteem was between-person variation and the remainder (55%) was within-person variation. With substantial amounts of variability within- and between-persons, we proceeded to model the changes in self-esteem as a function of time, at the within-person level, and chronological age or time-to-death, at the between-person level. In a final step, socio-demographic, health, cognitive, self-regulatory, and social variables as well as all possible interaction effects with age and time-to-death, respectively, were included to explore their association with the between-person differences in late-life self-esteem trajectories.

Self-Esteem Trajectories Late in Life

Table 2 summarizes the results of the two multilevel models across time with either chronological age or time-to-death included as moderating variable. With respect to chronological age, the model illustrates two important findings: First, for the average person in the sample, self-esteem is relatively stable ($\gamma_{10} = -0.22$, $SE = 0.11$, $p = .057$). Second, self-esteem level but not the rate of change across time in study was associated with chronological age, such that older participants reported on average lower self-esteem levels ($\gamma_{01} = -0.19$, $SE = 0.06$, $p < .05$). The pattern of age-related differences across 3.5-year age-bins² is shown in the left-hand panel of Figure 1. An important feature discernable in this plot is the presence of (non-)convergence in the self-esteem trajectories. When the age-binned changes in self-esteem produce one continuous trajectory age, there is “age-convergence”. Among participants in their 70s and early 80s, the model-implied 3.5-year changes indicate such a continuous pattern (formal tests of non-convergence were not significant when evaluated at age 85; e.g., differences of between-person and within-person age effects = $-.01$, $p = .96$). Furthermore, despite the fact that at higher ages (e.g., age 95+) the extent of non-convergence is more clearly visibly, this amount of non-convergence is not substantial. The increasing non-overlapping trajectories of change indicate that the older participants have higher levels of self-esteem than would be expected based on how their

²The display of 3.5-year bins was chosen because it represents the average time in the study (exact $M = 3.32$ years, $SD = 4.24$).

younger peers were changing. However, based on the test results, there is no substantial indication of an increasingly positive selection of the sample.

Similarly, the time-to-death model in Table 2 illustrates, first, that self-esteem is on average relatively stable across time in study ($\gamma_{10} = -0.21$, $SE = 0.24$, $p > .05$), and second, that participants closer to death have on average lower levels of self-esteem ($\gamma_{01} = -0.35$, $SE = 0.12$, $p < .05$). Systematic differences in the rates of change with closeness to death were not apparent. This suggests that participants seem to follow similar change trajectory across time. Some tendency for non-convergence across time-to-death is again apparent in Figure 1 (right-hand panel), but again the formal test of non-convergence was not significant (e.g., differences of between-person and within-person time-to-death effects = $-.18$, $p = .25$). Thus, there appears to be no indication of an increasingly positive selection of the sample.

Importantly, the random effects portions of the two models can be used to estimate the proportional reduction in residual variance from a model with no predictors (Snijders & Bosker, 2011). Using the resulting *pseudo R*² coefficients facilitates the comparison of models within and across time metrics. Previous research reports that time-to-death models provide for a more efficient description of between-person differences in late-life psychological functioning in general (Fauth et al., in press; Gerstorf et al., 2013; Palgi et al., 2010; Ram et al., 2010), and with respect to self-esteem (Wagner, Gerstorf et al., 2013). However, the set of models used here to examine self-esteem in the BASE did not reveal major differences in amounts of explained variance (*pseudo R*_{time-to-death} = 0.077; *pseudo R*_{age} = 0.085). Such high similarity in model statistics was also true with respect to the AIC goodness of fit index, again, with the chronological age model being slightly in favor (*AIC*_{time-to-death} = 5,988; *AIC*_{age} = 5,984). We also estimated a growth model over time that included both time metrics simultaneously (correlation between the two time metrics: $-.49$, $p < .001$). Results revealed that both effects prevailed (age: -0.15 , $p < .05$; mortality: -0.27 , $p = .051$). In sum, results indicated persistent but small evidence for systematic age-related and mortality-related differences in self-esteem levels, but not in rates of change over 13 years.

Correlates of Self-Esteem Trajectories Late in Life

Table 3 presents parameter estimates for associations between the correlates and self-esteem as well as how those associations were moderated by age or time-to-death, respectively. Including the correlates into the self-esteem model with chronological age as moderator revealed several main and moderation effects on self-esteem level and slope. First, higher perceived personal control related to higher self-esteem levels ($\gamma_{08} = 0.09$, $SE = 0.04$, $p < .05$). Second, the expected effect of social inclusion was supported with higher loneliness being related to lower self-esteem levels ($\gamma_{011} = -0.34$, $SE = 0.05$, $p < .05$). Third, both number of physician-observed comorbidities and perceived others' control affected the rate of change of self-esteem. A larger number of comorbidities ($\gamma_{15} = -0.03$, $SE = 0.01$, $p < .05$) related to steeper declines whereas more perceived dependency on others ($\gamma_{19} = 0.03$, $SE = 0.01$, $p < .05$) related to less declines in self-esteem across time.

Three age moderation effects were also found to be reliably different from zero and were thus retained in the final model ($p < .05$). Specifically, associations of perceived others'

control, loneliness, and education with self-esteem were moderated by age. Based on the Johnson-Neyman technique (Johnson & Neyman, 1936; Preacher, Curran, & Bauer, 2006), we plotted the interaction and identified the range of the moderator variable (age) for which the focal predictor (e.g., perceived others' control) and outcome variable (self-esteem) are significantly associated. Overall, effects on self-esteem levels were somewhat stronger in older age, but the significant age region varied across correlates. Figures 2a and b illustrate the age-moderations. For perceived others' control, findings pointed in the expected direction with less perceived others' control ($-1SD$) being related to higher self-esteem ($\gamma_{013} = -0.012$, $SE = 0.005$, $p < .05$), but this was true only for participants older than 85 years and the association appears to become stronger with age (see Figure 2a). We also found that more loneliness was associated with lower self-esteem ($\gamma_{014} = -0.011$, $SE = 0.005$, $p < .05$) over the entire range of the sample, age 70 to 103 years (see Figure 2b). Finally, the age-related attenuation between education ($\gamma_{011} = -0.017$, $SE = 0.005$, $p < .05$) and self-esteem was shown to hold only for adults older than 91 years. However, we note that our data are particularly sparse for people in their early 70s and those above age 95. Thus, interpretations outside the age 75 to age 95 window are not warranted.

Including the correlates and time-to-death interactions into the self-esteem model produced very similar sets of associations, but did not evince substantial moderation of those associations. Thus, in this context higher perceived personal control ($\gamma_{08} = 0.08$, $SE = 0.04$, $p < .05$), lower perceived others' control ($\gamma_{09} = -0.10$, $SE = 0.04$, $p < .05$), and lower loneliness ($\gamma_{011} = -0.37$ ($SE = 0.04$), $p < .05$) were related to higher levels of self-esteem. Furthermore, levels of self-esteem were significantly lower two years prior to death for people with more disabilities ($\gamma_{06} = -1.75$ ($SE = 0.86$), $p < .05$). Finally, participants with more comorbidities ($\gamma_{15} = -0.03$ ($SE = 0.01$), $p < .05$) and with higher perceived others' control ($\gamma_{19} = 0.03$, $SE = 0.01$, $p < .05$) reported stronger declines in self-esteem. None of the associations between self-esteem and the correlates were moderated by time-to-death.

The final conditional models explained a considerable amount of variance in self-esteem levels (age-moderated model $R^2 = 40.5\%$; mortality-moderated model $R^2 = 33.8\%$), indicating the important role of the three identified domains, physical health, self-regulation, and social inclusion, for late-life self-esteem.

Discussion

Our aim in the current study was to corroborate and extend initial evidence that self-esteem is, on average, relatively stable late in life and to shed additional light on several key factors that contribute to the well-known individual differences in late-life self-esteem. Multilevel growth models of now deceased participants in the BASE study revealed that, first, the self-esteem trajectory indicated on average relative mean-level stability until people reach their late 80s and early 90s. Second, both older age and being closer to death were associated with lower self-esteem, but not necessarily with steeper self-esteem decrements. Third, including potential explanatory variables indicated that higher perceived personal control and lower loneliness related to more self-esteem, whereas the presence of comorbidities and higher perceived others' control was associated with steeper self-esteem declines. Fourth, associations of both perceived others' control and loneliness with self-esteem appeared to be

stronger the older the participants were. Our discussion focuses on possible challenges to late life self-esteem development.

Self-Esteem Late in Life

Despite a tendency of decrease, the findings generally suggest that the amount of average decrements in self-esteem is small in absolute terms. Extending previous studies, the current sample corroborates this robustness based on an independent sample that was considerably older at the first assessment compared with samples investigated in previous studies (ACL: Orth et al., 2010; Shaw et al., 2010; ALSA: Wagner, Gerstorf et al., 2013). At the same time, our findings also indicate lower levels of self-esteem with older age and being closer to death. That is, people who were on average 10 years older at the first assessment reported a self-esteem that was only about 0.2 *SD* lower. An increasingly negative gain-loss ratio appears to take a toll on the positive self-evaluation of older adults and this corroborates previous conceptual and empirical work of increasingly limited self-adaptive capacities in this late-life period (Baltes, & Smith, 2003; Brandtstädter & Renner, 1990).

In addition, our results indicate that assumptions of age convergence, that is continuous trajectories of self-esteem across participants of all ages, might not be met throughout accelerated longitudinal designs of self-esteem development. As depicted in Figure 1(a), self-esteem levels of study cohorts of older adults appear to be higher in older ages. Such non-convergence, although not substantial in this study, may hint to birth-cohort differences and selection effects (Sliwinski et al., 2010). In our sample, findings suggest a tendency that older participating individuals have a more positive picture of themselves than one would expect based on changes observed among relatively younger participants. This suggests that just the fact of living a long life and still being able to participate in a study might be associated with a more positive self-evaluation and, thus, could be regarded as more positive sample selection of participants who are in their mid-to-late 80s as compared to participants in their 70s or early 80s. Such result patterns might blur our interpretation of self-evaluative capacities in a positive way. Such findings also dovetail with our selectivity analyses³. That is, our results might not necessarily generalize to older individuals with severe health challenges such as those who are in need of care or who are demented and thus do not participate in studies like BASE. In those segments of the population, we might find a less positive picture of low or declining self-esteem late in life.

However, contrary to most previous research in other domains such as cognition or well-being (Bäckman & MacDonald, 2006; A. I. Berg et al., 2011; S. Berg, 1996; Gerstorf et al., 2008, 2013) and contrary to an initial study on self-esteem development in late life (Wagner,

³Additional longitudinal selectivity analyses included a dummy variable into our final models to consider possible effects of whether participants remained in the study for “1 to 2 occasions” versus “3 and more occasions”. Results of these analyses illustrated that patterns of our main findings were largely stable. However within the age-model, participants with “3 or more occasions” showed a less strong decrease in self-esteem in the model without covariates. Plus, including all covariates, it showed that the negative age-moderation effect only showed for those with 1 to 2 occasions in the study; but was reduced for those with 3 or more occasions. With respect to the mortality models, effects were stable but generally somewhat stronger (i.e., stronger self-esteem decrease) for those with fewer occasions in the study. Also, in addition to lower loneliness higher social activity related to less strong decreases of self-esteem across time but only for those with 3 or more occasions in the study. One has to bear in mind that age was a strong differential predictor for shorter vs. longer participation. Thus, these selectivity analyses further point into the discussed direction of stronger self-esteem decreases for older and less-resourceful individuals.

Gerstorf et al., 2013), time-to-death did not appear to be as systematically related to rate of change in self-esteem. Both time metrics explained about equal shares of variance that did not exceed 8% of the total variation in self-esteem. Such findings suggest that in general, long-term self-esteem development may not be adequately described by either age-related or time-to-death-related processes that underlie the existing individual differences (cf., Pullmann et al., 2009). Thus, more mechanism-oriented research on self-esteem is needed to get a better handle at change-inducing effects of life-events or conditions that either support or compromise positive self-evaluations throughout adulthood and particularly late life (see Fauth et al., in press; Ram, Gerstorf, Fauth, Zarit, & Malmberg, 2010). For example, having a heart attack may not only relate to the subsequent fear of further incidences, but also to restraints with respect to food consumption or the necessity to exercise daily. Thus, beside the stressful life event itself, the daily perception of limitations and loss of control might challenge adaptation processes such that they possibly lead to strong fluctuations in self-evaluations. Another possible direction may be to think about self-esteem as buffer against death anxiety in such contexts. That is, drawing from theoretical notions of terror management theory (Greenberg et al., 2002; Routledge et al., 2010), maintaining self-esteem into late life may help people alleviate thoughts of and anxiety about death and thereby contribute to maintaining well-being.

Correlates of Self-Esteem Change in Late Life

Our analyses included four key domains of functioning that possibly contribute to interindividual differences in self-esteem levels and change in late life. Our findings both corroborate and extend previous results. First, our results are generally in line with the view that perceived personal control may act as a resource for self-esteem. They extend previous studies by showing that only the association between self-esteem and perceived others' control was moderated by age suggesting that the negative relationship became stronger with age. Thus, with increasing age, the perception of being dependent on others appears to have increasingly negative effects for the evaluation of the self. These findings are consistent with reports showing that perceived control is a key component of successful adult development and aging (Heckhausen & Schulz, 1995; Lachman, 2006). For example, Infurna and colleagues (2011) showed that perceiving control over one's life relates to lower risks for disability and mortality. Successfully adapting to a changing gain-loss ratio by using appropriate control strategies such as compensatory approaches appears to be a key aspect of positive self-evaluation and successful aging in general. Unexpectedly, perceptions of too much dependency on others indicated less decline in positive self-evaluations across time. To follow up on this, it would be highly informative for future studies to look closer into goal disengagement and re-engagement processes and how they may help to stabilize perceptions of control and positive self-evaluations in the often challenging conditions of late life (cf., Heckhausen et al., 2013).

Second, poor or declining health has repeatedly been documented to compromise functioning in other pivotal domains, including such domains as subjective well-being (Palgi et al., 2010) or general functioning (Marengoni, von Strauss, Rizzuto, Winblad, & Fratiglioni, 2009), and multimorbidity generally increases the risk of mortality (Marengoni et al., 2011). Consistent with these findings, physician-rated comorbidities were found to be

associated with substantially stronger declines in self-esteem. This result clearly extends previous findings of self-rated health in late life where we found no such associations (Wagner, Gerstorf et al., 2013). Taken together, these findings suggest that people might be able to lower expectations regarding their self-perceived health. That is, physician diagnoses capture actual health problems; whereas subjective health might rather reflect individual perceptions of their overall resource status, which tend to go much beyond matters of physical health (see Baltes & Smith, 2003). For example, subjective perceptions might adapt to (or even partly deny) the presence of a disease. It would thus be highly informative if future research were to include possible moderators to explore the mechanisms that allow disentangling the effects of subjective and objective health indicators on self-esteem. For example, peer and expert (i.e., physician) reports could be used as complementary sources to self-reported perceptions of health.

Third, our results support the predicted association of social inclusion resources with self-esteem. Not feeling lonely in old age was associated with more self-esteem. In addition, older participants reported even lower self-esteem when being lonely. Such results blend in with theoretical notions and empirical evidence from midlife that highlight the important role of social networks and social support well into late life (Antonucci & Akiyama, 1991; Lang & Carstensen, 2002; Lang, Wagner, Wrzus, & Neyer, 2013). In addition, the age moderation might point towards the fact that social relationships not only play an important role in late life, but also become increasingly important for positive self-evaluations. As Carstensen and colleagues (Carstensen, 1995; Charles & Carstensen, 2010) pointed out, later life is characterized by an increased focus on emotion regulation and close relationships. Not being able to fulfill such motives appears to be specifically detrimental for the self with increasing age. One possible reason that we did not find such effects in previous studies such as the one by Wagner, Gerstorf et al. (2013) is the more comprehensive measure of loneliness we have had available in the BASE as compared to the ALSA. We also note that it was only for loneliness that we found reliable associations with self-esteem, not for the second social indicator used (social participation). It is upon future research to clarify if this is a substantive phenomenon or reflects other processes being at work.

The fourth domain of cognitive resources was related to self-esteem at the zero-order level (see Table A1), but was not found to be uniquely associated with self-esteem over and above the three other domains of functioning. One possible explanation could be that the amount of shared variance between cognitive resources and self-esteem is explained by the physician-rated indicators of physical health because cognitive abilities and functional health limitations are known to be closely related in late life (Infurna, Gerstorf, Ryan, & Smith, 2011; Luszcz & Bryan, 1999). A second possibility is that in the oldest old some participants drop out of the study because their cognition drops below a certain threshold, thereby reducing the amount of variance that is linked with self-esteem. Further research is needed to explore this interdependent relationship of different resources and their role in self-esteem development.

There are two further aspects of note: First, when all four key domains of functioning were included in the model, chronological age or time-to-death no longer accounted for differences in level of self-esteem anymore. This result can be taken to suggest that these

four key domains of functioning largely account for the existing individual differences in self-esteem that are associated with age and time-to-death. At the same time, considerable amounts of between-person variance were not accounted for, suggesting that there are some additional age-related risk factors that moderate change in self-esteem. Second, arguing that possibly also changes in the domains of functioning could drive change in self-esteem, we conducted additional analyses that considered such trajectories. However, including estimated change in health and cognitive functioning into our models did not alter our result patterns.

Limitations and Outlook

The current study draws from a number of strengths, including a community-dwelling late-life longitudinal sample, physician-rated indicators of physical health, and central indicators of four key domains of late life functioning. At the same time, we note several limitations. To begin with, self-esteem was assessed with a single item, thus, we were unable to examine the reliability of our outcome measure. Also, the item has been drawn from the NEO questionnaire and has a negative valence. Both characteristics might influence the pattern of results (Vogel et al., 2012; Windsor et al., 2013). However, self-esteem has been validly assessed with single items before (Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001; Robins et al., 2002) and the interrelations with other measures found in our study was very similar to those reported in studies that had used more complex scales. In addition, our results were mainly consistent with the findings of Wagner, Gerstorf et al. (2013a) who used a 10-item Bachman revised Rosenberg self-esteem scale (Bachman, 1970), the standard measure used in self-esteem research. Another limitation of our measure is that there were only five response options. As a consequence, our measure was not very sensitive to picking up within-person changes that may indeed exist. It may take some quite severe situations to move a person from one response category to the next. This limitation may have also contributed to the limited slope variance. Future studies seeking to track change in self-esteem should consider measures that are more sensitive to change (e.g., 10- or even 100-point response scales; Ram et al., 2014).

Second, our study design assessed self-esteem development at a macro-scale level with several years in-between assessments. However, self-esteem is also known to have state-like components that may go up and down over shorter time scales (Donnellan et al., 2012). Therefore, it would be highly informative if future studies were to look into how daily life-experiences and challenges (of late life) shape state self-esteem and how such day-to-day processes accumulate to affect the long-term trajectories of trait self-esteem (cf., Roberts & Jackson, 2008). In this context, state self-esteem scales should be applied to capture more fine-grained fluctuations and changes in self-esteem to then examine how individuals' self-esteem fluctuates around these long-term trends (see e.g., Molloy, Ram, & Gest, 2011; Morin et al, in press). A first empirical study with adolescents illustrated the dynamic interplay between these more stable and variable facets of self-esteem. In the context of an international student exchange trait change in self-esteem was mediated by state self-esteem change (Hutteman, Nestler, Wagner, Egloff, & Back, in press). However, to date there is no process-oriented self-esteem research considering challenging late-life situations such as dealing with a sudden or mortal illness. Since the current study did not include such state-

like measures, our analyses concentrate on trait development. Previous studies illustrated the existence of trait self-esteem development across the life span (Orth et al., 2012; Wagner, Lüdtke, et al., 2013). Thus, we assume that the gradual change over four or five time points covering up to a 13 year-span is our approximation to get at developmental trends that manifest in a macro rather than micro time-scale. Further work should consider the interplay between the processes occurring at multiple time-scales (Ram et al., 2014; Röcke & Brose, 2013).

Third, participants in the BASE study provided an important piece to the larger puzzle of remaining capacities the oldest old still have. It is to be expected that the seemingly unavoidable declines this age group is often facing such as with respect to cognition and health resources constitute a challenge to people's self-evaluative and self-regulatory processes (Baltes & Smith, 2003). One further important piece in understanding self-esteem vulnerability would be to examine participants who are faced with particular life transitions or a terminal decease in younger ages. Drawing from an example in young adulthood, the transition from being single to a first stable partnership has been related to considerable increases in self-esteem (Lehnart, Neyer, & Eccles, 2010; Wagner, Lüdtke et al., 2013). People late in life but also in younger ages can be faced with critical life transitions such as life-threatening medical conditions, or, specifically in late life, the need to move into a nursing home, and it would be intriguing to examine in a prospective manner how self-esteem changes and what factors contribute to individual differences in such transition-related self-esteem change.

Taken together, this study has corroborated empirical findings of relative self-esteem stability with regard to both age- and mortality-related trajectories. In addition, the study extends our knowledge by demonstrating that self-evaluative capacities work well until the mid to late 80s. Our results also highlight the role of perceived personal and others' control as well as social inclusion for a more positive self-evaluation in late life, whereas objective health constraints are often associated with self-esteem declines. Thus, self-regulatory capacities and social inclusion represent important resources of late life function, but the fourth age with often inevitable decreases in the health domain may be characterized by increasingly limited adaptive capacities (Baltes & Smith, 2003). Future studies not only need to assess the within-person dynamics of diverse developmental trajectories but should combine different strategies of data assessment to be able to understand more comprehensively the processes and determinants of late-life functioning.

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Figure 1.

Average trajectories of self-esteem decline observed over (a) age (for 5-year slices of age) and (b) time-to-death (for 5-year slices of time-to-death). With respect to both time-metrics, self-esteem shows relatively little tendencies of decline and no pattern of acceleration in decrease at any time point. However, higher age at the first assessment related to higher self-esteem levels.

Figure 2.

Average trajectories of self-esteem decline observed over age (for 5 year chunks of age) moderated by (a) perceived control, and (b) emotional loneliness. Higher perceived control (+ 1SD) and lower loneliness (– 1SD) relates to higher self-esteem and both of these effects become stronger with age. *Note.* Self-esteem was assessed with a five-point Likert-scale. The dotted vertical line indicates the respective region of significance for moderation effect (to the right).

Table 1

Descriptive Statistics for Self-Esteem over Age and Time-to-death.

Age	Self-esteem					
	Time-to-death					
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
70	5	47.74	4.42	16	50.97	6.36
71	9	53.48	7.48	15	52.58	9.10
72	12	53.92	6.73	14	54.00	7.67
73	12	49.22	13.52	13	51.34	8.44
74	17	53.06	7.79	12	53.43	5.31
75	25	52.26	8.22	11	51.75	8.71
76	23	51.18	10.50	10	51.20	8.63
77	26	53.20	9.10	9	53.06	7.41
78	29	50.08	7.50	8	51.07	8.91
79	36	51.24	8.94	7	47.32	9.35
80	42	52.58	7.97	6	50.33	8.73
81	31	48.42	9.96	5	51.24	9.85
82	42	52.96	9.25	4	50.01	10.46
83	35	50.74	8.08	3	49.12	10.69
84	29	51.47	8.55	2	48.82	9.90
85	49	50.61	8.95	1	48.68	10.30
86	38	50.88	8.42	0	48.36	11.58
87	44	51.48	10.08			
88	31	48.94	8.54			
89	26	50.41	7.05			
90	28	49.41	10.37			
91	31	49.72	11.13			
92	28	48.26	11.08			
93	26	46.38	10.53			
94	21	46.82	9.92			
95	32	50.56	9.82			

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Age	Self-esteem			Time-to-death		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
96	21	46.82	11.73			
97	23	49.07	10.83			
98	13	49.48	12.55			
99	12	43.84	9.39			
100	11	45.25	13.71			
101	11	46.72	10.87			
102	3	44.52	13.97			
103	2	36.45	11.40			
104	0					
105	1	44.52				

Multi-Level Growth Model Over Time Including Chronological Age and Time-to-death as Moderator of Change Trajectories

Table 2

Effect	Self-esteem			
	Age as Moderator		Time-to-death as Moderator	
	Intercept	Linear time slope	Intercept	Linear time slope
Fixed effects				
Age or Time-to-death	50.16* (0.42)	-0.22 (0.11)	48.79* (0.55)	-0.21 (0.24)
	-0.19* (0.06)	-0.02 (0.02)	-0.35* (0.12)	-0.01 (0.04)
Random effects				
Variance	44.23* (6.34)	0.28 (0.23)	44.87* (6.37)	0.26 (0.22)
Covariance	0.93* (1.10)		1.27 (1.07)	
Residual Variance	47.97* (4.62)		48.39* (4.62)	
Goodness-of-fit indices				
AIC	5984		5988	
Explained variance				
R ²	.085		.077	

Note. Unstandardized estimates and standard errors (in parentheses) are presented. Age was centered at 85 years and time-to-death at 2 years prior to death. 462 participants provided 824 observations ($M = 2.54$, $SD = 3.42$). T-scores standardized to cross-sectional Berlin Aging Study sample at Time 1 ($N = 516$, $M = 50$, $SD = 10$).

* $p < .05$

Table 3

Conditional Multi-Level Growth Model On Self-esteem Over Time Using Chronological Age and Time-to-death as Moderators And Including Additional Covariates

Effect	Self-esteem			
	Age as Moderator		Time-to-death as Moderator	
	Intercept	Linear time slope	Intercept	Linear time slope
Fixed effects				
	49.87* (0.42)	-0.08 (0.17)	49.21* (0.53)	0.04 (0.27)
Covariates				
Age/Time-to-death	-0.02 (0.06)	-0.04 (0.02)	-0.13 (0.12)	0.02 (0.04)
Men	0.44 (0.92)	-0.14 (0.30)	0.57 (0.95)	-0.15 (0.32)
Education	0.00 (0.04)	0.00 (0.01)	-0.02 (0.04)	-0.01 (0.01)
Married	-0.84 (1.00)	0.04 (0.30)	-0.92 (1.03)	0.08 (0.32)
<i>Physical health</i>				
Comorbidities	-0.01 (0.04)	-0.03* (0.01)	0.01 (0.04)	-0.03* (0.01)
Disabilities	-1.34 (0.84)	0.21 (0.23)	-1.75* (0.86)	0.10 (0.25)
<i>Cognition</i>				
Digit letter	0.00 (0.05)	0.00 (0.01)	-0.03 (0.05)	0.00 (0.02)
<i>Self-regulation</i>				
Personal control	0.09* (0.04)	0.00 (0.01)	0.08* (0.04)	0.00 (0.01)
Others' control	-0.08 (0.04)	0.03* (0.01)	-0.10* (0.04)	0.03* (0.01)
<i>Social inclusion</i>				
Social participation	0.03 (0.05)	-0.01 (0.02)	0.02 (0.05)	-0.01 (0.02)
Emotional loneliness	-0.34* (0.05)	0.02 (0.01)	-0.37* (0.04)	0.01 (0.02)
Moderation effects				
Age × education	-0.017* (0.005)	/	/	/
Age × others' cont.	-0.012* (0.005)	/	/	/
Age × loneliness	-0.011* (0.005)	/	/	/
Random effects				
Variance	26.30* (4.87)	0.13 (0.20)	29.71* (5.35)	0.29 (0.25)

Effect	Self-esteem			
	Age as Moderator		Time-to-death as Moderator	
	Intercept	Linear time slope	Intercept	Linear time slope
Covariance	1.55* (0.77)		2.13* (0.89)	
Residual Variance	47.70* (4.40)		48.53* (4.62)	
Goodness-of-fit indices				
AIC	5585		5638	

Note. Unstandardized estimates and standard errors (in parentheses) are presented. T scores standardized to cross-sectional Berlin Aging Study sample at Time 1 ($N = 516$, $M = 50$, $SD = 10$). Age was centered at 85 years and time-to-death at 2 years prior to death. 462 participants provided 824 observations ($M = 2.54$, $SD = 3.42$).

* $p < .05$

Table A1

Descriptive Statistics and Correlations of Self-Esteem, Chronological Age, Time-To-Death, and all Covariates at T1

	<i>M</i>	<i>SD</i>	<i>α</i>	1	2	3	4	5	6	7	8	9	10	11	12
1. Self-esteem	3.66	1.24													
2. Age	85.86	8.36		-.14*											
3. Time-to-death	-5.97	4.55		-.15*	.55*										
Covariates (all at T1)															
4. Men	0.51	0.50		.11*	-.05	.08									
5. Education	50.08	10.15		.09	-.16*	-.09	.23*								
6. Married	0.29	0.46		.13*	-.22*	-.05	.50*	.24*							
7. Comorbidities	50.62	10.05		-.10*	.18*	.27*	-.14*	-.17*	-.14*						
8. Disabilities	0.41	0.49		-.15*	.28*	.11*	-.13*	-.11*	-.14*	.16*					
9. Digit letter	49.45	9.96		.14*	-.51*	-.41*	.04	.31*	.23*	-.20*	-.28*				
10. Personal control	49.99	10.06		.64	.01	.03	.07	-.13*	.00	-.01	-.04	-.03			
11. Others' control	50.49	10.06		.78	-.24*	.29*	.23*	-.12*	-.18*	.10*	.28*	-.30*	.04		
12. Social participat.	49.12	9.91		.21*	-.51*	-.43*	.07	.30*	.18*	-.19*	-.33*	.53*	-.01	-.33*	
13. Emotional lonelin.	50.34	10.00		.70	-.44*	.26*	.20*	-.17*	-.22*	.20*	.12*	-.26*	-.06	.19*	-.27*

Note. Self-esteem Item "Sometimes I feel completely worthless." (Original: "Manchmal fühle ich mich völlig wertlos,"), reverse coded for all analyses; Range 1 to 5

* $p < .05$.