

# Stability and Change of Optimism and Pessimism in Late Midlife and Old Age Across Three Independent Studies

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Research across a number of different areas in psychology has long shown that optimism and pessimism are predictive of a number of important future life outcomes. Despite a vast literature on the correlates and consequences, we know very little about how optimism and pessimism change across adulthood and old age and the sociodemographic factors that are associated with individual differences in such trajectories. In the present study, we conducted (parallel) analyses of standard items from the Life Orientation Test (Scheier & Carver, 1985) in three comprehensive data sets: Two-wave data from both the Berlin Aging Study II ( $N = 1,423$ , aged 60–88;  $M = 70.4$ ,  $SD = 3.70$ ) and the Midlife in the U.S. Study ( $N = 1,810$  aged 60–84;  $M = 69.12$ ,  $SD = 6.47$ ) as well as cross-sectional data from the Survey of Health, Aging, and Retirement ( $N = 17,087$ , aged 60–99;  $M = 70.19$ ,  $SD = 7.53$ ). Using latent change-regression models and locally weighted smoothing curves revealed that optimism is on average very stable after age 60, with some evidence in Survey of Health, Aging, and Retirement of lowered optimism in very old age. Consistent across the three independent studies, pessimism evinced on average modest increases, ranging between .25 and .50  $SD$  per 10 years of age. Of the sociodemographic factors examined, higher levels of education revealed the most consistent associations with lower pessimism, whereas gender evinced more study-specific findings. We take our results to demonstrate that age-related trajectories and correlates thereof differ for optimism and pessimism. Older adults appear to preserve into older ages those levels of optimistic expectations they have had at 60 years of age and show only modest increases in pessimism. We discuss possible reasons for these findings.

## Public Significance Statement

Research of the last decades revealed a lot of information about the mostly positive effects of optimism. An important task for future research is therefore to get more insight in why some people are more optimistic or, on the other side, why they are more pessimistic. This study demonstrated that the nature of age-related trajectories and correlates differs between optimism and pessimism. Whereas older adults appear to preserve into older ages those levels of optimistic expectations they have had at 60 years of age, they show modest increases in pessimism. The results may help to provide a useful knowledge base about the development and correlates of optimism and pessimism and give starting points for efforts to promote optimism and lower pessimism especially in old adults.

**Keywords:** optimism; pessimism; Berlin Aging Study II; Midlife in the U.S. Study; Survey of Health, Aging, and Retirement

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Over the last decades, empirical studies have repeatedly demonstrated the beneficial effects of being an optimist: Higher levels of optimism predict for the future better physical health, better interpersonal relationships, greater life satisfaction, and more successful occupational outcomes (Carver et al., 2010; Segerstrom, 2007; Tetzner & Becker, 2024). In the light of these all-around advantages, an important question concerns how optimism changes across adulthood and old age and, as a corollary, ways to eventually acquire, maintain, or promote optimism. Given the ongoing debate on the overlap and differentiation between positive and negative expectations for the future (Scheier et al., 2021), a second key question concerns whether pessimistic expectations for the future solely represent the opposite end of the optimism continuum or whether pessimism constitutes a separable construct with a distinct age trajectory and correlates thereof.

In the present study, we address these questions by examining how optimism and pessimism develop over the life course and how they differ in midlife and old age. Toward that end, we conduct (parallel) analyses of three comprehensive data sets: the Berlin Aging Study II (BASE-II), the Midlife in the United States Study (MIDUS), and the Survey of Health, Aging, and Retirement (SHARE). We investigate longitudinal within-person change and cross-sectional age differences in optimism and pessimism and how these changes differ across population strata of sex and education.

### The Nature of Dispositional Optimism and Pessimism

Dispositional optimism is a personality dimension that is defined as the “extent to which people hold generalized favorable expectancies for their future” (Carver et al., 2010, p. 879). Thus, optimism reflects a relatively stable predisposition regarding whether individuals generally expect good things to happen to them (Carver et al., 2010). Conversely, pessimism is defined as the “generalized expectancy that unfavorable outcomes will occur in the future” (Scheier, Swanson, et al., 2021, p. 531). The field largely disagrees on whether optimism and pessimism represent two ends of one dimension or whether they represent two separate dimensions (Carver & Scheier, 2014; Scheier, Swanson, et al., 2021; Scheier, Wrosch, et al., 2021; VanderWeele & Kubzansky, 2021). Scheier, Swanson, et al. (2021) provide a conceptual rationale for why optimism and pessimism constitute separate constructs by arguing that the absence of optimism does not necessarily mean that a person is pessimistic and vice versa. Instead, a person can be neither optimistic nor pessimistic. They acknowledged that even high optimism and high pessimism may coexist within a given person (Scheier, Wrosch, et al., 2021; see also Benyamini,

2005). Likewise, Wallston (1994) proposed that so-called cautious optimists (or realists; Benyamini, 2005) exist who are in general optimistic but also expect and acknowledge the possibility that some bad things could happen to them and that necessarily some unfavorable outcomes will occur in their future. Hence, these persons may show considerably high levels on both constructs, optimism and pessimism. This idea may be especially relevant in late adulthood when older people need to accept age-related declines in functioning. It is in this sense that debates about optimism may mirror long-term developments in other fields like emotions and control beliefs that have also evolved from a single construct perspective to a more differentiated view of the construct space to encompass related but distinguishable dimensions (e.g., positive and negative affect: Watson et al., 1988; internal and external control beliefs: Levenson, 1981).

Recent empirical evidence also suggests that optimism and pessimism may be considerably related but represent two separate constructs (Scheier et al., 2021). This is in line with previous empirical results which, on the one hand, found that two factors represent optimism and pessimism items of the commonly used Life Orientation Test (LOT) better than one global factor (Chang & McBride-Chang, 1996; Hjelle et al., 1996) and, on the other hand, indicated that optimism and pessimism may be only moderately related. In addition, recent studies indicate that optimism and pessimism are differentially associated with important life outcomes (for review, see Scheier et al., 2021). Although optimism has been found to be associated with better physical health, this association was lower than the association between the absence of pessimism and better health-related outcomes (Scheier et al., 2021).

### Stability and Change of Optimism and Pessimism Across Late Midlife and Old Age

One important question revolves around whether and how optimism and pessimism change across late adulthood. Dispositional optimism is mainly conceptualized as a trait that is stable and consistent across time and contexts (Carver et al., 2010; Costa & McCrae, 1994). However, test–retest correlations of between .58 and .79 for time periods of no more than 3 years (Atienza et al., 2004; Carver et al., 2010; Scheier et al., 1994) suggest that there is both (rank-order) stability and change. Moreover, optimism and pessimism seem to be less genetically based than other personality traits. Twin studies have reported heritability estimates around 24% for optimism and 29% for pessimism (Plomin et al., 1992), whereas the genetic influence on

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The statistical analysis code needed to prepare the data and reproduce our analyses for all three data sets are available at [https://osf.io/4gwp8/?view\\_only=a94c888340ec4a0ca076daffdb24ca0f](https://osf.io/4gwp8/?view_only=a94c888340ec4a0ca076daffdb24ca0f). The ideas and data appearing in the article have not been disseminated before.

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personality traits typically ranges between 30% and 50% (Plomin et al., 2016; for the Big Five personality traits between 41% and 61%; Jang et al., 1996). Thus, optimism and pessimism may be prone to environmental influences, including age-associated changes and social role transitions (Segerstrom, 2007). Drawing on a life-span perspective (Baltes et al., 2006), changes in opportunities, threats, and norm across the life span may cause age-related trends in people's optimism and pessimism (see also Magee et al., 2022). Accordingly, optimism and pessimism may be less stable during stages that are characterized by substantial transitions in life circumstances, goals, and environments (Carver et al., 2010; Costa & McCrae, 1994). For example, Segerstrom (2007) investigated optimism in American 1st-year law students and again 10 years later and found a long-term stability of only  $r = .33$  for optimism and  $r = .31$  for pessimism. She speculated that the young adult age and the fundamental normative changes during emerging adulthood (cf. Arnett, 2000) such as moving out of the parental home, establishing a romantic partnership, choosing an occupational path, or becoming a parent contributed to the low stability in this sample.

Substantial changes in individuals' expectations for the future are also conceivable during late adulthood and old age. To illustrate, older adults experience many transitions in social roles such that they retire from work and may become grandparents. They also face new challenges like establishing a new social and volunteer life after having left the work force or coping with declining health and mobility. All these changes may force them to reevaluate their own social roles within their families and the society and may change their views on and expectations for the self, their environment, and their futures. Normative age-related declines may give reasons for the expectation of more negative events in the future and may suggest that optimistic expectations would decline and pessimistic expectations would increase in late midlife and old age.

In contrast, research on age-related changes in other key psychosocial constructs such as affect and well-being would suggest stability or improvement. For example, socioemotional selectivity theory (Carstensen, 2006) proposes that the awareness of shortening future time horizons leads older adults to focus on the present and less onto the future. As a consequence, older adults prefer emotionally meaningful goals over more knowledge-related goals, with emotionally meaningful states being experienced more immediately and having value in and of themselves rather than being related to an unspecified future. Likewise, older adults are assumed to pay more attention to positively valenced stimuli and information (Carstensen, 2021) and invest more into the quality of close social relationships, show an enhanced appreciation of life, and a desire to derive meaning and satisfaction from life. All these changes may strengthen older adults' well-being in the present. However, especially the more pronounced attention on positive information and the investment in reliable and persistent social relationships may also lead them to focus more on positive aspects in their future and hence may sustain older adults' optimism.

In addition to this, the strengths and vulnerabilities integration model (Charles, 2010) may also hint to changes in older adults' future expectations. It proposes that aging-related vulnerabilities (e.g., exposure to uncontrollable stressors resulting from chronic health conditions and functional limitations or experiences like the loss of significant others) can prompt sustained emotional arousal that makes it more difficult to draw from the above-mentioned regulatory skills that older adults typically use to maintain their well-being. With such vulnerabilities, pessimism may also rise because

older adults are aware of the fact that their health and functioning will necessarily decline in their future.

Research on future thinking can also guide hypotheses on why and how optimism and pessimism may change in late adulthood (see Lang et al., 2013). From this perspective, individuals generally seek to harmonize their projections of desired life circumstances with real states (Brandtstädter & Rothermund, 2002). As people get older, they may have learned from earlier experiences with the accuracy of their future predictions and forecast their future in a more accurate (or realistic) way (Lachman et al., 2008). Since older age realistically includes the anticipation of losses in the future, this more realistic future thinking may necessarily involve increases in pessimism.

To the best of our knowledge, only three previous studies have examined developmental trajectories of dispositional optimism in late adulthood. First, Chopik et al. (2015) used data from the Health and Retirement Study of American older adults to examine cross-sectional age differences and longitudinal changes in optimism across 4 years. Their results indicated an inverted U-shaped pattern such that optimism generally increased from age 50 to age 70 and then decreased afterward. However, the amount of change was rather small. Second, Schwaba et al. (2019) used four-wave, 7-year longitudinal data from Mexican-origin couples to examine the development of optimism across adulthood until the age of 71. Their results indicated that optimism increased by half a standard deviation between the ages of 26 and 55 years and then plateaued. The two studies thus suggest that optimism is relatively stable in the second half of life, with only modest age-graded declines after age 70. However, both studies relied on global measures of optimism that did not allow examination of whether optimism and pessimism change differentially across adulthood and old age. In a first recent study, Chopik et al. (2020) used data from three longitudinal studies to examine how optimism and pessimism change across the life span. In two of their samples (an American sample and a Dutch sample), optimism increased in young adulthood, reached a plateau in middle adulthood, and decreased in old age. They reported a corresponding pattern for pessimism. They found a rarely opposite pattern in a German sample; however, only a single-item measure was used in this sample.

## The Role of Gender and Education

Gender differences in optimism are traditionally researched in economics. Focusing especially on optimism regarding economic issues, men tend to be significantly more optimistic than women regarding a broad range of outcomes, especially regarding economic and financial matters (Bjuggren & Elert, 2019; Jacobsen et al., 2014). Economists explain these gender differences by differences in risk aversion, namely, that men hold riskier assets. The empirical studies available on whether men and women also differ in their general optimistic expectations have not drawn a consistent picture of gender differences in optimism (Tetzner & Becker, 2024), and first empirical findings also indicated that the developmental trajectories of optimism across old age do not differ between men and women (Chopik et al., 2015, 2020). Drawing on life-span research, developmental trajectories of optimism and pessimism may differ between genders because norms, opportunities, threats, and their timing across the life span may vary between men and women (Magee et al., 2022).

In a similar manner, higher education may offer more opportunities for individuals, which may influence their expectations for their futures (Magee et al., 2022). Moreover, a higher availability of socioeconomic resources may give more reason to expect positive future outcomes. Empirically, associations of socioeconomic indicators such as income and education with higher optimism are well established (Segerstrom, 2007). For example, in their analysis of three large samples with a wide age range ranging from early adulthood to old age, Chopik et al. (2020) found that higher education was related to higher optimism and lower pessimism. In the present study, we thus aim to better understand the role of education, as one indicator of socioeconomic status, for age-associated changes in optimism and pessimism.

## The Present Study

Extrapolating from theoretical assumptions and extending earlier empirical reports, this study examined stability and change in optimism and pessimism across late midlife and old age. Toward that end, we make use of three independent studies: one well-described study of older adults living in a metropolitan region (BASE-II) of Germany, one national sample in the United States (MIDUS), and one sample of older adults living in different countries in Europe (SHARE). We examined two sets of research questions.

First, we used cross-sectional data from all three studies to examine age differences in optimism and in pessimism among adults 60 years of age and older. For two studies (BASE-II and MIDUS), we also used longitudinal data across two measurement points to examine age-graded intraindividual changes in optimism across 7 and 9 years, respectively. In line with theoretical assumptions that older adults prioritize emotionally meaningful states and therefore pay more attention to positive information (Carstensen, 2006) but may be at the same time more vulnerable to experience stress in the face of considerable threats (Charles, 2010) and forecast their future more realistically (Lang et al., 2013) as well as previous findings of minor decreases or stability in optimism during adulthood (Chopik et al., 2015; Schwaba et al., 2019), we expect to find that optimism and pessimism are relatively stable among adults 60 years of age and older or only show slight decreases in optimism and slight increases in pessimism. Thereby, we also explore whether potential age-graded changes progress consistently across late adulthood or whether they are age specific (i.e., nonlinear).

Second, we examined whether demographic characteristics of gender and education are associated with optimism and pessimism and their age-graded changes. Analyses for gender are exploratory, while we expect that higher education is associated with more optimism and less pessimism. Since empirical evidence exists, that higher education is generally related to shallower age-related decline across different domains, we expect to find that education moderates age-associated changes in optimism and pessimism.

## Method

### Transparency and Openness

BASE-II data and material presented in this study are available upon request from the BASE-II office (for further details, see <https://www.base2.mpg.de/7549/data-documentation>). Toward that end, we have established procedures over the past 10 and more years that

we have successfully implemented literally hundreds of times. We are not in a position to make data fully publicly available because these contain information that could compromise research participants' privacy and consent. Data and materials for MIDUS are publicly available at U Michigan Institute for Social Research University of Michigan (<https://midus.wisc.edu/data/index.php>). Data and materials for SHARE are publicly available (see <https://www.share-project.org/>). This article uses data from SHARE Waves 1 and 2 (<https://doi.org/10.6103/SHARE.w1.800>, <https://doi.org/10.6103/SHARE.w2.800>); see Börsch-Supan et al. (2013) for methodological details. Data were analyzed using SPSS, Version 27.0 (IBM Corp. Released 2020) and the software package *Mplus* 8.5 (Muthén & Muthén, 1998–2020). We report how we determined our sample size, any data exclusions, all manipulations, and all measures. This study's design and its hypothesis and analysis were not preregistered.

### Participants

This study used data from three studies (BASE-II, MIDUS, SHARE) of older adults. Descriptions of participants, variables, and procedures including detailed information on the racial, ethnical, and sociodemographic composition of the samples can be found in previous publications (BASE-II: Bertram et al., 2014; Demuth et al., 2021; Gerstorff et al., 2016; MIDUS: Brim et al., 2004; Kirsch & Ryff, 2016; SHARE: Börsch-Supan, 2022a, 2022b). Details relevant to this analysis are included below. All three studies are approved by ethics committees. In MIDUS, all methods and sampling procedures were approved by the University of Wisconsin, Madison Institutional Review Board. The SHARE study is subject to continuous ethics review. During Wave 1 and 2, SHARE was reviewed and approved by the Ethics Committee of the University of Mannheim. BASE-II was approved by the state of Berlin.

### Berlin Aging Study II

We used two waves of data from  $N = 1,423$  individuals 7 years apart collected in 2012/13 and 2018/20. We restricted our sample to participants with at least one valid value on one optimism or pessimism item and full information on age. We only used participants who were aged 60 or older (aged 60–88;  $M_{\text{baseline age}} = 70.4$ ,  $SD_{\text{baseline age}} = 3.71$ ; female = 51.8%). In our sample, participants were highly educated ( $M_{\text{years of education}} = 14.3$  years;  $SD_{\text{years of education}} = 2.9$  years).

Sample attrition over the average of 7 years between the two waves was 34.5%, was unrelated to optimism or pessimism at  $t_1$ , and did not differ by sex or education. As to be expected, participants who did not participate at  $t_2$  were on average older (by 8 months) than those who continued participating ( $d = 0.2$ ,  $p < .001$ ).

### Midlife in the U.S. Study

We used two waves of data from  $N = 1,810$  individuals around 9 years apart collected in 2004–2006 and 2013/2014. We restricted our sample to participants with at least one valid value on one optimism or pessimism item and only included participants who were aged 60 or older (aged 60–84;  $M_{\text{baseline age}} = 69.1$ ,  $SD_{\text{baseline age}} = 6.47$ ; female = 54.1%). In our sample, only 12.1% did not graduate from high school and 39.8% went to college, with 4.1% reaching a masters degree or PhD.



Sample attrition across the average of 9 years between the two waves was 39.3%, was unrelated to optimism at  $t_1$ , and did not differ by sex. However, participants who did not participate at  $t_2$  were on average less educated ( $d = 0.3, p < .001$ ), were 2 years older ( $d = 0.3, p < .001$ ), and reported higher pessimism at  $t_1$  ( $d = 0.4, p < .001$ ).

### Survey of Health, Aging, and Retirement

We used cross-sectional data from  $N = 16,737$  individuals from SHARE Waves 1 and 2 (Börsch-Supan, 2022a, 2022b) collected in the years 2004–2010. (2004:  $N = 9,404$ , 2005:  $N = 1,745$ , 2006:  $N = 1,543$ , 2007:  $N = 3,603$ , 2009:  $N = 112$ , 2010:  $N = 328$ ) in different European countries (Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Israel, Italy, Netherlands, Poland, Spain, Sweden, and Switzerland). Since questions regarding optimism were in both data waves part of the drop-off questionnaire, no longitudinal data were available. As we did in the other two studies, we restricted our sample to participants with at least one valid value on one optimism or pessimism item and only included participants who were aged 60 or older. Hence, participants were aged between 60 and 99 years ( $M_{\text{baseline age}} = 70.1, SD_{\text{baseline age}} = 7.50$ ; female = 53.7%). In this sample, 38.1% only attended primary education and only 15.9% reached some form of tertiary education.

## Measures

### Optimism and Pessimism

In all three studies, optimism and pessimism were measured using items from the revised Life Orientation Test (LOT-R; Scheier et al., 1994). The scale consists of three items for optimism, including “In uncertain times, I usually expect the best”; three items for pessimism, “If something can go wrong for me, it will”; and four filler items.

In BASE-II, optimism and pessimism were each measured as responses provided on a 1 (*does not apply*) to 4 (*applies very well*) response scale to three relevant items (German translation by Wieland-Eckelmann & Carver, 1989). Reliabilities for optimism were at Time 1 (T1) Cronbach’s  $\alpha = .672$  and at Time 2 (T2) Cronbach’s  $\alpha = .658$  and for pessimism at T1 Cronbach’s  $\alpha = .678$  and at T2 Cronbach’s  $\alpha = .644$ . The three filler items were assessed, but following usual practice, were discarded.

In MIDUS, optimism and pessimism were each measured as responses provided on a 1 (*does not apply*) to 5 (*applies very well*) response scale to the three relevant items. Reliabilities for optimism were at T1 Cronbach’s  $\alpha = .622$  and at T2 Cronbach’s  $\alpha = .631$  and for pessimism at T1 Cronbach’s  $\alpha_{T1} = .736$  and at T2 Cronbach’s  $\alpha = .766$ .

In SHARE, the LOT-R was used in a translated version for each country. Optimism and pessimism were each measured as responses provided on a 1 (*does not apply*) to 5 (*applies very well*) response scale to two relevant items (the third items for each construct were not asked). Interitem correlations were  $r_{\text{optimism}} = .56$  and  $r_{\text{pessimism}} = .52$ .

### Gender and Education

In all three studies, participants were asked to report their *gender* as either male or female. In our analyses, higher values in gender variables represent female gender. All three studies used established, but different, indicators for education. In BASE-II, years of formal education were recorded as the number of years necessary to obtain

the final degree the participant reported they had obtained. In MIDUS, participants were asked to report their highest educational degree ranging from 1 = “no school/some grade school” to 12 = “PhD, EdD, MD, DDS, LLB, LLD, JD, or other professional degree.” In SHARE, education was coded using the International Standard Classification of Education framework, which was designed to facilitate comparisons of education statistics and indicators across countries (see United Nations Educational, Scientific, and Cultural Organization, 2012, for more details). Level of education is coded using seven ordinal categories (Level 0 = preprimary education, Level 1 = primary education, Level 2 = secondary education first stage, Level 3 = upper secondary education, Level 4 = postsecondary nontertiary education, Level 5 = first stage of tertiary education, Level 6 = second stage of tertiary education).

## Analytical Approach

Three sets of analysis were used to prepare, test, and explore age-related differences and changes in optimism and pessimism and how those differences and change may be moderated by gender and education. The preparation step included stepwise testing of measurement invariance (following Meredith, 1993). The testing step made use of multivariate latent change models (McArdle, 2009; McArdle & Hamagami, 2001). Both sets of models were articulated as structural equation models with latent factors and change scores and estimated using *Mplus* 8.5 (Muthén & Muthén, 1998–2020). We applied the full information maximum-likelihood estimation method to account for missing data. The exploration step which was specifically focused on uncovering nonlinear age trends made use of locally weighted smoothing (LOESS) regressions (see Cleveland, 1979) estimated using SPSS Version 27.0 (IBM Corp. Released 2020) software.

### Measurement Model

As a basis for all further analyses, we specified separate structural models for optimism and pessimism. For all three studies, we compared a solution that used one common latent factor for optimism and pessimism (i.e., one dimension) against a model where optimism and pessimism are articulated as two separate constructs. We also added a method factor to the models that used one common latent factor to control for the potential influence of item wording (i.e., optimism is measured via positively worded items, whereas pessimism was measured via negatively worded items).

For BASE-II and MIDUS, we progressively tested for measurement invariance across waves. We evaluated the fit of our models using multiple model fit indices: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR). CFIs above .90 and RMSEAs and SRMRs below .08 typically indicate an acceptable fit with the data (Schermelleh-Engel et al., 2003).

As reported in Supplemental Table S1, results provided evidence that strict factorial invariance held in both the BASE-II and MIDUS over time for both studies because factor loadings (weak factorial invariance), measurement intercepts (strong factorial invariance), and residual variances (strict factorial invariance) could be constrained to be equal across time points without major loss in fit (see Meredith, 1993). As a consequence, our results are relatively independent of changes in measurement across time. By the same

token, we allowed for correlated residuals of the corresponding manifest items across adjacent time points (Bollen & Curran, 2006; Sörbom, 1975).

**Latent Change Models.** We successively estimated multivariate latent change models to further investigate our hypotheses (see McArdle, 2009; McArdle & Hamagami, 2001; see Figure 1). We used the specified measurement models to estimate a latent intercept factor ( $i$ ) and a slope factor ( $s$ ) for optimism and pessimism, respectively, as additional latent variables. The latent intercept factor indicates mean levels of and interindividual differences in our constructs at  $t_1$ , and the latent slope factor indicates intraindividual mean-level changes between  $t_1$  and  $t_2$  and interindividual differences therein.

The model was then expanded to include baseline age (and higher orders of baseline age), gender, and education as predictors to test for associations with cross-sectional differences and mean-level changes in optimism and pessimism. We also tested in a stepwise fashion all possible interaction terms among the correlates but for parsimony retained only those that were statistically significant at  $p < .01$ . For the SHARE data, we used a cross-sectional model, where latent optimism and pessimism factors were predicted by age, gender, and education.

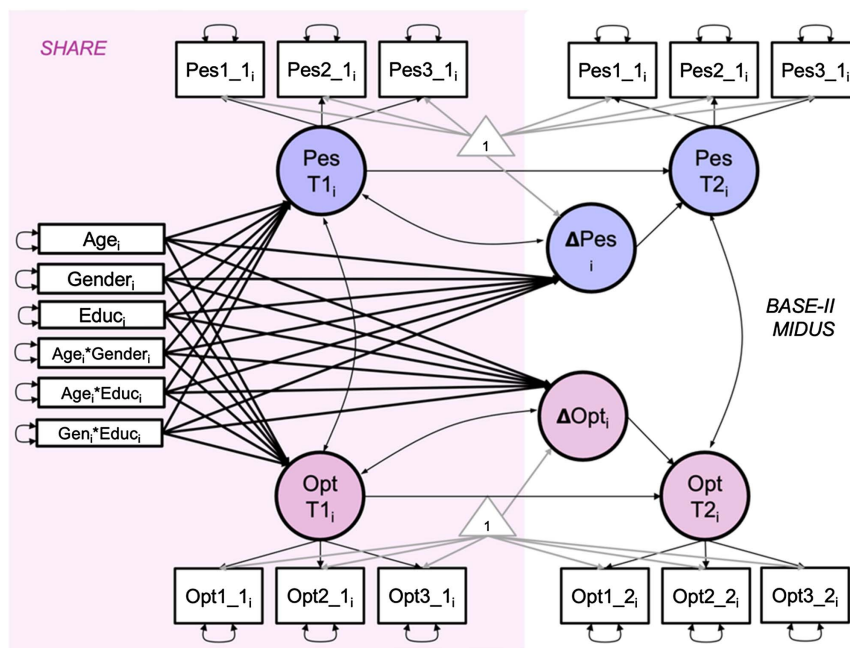
We also conducted two sets of follow-up sensitivity analyses. First, for direct comparison to the more limited age ranges of the BASE-II and MIDUS samples, we conducted additional analyses that reduced the age range of participants of the SHARE study to only use participants between the ages of 60 and 85 years. Second, we also

conducted multiple group models to examine similarities and differences in associations of optimism and pessimism with the demographic variables across four European regions. Following the United Nations Standard Area code (United Nations, Statistical Office, 1975), we contrasted Western Europe (Austria, Germany, Netherlands, France, Switzerland, Belgium, Luxembourg) with Northern Europe (Sweden, Denmark, Ireland, Estonia, Finland, Latvia), Southern Europe (Spain, Italy, Greece, Portugal, Slovenia, Croatia, Cyprus), and Eastern Europe (Czech Republic, Poland, Hungary, Bulgaria, Romania, Slovakia).

**LOESS Curves.** To investigate the shape of potential nonlinear associations of optimism and pessimism with age more thoroughly, we also estimated locally weighted smoothing (LOESS) curves (see Cleveland, 1979). LOESS curves are nonparametric and provide a graphical tool for depicting the shape of a bivariate association using local regression techniques. The statistical procedure therefore splits the values of the independent variable (optimism/pessimism) into smaller subsets, uses these to compute multiple regression lines, and finally combines these lines into a smoothed curve. Since LOESS curves are obtained empirically rather than using a specific statistical model (e.g., linear, quadratic), they can reveal complex relationships between variables that may be overlooked when using other statistical techniques (Jacoby, 2000).

We proceeded as follows: We first estimated a graph that depicts the functional form of bivariate associations that optimism/pessimism exhibit with age more thoroughly. To model this, we used manifest scores of optimism/pessimism at  $t_1$ , obtained as factor

**Figure 1**  
*Latent Change Model Analyzing Longitudinal Mean-Level Differences in Optimism/Pessimism Simultaneously*



*Note.* Opt = optimism; Pes = pessimism; Educ = education; Gen = gender;  $\Delta$  = slope; SHARE = Survey of Health, Aging, and Retirement; BASE-II = Berlin Aging Study II; MIDUS = Midlife in the U.S. Study; T = time. We also allowed for correlated residuals between the corresponding items of T1 and T2. See the online article for the color version of this figure.

scores from our latent change models as well as the manifest variable of chronological age. We then estimated a second set of graphs to further examine associations that changes between  $t_1$  and  $t_2$  in optimism/pessimism exhibit with age.

## Results

Descriptive statistics and intercorrelations for the measures under study are reported in Table 1. Four points are of note. First, optimism and pessimism showed considerable rank-order stability in old age (i.e., optimism:  $r = .81$  over an average of 7 years in BASE-II and  $r = .71$  over an average of 9 years in MIDUS; pessimism:  $r = .80$  in BASE-II and  $r = .69$  in MIDUS). Second, in all three studies, pessimism at  $t_1$  was significantly correlated with chronological age (between  $r = .09$  and  $r = .12$ ), whereas optimism at  $t_1$  only showed as statistically significant association in the SHARE study ( $r = -.08$ ; for MIDUS and BASE-II between  $r = .00$  and  $r = -.03$ ). Third, optimism and pessimism were substantially, but moderately, related (for BASE-II and MIDUS between  $r = -.52$  and  $r = -.59$  at both measurement points) with a lower correlation between the two-item composites in SHARE,  $r = -.20$ . Fourth, all three studies indicated negative associations between education and pessimism (between  $r = -.13$  and  $r = -.28$ ) but weaker or no associations between education and optimism.

### Preliminary Results

Prior to addressing our research questions, we investigated whether optimism and pessimism are separable constructs or whether they represent two ends of one dimension. Comparing models that used two factors for optimism and pessimism with models that used one global factor favored the two-factor solution for both longitudinal

studies, BASE-II and MIDUS (see Supplemental Table S1). For example, in BASE-II, the restriction of strict measurement invariance favored the two-factor solution by exhibiting an RMSEA of .028 versus an RMSEA of .030 for the global factor. Similarly, in MIDUS, the two-factor solution showed an RMSEA of .044 for strict measurement invariance versus an RMSEA = .058 for the global factor. Hence, we decided to consider optimism and pessimism as two separate constructs in all further analyses.

Intercorrelations of the simultaneous latent change models for BASE-II and MIDUS are shown in Supplemental Table S2. Consistently across both studies, the intercepts of optimism and pessimism were correlated in the moderate range ( $r = -.57$  to  $-.58$ ), whereas the size of the respective slope correlations was substantially smaller (BASE-II:  $r = -.41$ ; MIDUS:  $r = -.24$ ).

### Stability and Change of Optimism and Pessimism Across Late Midlife and Old Age

As a first aim of our study, we investigated whether optimism and pessimism change across late adulthood. Table 2 presents the effects of age on the intercept of optimism and pessimism, that is, between-person age differences as well as the effects of age on the slope of optimism and pessimism, that is, within-person changes over time. General findings for overall changes in optimism and pessimism across the study measurement points for BASE-II and MIDUS can be found in Supplemental Table S3 (see Supplemental Table S4, for standardized results). Table 3 presents the effects of age and further demographic variables on optimism and pessimism for BASE-II and MIDUS, whereas Table 4 presents these results for the SHARE study (see also Supplemental Tables S5 and S6, for stepwise testing). A graphical representation of our findings is presented in Figures 1 and 2.

**Table 1**  
*Descriptive Statistics and Intercorrelations for the Variables Under Study in All Three Studies*

Variable	Intercorrelation							Descriptive	
	1	2	3	4	5	6	7	<i>M</i>	<i>SD</i>
<b>BASE-II</b>									
1. Optimism $t_1$ (1-4)	—							3.28	3.24
2. Optimism $t_2$ (1-4)	.81	—						3.24	0.55
3. Pessimism $t_1$ (1-4)	-.58	-.49	—					1.98	0.63
4. Pessimism $t_2$ (1-4)	-.51	-.59	.80	—				1.93	0.61
5. Chronological age T1 (60-88)	.00	-.01	.12	.12	—			70.44	3.71
6. % Women (0 = male; 1 = female)	-.04	-.04	-.09	-.07	.02	—		52	
7. Education (0-18)	-.02	-.06	-.13	-.13	-.02	-.17	—	14.33	2.92
<b>MIDUS</b>									
1. Optimism $t_1$ (1-5)	—							4.06	0.74
2. Optimism $t_2$ (1-5)	.71	—						4.00	0.72
3. Pessimism $t_1$ (1-5)	-.58	-.45	—					2.15	0.96
4. Pessimism $t_2$ (1-5)	-.49	-.52	.69	—				2.15	0.96
5. Chronological age T1 (60-84)	-.03	-.07	.09	.16	—			76.87	5.78
6. % Women (0 = male; 1 = female)	.03	.06	.03	.01	.03	—		55	
7. Education (1-12)	.17	.10	-.26	-.28	-.08	-.15	—	6.78	2.61
<b>SHARE</b>									
1. Optimism $t_1$ (1-5)	—							2.34	0.84
2. Pessimism $t_1$ (1-5)	-.20	—						3.11	0.92
3. Chronological age (60-99)	-.08	.09	—					70.19	7.53
4. % Women (0 = male; 1 = female)	-.08	.02	.03	—				54	
5. Education (0-6)	.09	-.19	-.16	-.13	—			2.36	1.50

*Note.* In brackets, scale ranges are reported. Intercorrelations of  $|r = .07|$  or above differ statistically from zero at  $p < .05$ . BASE-II = Berlin Aging Study II; T = time; MIDUS = Midlife in the U.S. Study; SHARE = Survey of Health, Aging, and Retirement.

**Table 2**  
*Latent-Change Model Examining Predictive Effects of Sociodemographic Variables for Trajectories of Optimism and Pessimism in the Berlin Aging Study II (BASE-II) and the Midlife in the U.S. Study (MIDUS)*

Parameter	BASE-II (N = 1,521)						MIDUS (N = 1,554)					
	Optimism			Pessimism			Optimism			Pessimism		
	Intercept	Slope		Intercept	Slope		Intercept	Slope		Intercept	Slope	
	b	SE	p	b	SE	p	b	SE	p	b	SE	p
Means $\alpha$	0	0		0	0		0	0		0	0	
Age	.018	.033	.593	-.078	.039	.043	-.058	.041	.154	-.176	.054	.001
Age <sup>2</sup>	-.001	.023	.967	-.026	.033	.446	-.001	.035	.982	-.036	.041	.386
Covariance	-.171	.040	<.001	-.021	.023	.356	-.019	.024	.430	.037	.043	.392
intercept, slope				-.219	.041	<.001				-.325	.046	<.001
Residual $\zeta$	1	0		.400	.056	<.001	.399	.060	<.001	.547	.072	<.001
Model fit indices												
RMSEA		.024										
CFI		.983										
TLI		.979										
SRMR		.048										

Note. The intercepts for optimism and pessimism at  $t_1$  were set to 0 and the variance to 1. SE = standard error; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; SRMR = standardized root mean square residual.

## Optimism

Focusing on cross-sectional age differences (i.e., between-person age differences), our results showed that optimism does not differ by age in both BASE-II ( $b_{\text{age}} = .018, p > .10; b_{\text{age}2} = -.010, p > .10$ ) and MIDUS ( $b_{\text{age}} = -.035, p > .10; b_{\text{age}2} = -.001, p > .10$ ). The overall pattern of results of BASE-II and MIDUS data indicated that optimism seemed to be fairly stable across late adulthood (see Table 2; see also Figure 2).

The SHARE data showed some indications that optimism may be lower among very old adults in their 80s and 90s than it is among old adults in their 60s and 70s ( $b_{\text{age}} = -.077, p < .001, b_{\text{age}2} = -.016, p > .05$ , see Table 4, Model 1). Our first sensitivity analyses that only included older adults between the ages of 60 and 85 revealed that the linear age association seen in the total sample was virtually the same but seemed to show a turning point with larger decreases in older ages ( $b_{\text{age}} = -.064, p < .001, b_{\text{age}2} = -.020, p < .05$ ; see Table 4, Model 3). This suggests that age-related differences are less pronounced between ages 60 and 85 and larger for very old age (see also Figure 2: a3). The second sensitivity analyses compared the different European regions (see Table 5) and revealed that age-related reductions in optimism were stronger in Eastern Europe ( $b_{\text{age}} = -.154, p < .001; b_{\text{age}2} = .041, p > .10$ ) than these were on Western Europe ( $b_{\text{age}} = -.052, p = .001; b_{\text{age}2} = -.014, p > .10$ ), Northern Europe ( $b_{\text{age}} = -.063, p > .01; b_{\text{age}2} = -.021, p > .10$ ) and Southern Europe ( $b_{\text{age}} = -.014, p = .583; b_{\text{age}2} = -.057, p = .001$ ). In other words, when reducing the SHARE data to the same age range as in BASE-II and in MIDUS and to Western Europe, the results were by and large comparable (no or minor age-related reductions in optimism).

Focusing on longitudinal (intraindividual) changes in optimism, we found for both longitudinal studies (i.e., BASE-II and MIDUS) that optimism decreased in statistically significant ways over the course of the study by around 0.10 standard deviations (for details, see Supplemental Table S4) over the 7 and 9 years, respectively. Most importantly, the rate of decline did not show any associations with participants' age (i.e., no age effects in within-person changes), neither for the BASE-II nor the MIDUS data. This suggests that relatively older adults in their early 80s did not exhibit steeper age decrements in optimism than relatively younger adults in their late 60s (Figure 3).

## Pessimism

For pessimism, we found consistently across all three studies evidence of cross-sectional age differences in pessimism, that is, higher pessimism in older people, BASE-II:  $b_{\text{age}} = .121, p < .001; b_{\text{age}2} = .002, p = .921$ ; MIDUS:  $b_{\text{age}} = .076, p = .017; b_{\text{age}2} = .021, p = .497$ ; SHARE:  $b_{\text{age}} = .115, p < .001; b_{\text{age}2} = -.040, p < .001$ . The sensitivity analyses that had restricted the SHARE sample to those aged 60–85 corroborated this pattern. Similarly, sensitivity analyses that compared the different European regions (see Table 5) revealed that these age effects were stronger in Northern Europe ( $b_{\text{age}} = .219, p < .001; b_{\text{age}2} = -.070, p = .002$ ) than in Western Europe ( $b_{\text{age}} = .083, p < .001; b_{\text{age}2} = -.023, p = .075$ ), Southern Europe ( $b_{\text{age}} = .053, p = .056; b_{\text{age}2} = -.032, p = .087$ ), and Eastern Europe ( $b_{\text{age}} = .048, p > .10; b_{\text{age}2} = -.050, p = .062$ ).

Focusing on longitudinal (intraindividual) changes in pessimism, we found that pessimism decreased over the 7 years between both measurement points for BASE-II participants by 0.08 SD and increased over the 9 years of observation in MIDUS by 0.09 SD (see



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**Table 3**  
*Latent-Change Model Examining Predictive Effects of Sociodemographic Variables for Trajectories of Optimism and Pessimism Across Two Measurement Points*

Parameter	BASE-II (N = 1,521)												MIDUS (N = 1,554)											
	Optimism						Pessimism						Optimism						Pessimism					
	Intercept		Slope		Intercept		Slope		Intercept		Slope		Intercept		Slope		Intercept		Slope					
	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p			
Means $\alpha$	0	0		-.023	.057	.688	0	0		-.073	.061	.237	0	0		-.195	.055	<.001	0	0		.237	.051	<.001
Age	-.028	.045	.526	.029	.044	.513	.132	.047	.005	.008	.047	.868	-.018	.035	.608	-.039	.042	.355	.057	.032	.073	.099	.039	.011
Age2	.009	.033	.777	-.043	.031	.174	-.008	.035	.808	-.019	.034	.582	-.005	.034	.890	.054	.044	.213	.026	.031	.397	-.116	.041	.004
Women	-.030	.041	.460	-.034	.041	.403	-.094	.043	.028	.001	.044	.978	.030	.048	.526	.105	.055	.057	-.048	.043	.271	.023	.051	.654
Women $\times$ Age	.043	.036	.230	-.061	.036	.091	.020	.037	.588	-.050	.038	.192	-.008	.036	.818	.054	.043	.204	-.043	.033	.189	.052	.040	.193
Women $\times$ Age2	-.001	.025	.967	.015	.025	.551	-.003	.026	.907	.002	.027	.940	.030	.035	.393	-.075	.044	.090	.036	.032	.253	-.042	.041	.303
Education	.012	.052	.815	-.111	.054	.039	-.198	.054	.000	.017	.057	.761	.122	.048	.011	.055	.055	.320	-.302	.044	.000	-.048	.051	.350
Education $\times$ Age	.027	.035	.434	-.059	.036	.098	.020	.036	.574	-.010	.039	.798	-.046	.036	.205	-.022	.043	.607	.001	.033	.979	-.007	.040	.852
Education $\times$ Age2	.009	.024	.700	.005	.026	.845	.002	.025	.942	-.031	.028	.260	.062	.035	.081	-.170	.047	<.001	.031	.032	.332	.044	.044	.316
Education $\times$ Women	-.051	.034	.131	.062	.034	.067	.049	.035	.162	.010	.037	.782	.002	.032	.939	-.024	.038	.521	-.019	.029	.527	.020	.035	.576
Covariance intercept, slope	1	0	<.001	.395	.057	<.001	1	0	<.001	-.206	.044	<.001	1	0	<.001	-.318	.047	<.001	1	0	<.001	1	0	<.001
Residual $\zeta$	1	0																						
Model fit indices																								
RMSEA																								
CFI																								
TLI																								
SRMR																								

*Note.* The intercepts for optimism and pessimism at  $t_1$  were set to 0 and the variance to 1; women and education were  $z$  standardized. BASE-II = Berlin Aging Study II; MIDUS = Midlife in the U.S. Study; SE = standard error; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual.

**Table 4**  
*Cross-Sectional Regression Analyses Examining Predictive Effects of Sociodemographic Variables for Optimism and Pessimism in the Survey of Health, Aging, and Retirement*

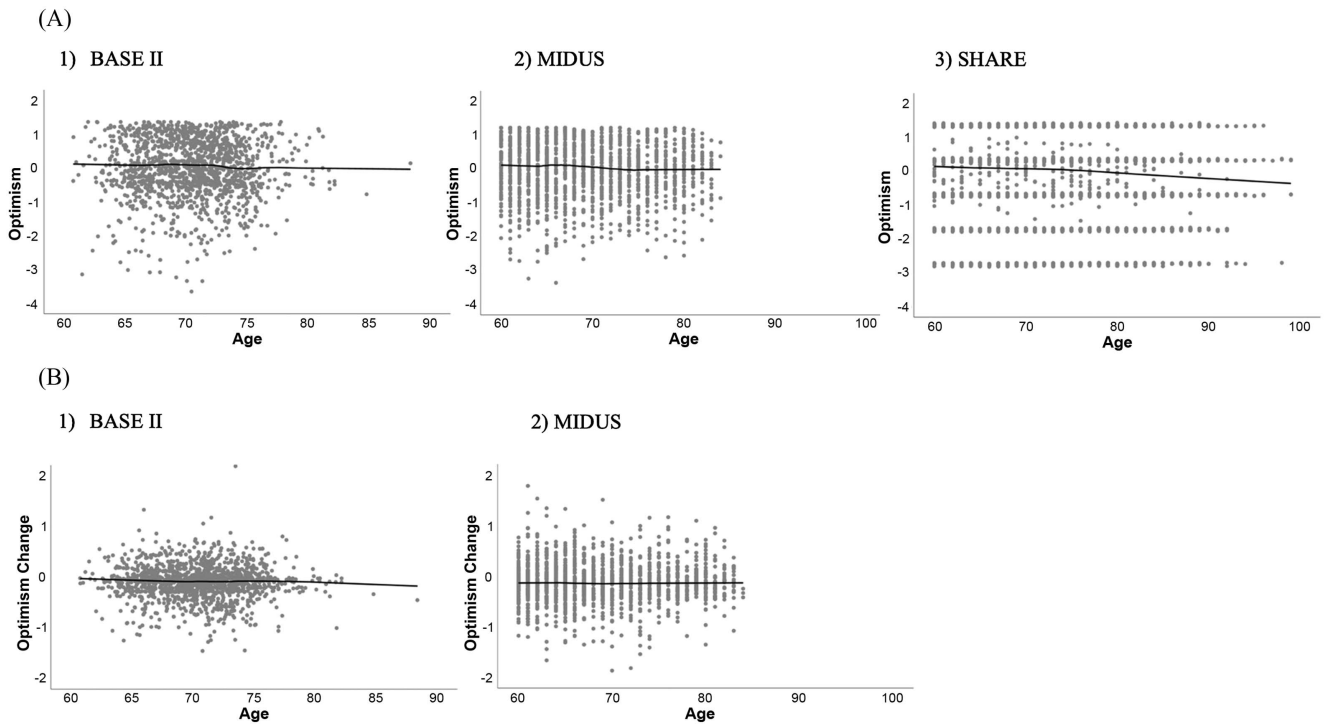
Parameter	Model 1 (N = 16,591)						Model 2 (N = 16,591)						Model 3 (age 60–85; N = 16,060)						
	Optimism			Pessimism			Optimism			Pessimism			Optimism			Pessimism			
	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	
Means $\alpha$	0	0		0	0		0	0		0	0		0	0		0	0		
Age	-.077	.009	<.001	.115	.011	<.001	-.064	.009	<.001	.083	.011	<.001	-.064	.009	<.001	.084	.011	<.001	
Age2	-.016	.007	.020	-.040	.008	.001	-.011	.007	.117	-.027	.008	.001	-.020	.010	.045	-.033	.012	.006	
Women							-.073	.010	<.001	-.015	.013	.223	-.069	.012	<.001	-.008	.014	.578	
Women $\times$ Age							-.014	.009	.122	-.029	.011	.007	-.013	.009	.167	-.032	.011	.004	
Women $\times$ Age2							-.001	.007	.862	.008	.008	.309	-.006	.010	.573	-.003	.012	.798	
Education							.077	.011	<.001	-.193	.013	<.001	.075	.012	<.001	-.193	.014	<.001	
Education $\times$ Age							.040	.009	<.001	.036	.011	.001	.038	.009	<.001	.036	.011	.001	
Education $\times$ Age2							-.005	.007	.483	.005	.008	.557	-.003	.010	.787	.005	.012	.655	
Education $\times$ Women	.038	.008	<.001	-.017	.010	.070	.038	.008	<.001	-.017	.010	.070	.040	.008	<.001	-.017	.010	.070	
Residual $\zeta$	1	0		0	0		1	0		0	0		1	0		0	0		
Model fit indices																			
RMSEA	.006						.013						.014						
CFI	1.00						.995						.995						
TLI	.999						.990						.989						
SRMR	.004						.008						.009						

*Note.* The intercepts for optimism and pessimism at  $t_1$  were set to 0 and the variance to 1; women and education were z standardized. SE = standard error; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual.

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**Figure 2**

LOESS Curves Analyzing Developmental Trajectories of Optimism Across Late Adulthood (Age 60 and Higher) in Three Studies



Note. Panel A: Intercept optimism. Panel B: Slope optimism. LOESS = locally weighted smoothing; BASE-II = Berlin Aging Study II; MIDUS = Midlife in the U.S. Study; SHARE = Survey of Health, Aging, and Retirement.

Supplemental Tables S3 and S4). Most importantly, differences in extent of change were not related to participants' age for the BASE-II (i.e., no age effects in within-person changes), but we found indications for small-sized age effects on changes in pessimism in the MIDUS data ( $b_{\text{age}} = .092, p = .015; b_{\text{age}^2} = .102, p = .009$ ; see Table 2). Taken together, our longitudinal results indicate that pessimism changes across later adulthood and old age, but the direction and amount of change are relatively consistent (i.e., not associated with age) throughout the 60s to early 80s.

### The Role of Gender and Education

As a second aim, we examined whether demographic characteristics of gender and education are associated with optimism and pessimism and their age-graded changes. The results showed different patterns of gender differences between the three studies (see Tables 3 and 4). In BASE-II, we found no gender differences in optimism, but women exhibited less pessimistic expectations than men ( $b = -.098, p = .009$ ). At the same time, age effects did not differ for men and women or as a function of educational background. In MIDUS, there were no gender differences at all for neither optimism or pessimism. In SHARE, we found that women showed less optimistic expectations than men ( $b = -.070, p < .001$ ). No general gender differences were observed in pessimism. However, we found an interaction of gender with age so that pessimism especially seems to increase in older ages in men ( $b_{\text{Sex} \times \text{Age}} = -.029, p = .007; b_{\text{Sex} \times \text{Age}^2} = .008, p = .309$ ).

Results for education were far more consistent. Specifically, across all studies, we found some evidence for education–optimism associations. In BASE-II, education was not related to interindividual differences in optimism, but higher education seemed to predict intraindividual decreases in optimism over the course of the study ( $b = -.111, p = .039$ ). In this study, effects of education did not vary as a function of age or gender. For MIDUS, we found a positive cross-sectional association between education and optimism ( $b = .122, p = .011$ ) and indications that higher education seemed to predict longitudinal decreases in optimism especially in older ages ( $b_{\text{education}} = .055, p = .320; b_{\text{Education} \times \text{Age}} = -.022, p = .607; b_{\text{Education} \times \text{Age}^2} = -.170, p < .001$ ). In SHARE, we found main effects of education on optimism as well as interactions with age and gender. Hence, higher education was associated with a generally higher level of optimism ( $b = .077, p < .001$ ). This association seemed to be more pronounced in higher ages ( $b_{\text{age}} = .040, p < .001; b_{\text{age}^2} = -.005, p = .483$ ) and women ( $b = .038, p < .001$ ).

Additionally, more education was consistently associated with lower levels of pessimism. In BASE-II and MIDUS, we found this association on a cross-sectional level (BASE-II:  $b = -.198, p < .001$ ; MIDUS:  $b = -.302, p < .001$ ), whereas we found no longitudinal effects and no interaction effects with age and gender. For SHARE, we also found that higher education may be associated with lower levels of pessimism ( $b_{\text{education}} = -.193, p < .001$ ) but also some indications that this effect may be somewhat reduced in older ages ( $b_{\text{Education} \times \text{Age}} = .036, p = .001; b_{\text{Education} \times \text{Age}^2} = .005, p = .557$ ).

**Table 5**  
*Cross-Sectional Regression Analyses Examining Predictive Effects of Sociodemographic Variables for Optimism and Pessimism in the Survey of Health, Aging, and Retirement: Geographical Region-Specific Analyses*

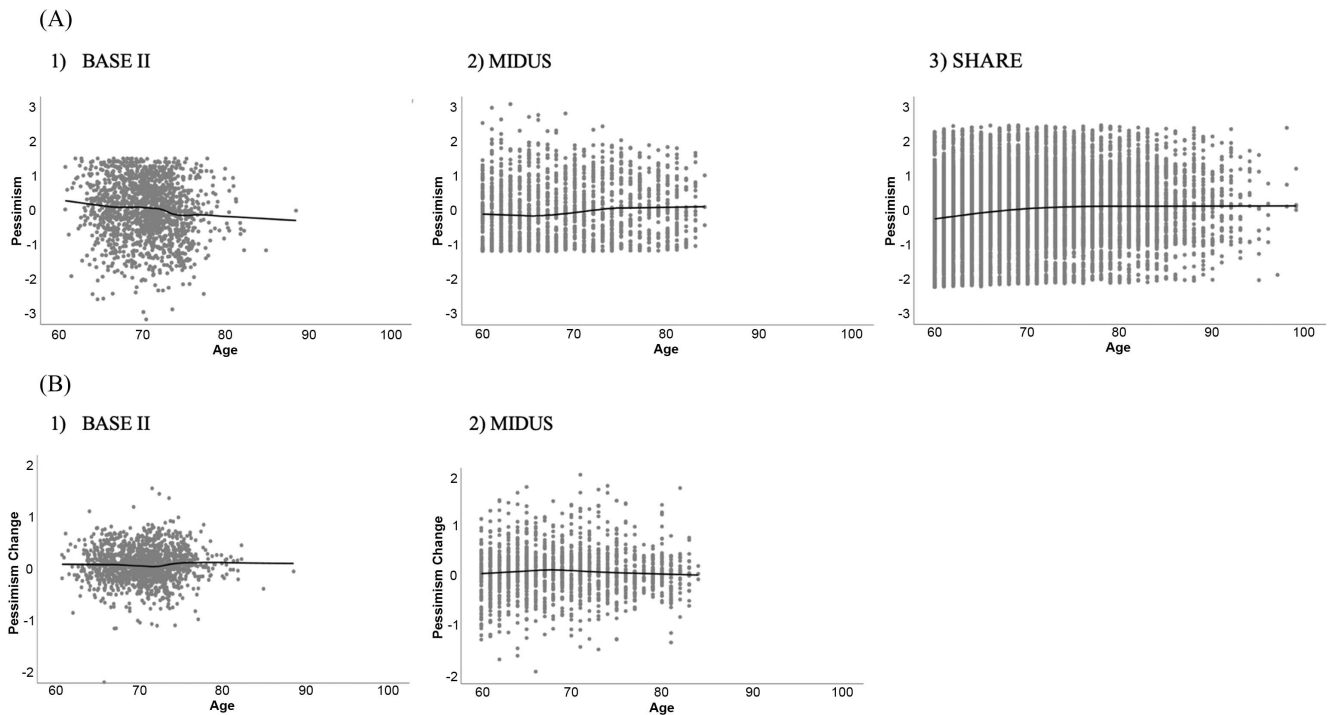
Parameter	Western Europe (N = 7,098)						Northern Europe (N = 2,665)						Southern Europe (N = 3,600)						Eastern Europe (N = 1,860)					
	Optimism			Pessimism			Optimism			Pessimism			Optimism			Pessimism			Optimism			Pessimism		
	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p	b	SE	p
Means $\alpha$	0	0	0	.331	.032	<.001	-.024	.039	.549	0	0	0	-.241	.041	<.001	.276	.041	<.001						
Age	-.052	.015	.001	.083	.018	<.001	.219	.030	<.001	-.014	.025	.583	.053	.028	.056	-.154	.030	<.001	.048	.031	.122			
Age2	-.014	.011	.216	-.023	.013	.075	-.021	.018	.231	-.057	.017	.001	-.032	.019	.087	.041	.025	.100	-.050	.027	.062			
Women	-.039	.018	.030	-.056	.021	.007	-.039	.035	.269	-.127	.028	<.001	.047	.031	.122	-.100	.034	.004	.070	.037	.056			
Women $\times$ Age	.001	.015	.930	-.046	.017	.008	-.019	.029	.523	-.007	.022	.766	-.032	.025	.193	-.057	.029	.052	-.021	.031	.507			
Women $\times$ Age2	-.020	.012	.103	.009	.014	.521	-.004	.017	.796	.024	.023	.281	.009	.015	.574	.008	.017	.633	.034	.023	.142			
Education	.067	.019	<.001	-.304	.022	<.001	-.066	.026	.011	.173	.025	<.001	-.021	.027	.431	.098	.040	.015	-.051	.043	.233			
Education $\times$ Age	.050	.016	.002	-.008	.018	.657	.012	.021	.562	.026	.028	.344	.082	.026	.001	.044	.028	.115	.043	.036	.242			
Education $\times$ Age2	-.004	.013	.760	.029	.015	.045	.005	.017	.776	.047	.023	.039	-.022	.017	.208	-.032	.019	.102	.006	.028	.822			
Education $\times$ Women	.008	.014	.558	.005	.016	.773	.015	.019	.428	.004	.025	.880	.067	.023	.003	-.010	.025	.680	.001	.031	.980			
Residual $\zeta$	1	0	1	0	0	0	.853	.039	<.001	1.244	.058	<.001	1	0	1	0	0	0	1.073	.055	<.001	.823	.051	<.001
Model fit indices																								
RMSEA							.032																	
CFI							.969																	
TLI							.943																	
SRMR							.024																	

*Note.* Geographical regions were coded according to the United Nations Standard Area code (United Nations, Statistical Office, 1975). Western Europe = Austria, Germany, Netherlands, France, Switzerland, Belgium, Luxembourg; Northern Europe = Sweden, Denmark, Ireland, Estonia, Finland, Latvia; Southern Europe = Spain, Italy, Greece, Portugal, Slovenia, Croatia, Cyprus; Eastern Europe = Czech Republic, Poland, Hungary, Bulgaria, Romania, Slovakia. SE = standard error; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual.



**Figure 3**

LOESS Curves Analyzing Developmental Trajectories of Pessimism Across Late Adulthood (Age 60 and Higher) in Three Studies



Note. Panel A: Intercept optimism. Panel B: Slope optimism. LOESS = locally weighted smoothing; BASE-II = Berlin Aging Study II; MIDUS = Midlife in the U.S. Study; SHARE = Survey of Health, Aging, and Retirement.

## Discussion

The major objective of our study was to examine stability and change of optimism and pessimism in late midlife and old age and to study the role of gender and education. Making use of data collected in three independent comprehensive studies in Europe and the United States, we applied latent change-regression models and locally weighted smoothing (LOESS) curves. Our results provided further evidence that optimism and pessimism are two separate constructs that follow different longitudinal trajectories and show differential associations with education and gender. Although old age is associated with decreasing psychosocial and physical functioning, older adults on average seem to preserve their optimistic expectations and only show moderately higher levels of pessimism.

### Stability and Change of Optimism and Pessimism Across Late Midlife and Old Age

As a first aim of the study, we investigated whether optimism and pessimism change across late midlife and old age. We found that optimism is on average very stable after age 60, with some evidence in SHARE of lowered optimism in very old age. Longitudinal results from BASE-II and MIDUS indicated that optimism decreases over the course of 7 and 9 years, respectively, but the amount of decline was modest, amounting for both studies to an average decline of 0.02 *SD* per year. These results correspond to previous findings of minor decreases or stability in optimism during these ages (Chopik et al., 2015, 2020; Schwaba et al., 2019).

Our findings therefore indicate that optimism and pessimism constitute another set of central psychological constructs that remain fairly stable with age, highlighting again that our self-regulation systems operate in robust and efficient ways also in the second half of life. Hence, it seems that age-associated losses and social role changes do not necessarily come along with decreases in older adults' optimism—as it was also formerly found for other psychosocial constructs such as affect and well-being. One explanation may be that the higher focus on positive emotions in older adults (Carstensen, 2006) may help them maintain their levels of optimism even in the face of age-associated losses and social-role transitions. This result is especially interesting in the light of the myriad of literature highlighting the importance of optimism for positive outcomes in various areas of life, such as cognitive and physical health, social functioning, and well-being and for resilience against adversities (Carver et al., 2010). Hence, maintaining optimistic expectations even in late adulthood may be an important component for successful aging.

Consistent across the three independent studies, pessimism evinced on average modest cross-sectional increases, ranging between .25 and .50 *SD* per 10 years. This result may indicate that even if older adults are on average successful in protecting their well-being and future optimistic expectations against age-normative challenges, this may not necessarily be the case for a pessimistic outlook for the future. Increases in pessimism may especially reflect the awareness and anticipation of age-associated changes and losses in functioning.

Another implication of this finding is that optimism, that is, positive future expectations, and pessimism, that is, negative future

expectations, seem to progress differently across the second half of life. Even though optimism also showed small decreases in old age, the amount of modest decline in optimism was substantively smaller than the amount of change in pessimism. This finding strengthens the assumption that optimism and pessimism may represent two separate constructs rather than two ends of one continuum.

Several theoretical considerations may help to put our findings in perspective. Considering research on optimism, our findings are consistent with notions that optimism and pessimism constitute separable dimensions (Benyamini, 2005). They also correspond to the assumption of so-called *cautious optimists* (Wallston, 1994) who are in general optimistic but also aware of the possibility that some unfavorable outcomes will occur in their future which may also heighten their pessimism. These concurrent processes may be especially relevant in older ages where individuals need to accept age-related declines in functioning. Theories on well-being in late adulthood may supplement these considerations. Hence, we can extrapolate from socioemotional selectivity theory (Carstensen, 2006) that the awareness of shortening future time horizons in older adults and the accompanied prioritization of positive emotional states and positive information and cues may help to sustain optimism in older ages. Following the theoretical model of strength and vulnerability integration (Charles, 2010), these overall beneficial processes may not work when older adults are confronted with significant threats. In these cases, they may experience more stress and recover more slowly than young adults, which may increase their pessimism. In a similar manner, the result is also consistent with research that takes a more global focus on future thinking and expectations rather than specifically addressing optimism and pessimism. This line of research argued that individuals generally aim to predict their future in an accurate way and that these predictions become more realistic in older ages (e.g., Lang et al., 2013), which would also favor the assumption of increases in pessimism.

Overall, during late adulthood, individuals may, at the same time, focus on positive aspects and positive emotional states and experience overall generalized optimism but may also recognize steady and increasing shortfalls that may heighten their pessimism. Older adults may preserve their overall positive expectations about their future and, at the same time, acknowledge the realistic opportunity that there may be an increasing probability of negative events in their future, such as decreasing health and functioning or the death of age peers. Hence, one possible explanation may be that the strengths of older ages may drive changes (or stability) in optimism, whereas the increasing vulnerabilities may drive increases in pessimism.

From an empirical point of view, this result is also in line with previous research, which reported differential heritability rates for optimism and pessimism (Plomin et al., 1992), and it was found that two factors represent optimism and pessimism better than one global factor and that these factors are only moderately correlated (Chang & McBride-Chang, 1996; Hjelle et al., 1996). They also correspond to previous findings that optimism and pessimism may be differently related to important life outcomes (e.g., Scheier et al., 2021).

At the same time, longitudinal results regarding pessimism differed from cross-sectional findings so that results from Germany (BASE-II) indicated small-sized reductions in pessimism over the course of the study, whereas results from the United States (MIDUS) indicated small-sized increases. Since the effect sizes of the longitudinal changes were small, future research should clarify which results are robust and significant. If results will be robust, one

explanation could be that the German and U.S. samples may differ in a lot of aspects, such as historical experiences during their life course or actual experiences of support and care systems, which may evoke differences in their optimism/pessimism. For example, the time interval of MIDUS included the great recession of the years 2008–2010. Since previous research has shown that dispositional optimism is prone to change due to individual experiences (Tetzner & Becker, 2019), this crises and the accompanied negative experiences may have contributed to increases in pessimism especially for U.S. Americans. In a similar manner, sensitivity analyses with SHARE indicated that age-related reductions in optimism and pessimism differed in their strength between regions and cultures in Europe.<sup>1</sup> Hence, contextual conditions may moderate whether and how older adults maintain optimism and pessimism. In a recent study, Magee et al. (2022) used a U.S.-American sample to examine age-graded changes in optimistic and pessimistic perceptual responses in adulthood and found indications for differences in trajectories according to age cohort, race (Black vs. White Americans), and gender. The authors of this study also interpreted their results in the light of sociohistorical trends. On the one hand, they draw on theories of social inequality (Ferraro et al., 2009) and hypothesized that an unequal distribution of opportunities and threats may influence peoples' future orientations. In addition, they draw on a life-course perspective (Elder et al., 2003) and stressed that historical changes in norms around role transitions and cohort differences on chances and risks may influence optimistic and pessimistic expectations. Future research may address this potentially relevant aspect in greater depth.

Over and above mean-level stability, our analyses in BASE-II and MIDUS also showed considerable rank-order stability for both optimism and pessimism over the 7 and 9 years of the study ( $r > .69$ ). Because previous studies indicated a low stability in adolescence and early adulthood over shorter time spans (Segerstrom, 2007; Tetzner & Becker, 2019) and a lower heritability compared with other personality traits (Plomin et al., 1992), individuals may consolidate a general optimistic (and pessimistic) outlook to the future over the life course. It is also possible that current generations of older adults have more consolidated views of life than later borns.

### The Role of Education

Although we also found some indications for cross-sectional associations between higher education and more optimism, the most consistent finding was that higher education was associated with lower pessimism. These findings may suggest that the consistent reports in the literature of higher education being associated with more optimism (when defined as a single factor including optimism and pessimism) appear to be largely driven by the pessimism piece in this overarching factor. Although our study cannot clarify the underlying mechanisms why more educated people are less pessimistic (or more optimistic), one possible explanation may be that the better availability of social and financial resources—that usually accompany higher education—may provide “objective” reasons for a more optimistic and less pessimistic outlook into the future (see Tetzner & Becker, 2019, for a similar argumentation). Drawing on life-span research, another possibility may be that higher education may offer more opportunities to individuals, which may reduce their pessimism (Magee et al., 2022). Another

<sup>1</sup> For country-specific analysis, please see Supplemental Table S4.

explanation may be that the greater availability of cognitive resources in higher educated older adults (such as more mental flexibility or better coping strategies) may prevent them from too much pessimistic ways of thinking.

### Limitations and Outlook

In closing, we note several limitations of our study design, measures, and sample. To begin with, our longitudinal within-person change analyses are based on only two measurement points in two samples to examine stability and change of optimism across late adulthood. To examine these changes more comprehensively, more measurement points with shorter time spans would increase the robustness of tracking how optimism and pessimism evolve as people move through old and very old age.

Although the SHARE data had many advantages including the large sample size from different European areas, optimism was only part of the drop-off questionnaires in Waves 1 and 2. Hence, SHARE did not offer the possibility to examine longitudinal changes in optimism and pessimism. Moreover, SHARE only used a reduced version of the revised life orientation tests and only incorporated two items for optimism and pessimism each (instead of the original three items per scale). Hence, we cannot fully rule out that this reduction in items has influenced our findings. However, we conducted additional analyses for BASE-II and MIDUS that only used the corresponding two items for checking whether this selectivity may cause differences in findings between SHARE and the other two studies. However, these additional analyses preserved the overall pattern of results. Similarly, the usage of only  $2 \times 2$  items did not allow us to test for the SHARE data whether a one-factor solution is better than a two-factor solution that differentiates between optimism and pessimism as we did for BASE-II and MIDUS. Additionally, since the different studies, and also the different countries within the SHARE study, used country-specific translations of the LOT-R, we cannot rule out that this modification may have also influenced the results. Also, because we used different indicators for education between the three studies (i.e., years of education or different categorizations of levels of education), results from structural equation modeling may not be completely comparable between the three studies. Although results are fairly consistent between studies, future studies should address this issue.

Another issue is the representativeness of our samples. Especially participants from BASE-II are on average higher educated than the corresponding population (Bertram et al., 2014). We cannot rule out that this self-selection may have influenced the results. It is also an open question whether and how our results generalize to more diverse samples. For example, given structural disadvantages in the United States, it is possible that ethnic minorities not only report lower levels of optimism when entering old age but are also more prone to age-related declines.

Moreover, although all of our statistical models provided an acceptable model fit (i.e., Schermelleh-Engel et al., 2003, propose that CFIs above .90 and RMSEAs and SRMRs below .08 typically indicate an acceptable fit with the data), some of our models for MIDUS did not meet more restrictive evaluation criteria of other authors (e.g., Hu & Bentler, 1999).

Overall, our study provides further empirical support that optimism and pessimism should be considered as separate constructs. Four sets of findings support this conclusion: First, results from our

confirmatory factor analyses indicated that optimism and pessimism represent separate constructs. Second, correlations between optimism and pessimism, and especially between changes in optimism and pessimism across time, were only of moderate size. Third, optimism and pessimism seemed to progress differently in older ages. And fourth, optimism and pessimism were differently related to education. At the same time though, we fully acknowledge that the debate about the construct space will continue. For example, VanderWeele and Kubzanski (2021) questioned the separability of optimism and pessimism by arguing that it may be “possible that only the more negatively worded items adequately assess the pessimism-pole of the construct” (VanderWeele & Kubzanski, 2021, p. 1192). With the current studies, we have not been in the position to address this point empirically because optimism and pessimism have not been assessed with both positively worded items and negatively worded items.

### Conclusion

This study examined stability and change of optimism and pessimism in late adulthood. Results revealed that optimism and pessimism showed potential for both, stability and change, in late adulthood. Despite increased risks of more frequent and severe health and social losses, older adults appear to preserve into older ages those levels of optimistic expectations they have had at 60 years of age. At the same time, the overall picture of results indicates that they seem to show modest increases in pessimism. Thereby, this study demonstrated that the nature of age-related trajectories and correlates thereof differs between optimism and pessimism and thus provides further empirical support that optimism and pessimism should be considered as separate constructs.

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