

Original Research Report

Associations Among Individuals' Perceptions of Future Time, Individual Resources, and Subjective Well-Being in Old Age

Christiane A. Hoppmann,¹ Frank J. Infurna,² Nilam Ram,^{3,4} and Denis Gerstorf^{3,5}

¹Department of Psychology, University of British Columbia, Vancouver, Canada. ²Department of Psychology, Arizona State University, Tempe. ³Department of Human Development and Family Studies, The Pennsylvania State University, University Park. ⁴German Institute for Economic Research (DIW), Berlin, Germany. ⁵Institute of Psychology, Humboldt University, Berlin, Germany.

Correspondence should be addressed to Christiane A. Hoppmann, PhD, Department of Psychology, University of British Columbia, 2136 West Mall, Vancouver, BC V6T 1Z4, Canada. E-mail: choppmann@psych.ubc.ca.

Received December 05, 2014; Accepted June 21, 2015

Decision Editor: Bob G. Knight, PhD

Abstract

Objectives: Perceptions of future time are of key interest to aging research because of their implications for subjective well-being. Interestingly, perceptions about future time are only moderately associated with age when looking at the second half of life, pointing to a vast heterogeneity in future time perceptions among older adults. We examine associations between future time perceptions, age, and subjective well-being across two studies, including moderations by individual resources.

Method: Using data from the Berlin Aging Study ($N = 516$; $M_{\text{age}} = 85$ years), we link one operationalization (subjective nearness to death) and age to subjective well-being. Using Health and Retirement Study data ($N = 2,596$; $M_{\text{age}} = 77$ years), we examine associations of another future time perception indicator (subjective future life expectancy) and age with subjective well-being.

Results: Consistent across studies, perceptions of limited time left were associated with poorer subjective well-being (lower life satisfaction and positive affect; more negative affect and depressive symptoms). Importantly, individual resources moderated future time perception—subjective well-being associations with those of better health exhibiting reduced future time perception—subjective well-being associations.

Discussion: We discuss our findings in the context of the Model of Strength and Vulnerability Integration.

Keywords: Future time perception—Old age—Well-being

Subjective well-being is relatively well maintained or even improves with age, but it exhibits pronounced individual differences (Carstensen et al., 2011; Charles, Reynolds, & Gatz 2001; Gana, Bailly, Saada, Joulain, & Alaphilippe, 2013; Kunzmann, Little, & Smith, 2000; Mroczek & Kolarz, 1998; Windsor, Burns, & Byles, 2013). We use a definition of subjective well-being that includes emotional as well as cognitive-evaluative components (Diener, Suh, Lucas, & Smith, 1999). Importantly, past

research shows that perceptions about future time are often more meaningfully linked to subjective well-being than age per se (Allemand, Hill, Ghaemmaghami, & Martin, 2012; Carstensen et al., 2011; Demiray & Bluck, 2014). However, there is some controversy regarding the direction of this association, with some research suggesting that limited future time perceptions relate to higher subjective well-being (Carstensen, Mikels, & Mather, 2006), whereas others show the opposite (Allemand

et al., 2012; Demiray & Bluck, 2014; Kozik, Hoppmann, & Gerstorf, 2015; Kotter-Gruehn & Smith, 2011). Such discrepant findings could be due to different operational definitions of future time perceptions, limited attention to individual differences in resources, or both (Carstensen et al., 2006; Cate & John, 2007; Charles, 2010; Kotter-Gruehn & Smith, 2011; Mirowsky, 1997; Zimbardo & Boyd, 1999). The purpose of this project was to examine associations between different operational definitions of future time perceptions and chronological age with multiple subjective well-being indices using data from the Berlin Aging Study (BASE; $M_{\text{age}} = 85$ years; Baltes & Mayer, 1999) and participants aged 70 and older from the Health and Retirement Study (HRS; Herzog & Rodgers, 1988; $M_{\text{age}} = 77$ years). In both studies, we also examined the potential moderating role of two key individual resources, namely cognitive functioning and physical health.

Perceptions of Future Time and Subjective Well-Being in Old Age

The concept of time is key to all aging research, but time can have several different meanings (Carstensen et al., 2006; Kotter-Gruehn & Smith, 2011; Mirowsky, 1997; Zimbardo & Boyd, 1999). Objective accounts of time since birth are captured by chronological age (Ram, Gerstorf, Fauth, Zarit, & Malmberg, 2010). Yet, individuals of the same age may differ in their subjective experience of time, often operationally defined by perceptions about future time (Carstensen et al., 2006; Demiray & Bluck, 2014; Mirowsky, 1997). Chronological age and perceptions about future time are typically negatively correlated in healthy samples ($r = -.20$ to $r = -.70$; Allemand et al., 2012; Coudin & Lima, 2011; Demiray & Bluck, 2014; Kessler & Staudinger, 2009; Lang & Carstensen, 2002). However, there are also considerable individual differences in perceptions about future time among individuals within the same age group.

Importantly, individual differences in perceptions about future time may have implications for subjective well-being (Carstensen et al., 2006; Demiray & Bluck, 2014; Kotter-Gruehn & Smith, 2011). Socioemotional selectivity theory (SST) posits that limited future time perceptions prompt motivational shifts leading to a prioritization of socioemotional goals and preferences for familiar over unfamiliar social partners (Carstensen et al., 2006; Hoppmann & Blanchard-Fields, 2010; Lang & Carstensen, 2002). There is ample support for this proposition as indicated by empirical evidence for a selective focus on emotionally close social partners among older as compared with young adults, symptomatic as compared with asymptomatic HIV-positive men, or individuals approaching sociopolitical endings (Carstensen & Fredrickson, 1998; Fredrickson & Carstensen, 1990; Fung, Carstensen, & Lutz, 1999). Although earlier notions of SST did not specifically address

associations between future time perceptions and subjective well-being per se, more recent extensions do target subjective well-being by saying that "SST maintains that emotional experience improves because people become increasingly motivated to pursue emotionally meaningful goals and thus invest psychological and social resources to optimize emotional well-being" (Carstensen et al., 2011, p. 29). Hence, older adults who perceive their future time as more limited are expected to report higher subjective well-being particularly with regards to emotional components.

Interestingly, there is also accumulating evidence that supports the opposite notion. Specifically, it has been shown that open-ended rather than limited future time perceptions are associated with higher subjective well-being including emotional (positive affect, negative affect, and happiness) and cognitive-evaluative aspects (life satisfaction) across different European, North American, and Asian samples (Allemand et al., 2012; Coudin & Lima, 2011; Demiray & Bluck, 2014; Kozik et al., 2015; Kotter-Gruehn & Smith, 2011; Yeung, Fung, & Lang, 2007).

Of note, comparisons across studies are complicated by differences in operational definitions of perceptions about future time and outcomes. For example, perceptions about future time have been studied using proxies such as health status (Carstensen & Fredrickson, 1998), sociopolitical endings (Fung et al., 1999), perceptions of time left in life (Mirowsky, 1997), the Future Time Perspective Scale (Lang & Carstensen, 2002), or multifactorial time-perspective inventories (Zimbardo & Boyd, 1999) with the Future Time Perspective Scale being optimally suited to capture the sociomotivational mechanisms specified by SST. Furthermore, outcomes differ across a wide spectrum from social preferences (e.g., Carstensen & Fredrickson, 1998; Lang & Carstensen, 2002) to emotional and cognitive indicators of well-being (e.g., Allemand et al., 2012; Carstensen et al., 2011; Yeung et al., 2007). Taken together, findings are inconsistent with some studies showing positive associations between limited future time perceptions and subjective well-being and other studies showing negative associations between limited future time perceptions and subjective well-being. This inconsistency may not just be due to differences in operational definitions of future time perceptions, but it also points to the need to better understand the role of individual resources for the realization of socioemotional goals, so that social-emotional goals can fuel subjective well-being.

The Role of Individual Resources

Prioritizing socioemotional goals may be an important prerequisite, but it is not sufficient to achieve high subjective well-being in old age. Specifically, the model of strength and vulnerability integration (SAVI; Charles,

2010; Charles & Luong, 2013) posits that older adults must also be capable of using effective strategies that enhance well-being. This is possible if they have the physical and cognitive capacity to limit or avoid exposure to negative situations (strengths). Conversely, if older adults are unable to employ such strategies due to chronic health constraints or cognitive limitations (vulnerabilities), well-being is jeopardized (Charles, 2010; Charles & Luong, 2013). The present study takes a strength-based approach by focusing on physical health and cognitive functioning as key resources that may enhance emotion regulation in old age. Specifically, we expect that health-related and cognitive resources moderate associations between future time perceptions and subjective well-being in such a way that older adults with good physical health or with high cognitive functioning who perceive their future as limited report higher subjective well-being than individuals with poor physical health or low cognitive functioning who perceive their future as limited.

To provide a meaningful interpretation of the proposed associations between future time perceptions, cognitive and health-related resources, and subjective well-being in old age, we also take into account a number of individual factors that are linked with subjective well-being. Specifically, analyses control for gender differences and individual differences in marital status, education, and social participation (Benyamini, 2011; Diener et al., 1999; Lachman, 2006).

The Present Studies

Our aim was to examine associations between future time perceptions and subjective well-being in old age and how those associations may be moderated by individual resources. Using BASE data ($N = 516$; $M_{\text{age}} = 85$ years; Baltes & Mayer, 1999), we first examine associations between perceptions about future time, age, and subjective well-being using an item (“I have the feeling that my time is running out.”) that closely resembles the wording of one item from the Future Time Perspective Scale (“I have the sense that time is running out.” Carstensen & Lang, 1996). In a second step, drawing on data from HRS participants aged 70 and older who completed the 2006 psychosocial battery ($N = 2,596$; $M_{\text{age}} = 77$ years; Roberts et al., 2009), we examine how perceptions about future time and age are associated with subjective well-being in a national sample of older adults using an item that is conceptually close to Mirowsky’s operationalization (“To what age do you expect to live?”; Mirowsky, 1997, 1999). The respective HRS item asked participants to rate the percent chance to live beyond a certain age (“Please rate the percent chance that you will live to be [X] or older”). Finally, we examine if cognitive functioning and physical health moderate the expected associations between future time perceptions and subjective well-being in both data sets.

Study 1: Interrelations Among Indicators of Future Time Perception and Subjective Well-Being

Method

Participants and Procedure

The BASE followed a sample of 516 older adults that was stratified by age and gender ($M_{\text{age}} = 84.92$ years, $SD = 8.66$, range: 70–103; 50% women; Baltes & Mayer, 1999) roughly every 2 years. We use Baseline data from the full sample ($N = 516$).

Measures

Subjective well-being

We examined three affective indices of well-being and one cognitive-evaluative index of well-being (see Smith, Fleeson, Geiselman, Settersten, & Kunzmann, 1999). Positive affect and negative affect were assessed using 10 items from the Positive Affect and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Participants indicated how frequently over the past year they had experienced five positive feelings (e.g., happy, at ease, cheerful) and five negative feelings (e.g., distressed, afraid, upset) using a 5-point Likert-scale (1 = *not at all*, 5 = *very often*; positive affect: $\alpha = .78$; negative affect: $\alpha = .81$). Depressive symptoms were assessed with 20 items from the Center for Epidemiological Studies-Depression scale (Radloff, 1977). Participants indicated whether they had experienced a spectrum of affective, somatic, and interpersonal symptoms of depression over the past week on a scale from 1 (*rarely/none of the time*) to 3 (*most/all of the time*; $\alpha = .78$). Cognitive-evaluative well-being was measured using the overall mean for the 15-item version of the Philadelphia Geriatric Morale Scale (Lawton, 1975) that asked participants to rate six non-agitation items, five aging satisfaction items, and four life satisfaction items on a 1 = *does not apply to me at all* to 5 = *applies very well to me* scale ($\alpha = .85$).

Perceptions about future time

Subjective nearness to death was measured by asking participants to indicate their agreement to the following statement: “I have the feeling that my time is running out.” (1 = *does not apply to me at all* to 5 = *applies very well to me*). Responses roughly followed a normal distribution across categories: 1 (*does not apply to me at all*): $n = 94$; 2: $n = 133$; 3: $n = 100$; 4: $n = 137$; and 5 (*applies very well to me*): $n = 51$; ($M = 2.84$, $SD = 1.28$). This subjective nearness to death item is similar to an item from the Future Time Perspective Scale (“I have the sense that time is running out.”; Carstensen & Lang, 1996).

Individual resources

Cognitive functioning was operationalized as episodic memory, using a unit-weighted composite of the Paired Associates and Memory for Text tests (see Lindenberger

et al., 1993). Functional limitations reflect a unit-weighted composite of self-reported limitations in Instrumental and Basic Activities of Daily Living (Lawton & Brody, 1969) and subjective physical health was rated on a 5-point Likert-scale (1 = *poor* to 5 = *very good*).

Covariates

Additional factors included age, gender, years of education, marital status, and social participation, which were measured using a unit-weighted composite across different social activities (see Lövdén, Ghisletta, & Lindenberger, 2005). All covariates (and predictors) were centered and/or effect coded.

Results and Discussion

Descriptive statistics and intercorrelations are presented in [Supplementary Table 1](#). Memory and health had sizeable associations with subjective well-being indices (e.g., r between memory and positive affect = .28; r between functional limitations and evaluative well-being = -.30), suggesting that, in this very old sample, participants with more cognitive and health-related resources also tended to report higher subjective well-being.

Perceptions About Time Left and Subjective Well-Being

We used regression analyses to examine whether the future time perception measure that was available at Baseline (subjective nearness to death) was related to subjective well-being and whether this association was moderated by individual resources (episodic memory, self-rated health, and functional limitations), controlling for covariates ([Table 1](#)). Subjective nearness to death was associated with lower levels across all four affective and cognitive-evaluative well-being indices (left columns of [Table 1](#); (positive affect: $\beta = -.15$; negative affect: $\beta = .27$; depressive symptoms: $\beta = .24$; evaluative well-being: $\beta = -.35$; all p values $<.05$) with some quadratic curvature in depressive symptoms. [Figure 1](#) illustrates that older adults who felt relatively far away from death as compared with those who felt nearer to death reported lower subjective well-being across the board. Subjective nearness to death explained between 2% (positive affect) and 12% (evaluative well-being) of the between-person variance in subjective well-being.

As expected, cognitive functioning and health were positively associated with several subjective well-being indices (right columns of [Table 1](#)). Subjective health and functional limitations moderated the subjective nearness to death–depressive symptom association. For example, [Figure 2](#) illustrates that older adults with few functional limitations who perceived their future time as limited reported fewer depressive symptoms than older adults with many functional limitations who perceived their future time as limited. Furthermore, episodic memory moderated associations between subjective nearness to death and positive

affect as well as depressive symptoms. Specifically, participants with high memory scores who perceived their future time as limited reported fewer depressive symptoms than participants with low memory scores who perceived their future time as limited. These findings dovetail with central propositions from the model of SAVI that points to the key role of individual resources in moderating future time perception–emotional well-being associations in old age (Charles, 2010). Individual resources and covariates explained subjective nearness to death-related differences in positive affect. However, subjective nearness to death continued to be significantly associated with cognitive-evaluative well-being, negative affect, and depressive symptoms when taking into account main effects and interaction effects of individual resources and covariates.

These findings provide preliminary evidence for a meaningful, albeit negative, relation between subjective nearness to death and subjective well-being in old age. However, they have to be qualified by several limitations, including that the data were obtained from a metropolitan German sample. In Study 2, we therefore corroborate and extend the findings in a much larger and diverse U.S. sample.

Given that the two operational definitions of perceptions about future time differ between the BASE and the HRS, we explored the conceptual overlap between these two operational definitions before moving into the HRS analyses. Specifically, we examined correlations between subjective nearness to death ratings and responses to an item assessing future life expectancy (“If you were to think about what age you could reach, what would you say? What do you think?”; adapted from Kastenbaum, Derbin, Sabatini, & Artt, 1972) that was available for the 81 individuals who participated in the 5th wave of the BASE. Responses to the two items were significantly correlated, in the expected direction, $r = -.47$, $n = 81$; $p < .01$ indicating that, even in this highly select sample of long-term BASE participants, individuals with a lower subjective nearness to death also rated their subjective life expectancy as more expanded. This finding provides some support for using subjective future life expectancy ratings to operationally define future time perceptions in Study 2. However, it must be kept in mind that, although responses to these two items are correlated in a relatively homogenous sample, they each also capture unique portions of the larger conceptual space.

Study 2: Corroborating and Extending Future Time Perception–Subjective Well-Being Links in a National U.S. Sample

Method

Participants and Procedure

The HRS is a nationally representative longitudinal study of adults in the contiguous United States aged 50 and older who are interviewed biennially (Herzog & Rodgers, 1988). In 2006, a random half of the HRS sample was asked to

Table 1. The Berlin Aging Study: Standardized Estimates From Regression Analyses Predicting Well-Being From Future Time Perceptions, With and Without the Covariates

| Predictor | Positive affect | | Negative affect | | Depressive symptoms | | Evaluative well-being | |
|-----------------------------------------------------------|-----------------|--------|-----------------|--------|---------------------|--------|-----------------------|--------|
| | M1 | M2 | M1 | M2 | M1 | M2 | M1 | M2 |
| Focus variable | | | | | | | | |
| Subjective nearness to death | -.15** | -.04 | .27** | .25** | .24** | .11** | -.35** | -.23** |
| Subjective nearness to death ² | -.02 | | -.00 | | .16** | .13** | -.02 | |
| Basic individual resources | | | | | | | | |
| Functional limitations | | -.12 | | -.05 | | -.36** | | .06 |
| Self-rated physical health | | .14** | | -.29** | | -.02 | | .44** |
| Memory | | .42** | | .17 | | .20 | | .02 |
| Covariates | | | | | | | | |
| Age | | -.02 | | -.12* | | .00 | | .11 |
| Men | | .03 | | .12* | | .06 | | -.08 |
| Education | | .04 | | -.03 | | .05 | | -.03 |
| Being married | | .06 | | .06 | | -.03 | | .07 |
| Social participation | | .21** | | .06 | | -.03 | | .02 |
| Subjective nearness to death × functional limitations | | .11 | | -.01 | | .23* | | -.05 |
| Subjective nearness to death × self-rated physical health | | .03 | | .02 | | -.29** | | .08 |
| Subjective nearness to death × memory | | -.31** | | -.14 | | -.24** | | .06 |
| ΔR ² | | | | .12 | | .14 | | .25 |
| R ² | .02 | | .07 | .19 | .08 | .22 | .12 | .37 |

Notes: $N = 516$. Model 1 (M1) = zero-order analyses. Model 2 (M2) = individual resources and covariates included. Predictors were effect coded/centered. We further tested all interaction effects between subjective nearness to death and the covariates given in the table. With the exception of a subjective nearness to death × memory interaction on positive affect, none of these interactions emerged as significant.

* $p < .05$. ** $p < .01$.

complete a psychosocial questionnaire. Completion rate was 90% (Clarke, Fisher, House, Smith, & Weir, 2008). We use data from all HRS participants who were aged 70 and older with data on the relevant measures from the regular battery and the psychosocial questionnaire (future life expectancies, subjective well-being, and moderators; $N = 2,596$; $M_{\text{age}} = 76.84$ years; $SD = 5.14$; range: 70–90 years; 57% women; 90% White/Caucasian; 9% Black/African American; 1% Other).

Compared with the remainder of the 70+-year-old participants in the parent 2006 HRS sample from which they were drawn ($N = 5,320$), our subsample was somewhat younger, 76.84 versus 79.10 years, $F(1, 7,914) = 215.21$; had completed more years of education, 12.46 versus 11.56, $F(1, 7,914) = 122.93$; reported slightly higher chances of surviving the next 11–15 years, 43.14 versus 40.83, $F(1, 6,106) = 7.47$; reported higher subjective well-being [e.g., positive affect: 3.62 vs. 3.47, $F(1, 3,188) = 25.64$] and more resources [e.g., memory: 8.82 vs. 7.88, $F(1, 7,060) = 120.60$, all p values $< .01$] but did not differ with respect to gender [$\chi^2(1, N = 7,916) = 3.43$, $p > .05$]. With effect sizes of the positive selection bias not exceeding 0.35 SD units for any of the variables examined (see Lindenberger, Singer, & Baltes, 2002), the analysis sample remains roughly comparable with the study population.

Measures

Subjective well-being

We use four indices of subjective well-being, three affective measures (positive affect, negative affect, and depressive symptoms) and one cognitive-evaluative measure (life satisfaction; see Clarke et al., 2008). Positive affect was measured using six items (Mroczek & Kolarz, 1998). Participants indicated how frequently they had experienced each of six positive states (e.g., cheerful, in good spirits, extremely happy; $\alpha = .91$) over the previous 30 days, using a 5-point Likert-scale (1 = *all of the time*, 5 = *none of the time*). Negative affect was measured in the same manner using six items (e.g., hopeless, restless or fidgety; $\alpha = .86$). All items were recoded so that higher scores correspond to higher levels of positive or negative affect. Number of depressive symptoms was measured as the sum of eight items from the CES-D scale (Radloff, 1977). Participants were asked whether they had (= 1) or had not (= 0) experienced the following symptoms “much of the time during the past week”: feeling depressed, everything was an effort, restless sleep, was (not) happy, felt lonely, (did not) enjoy life, felt sad, and could not get going ($\alpha = .77$). Life satisfaction was measured using the 5-item Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) using a

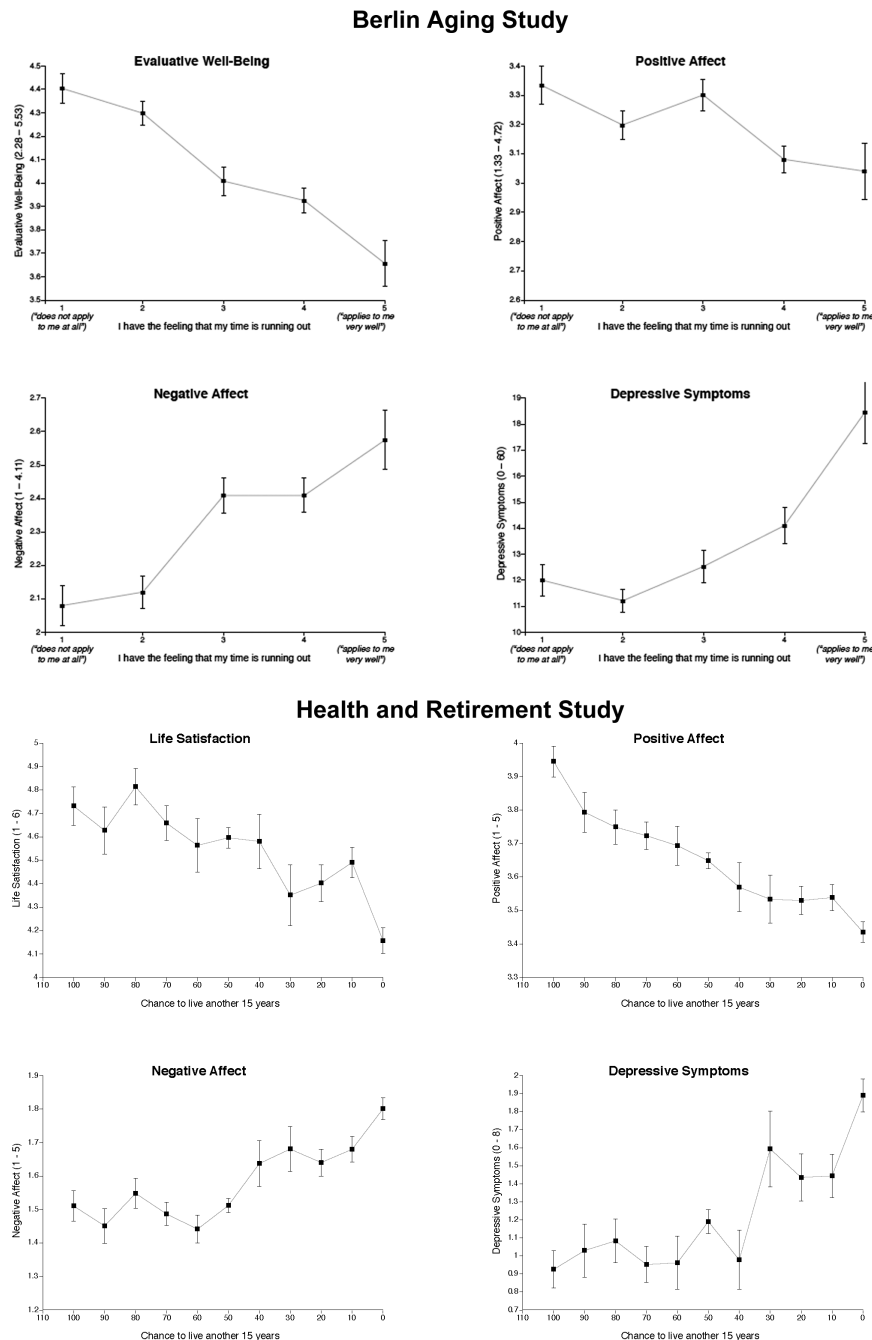


Figure 1. Differences in well-being in relation to future time perceptions (indexed by answers to a question about subjective nearness to death for the Berlin Aging Study; indexed by answers to a question about perceptions of time left in life in 70+-year-old participants from for the U.S. Health and Retirement Study). As compared with older adults with a more open-ended future time perceptions, those who perceived their future time as limited reported lower well-being across the different facets examined.

6-point Likert-scale (1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .88$).

Perceptions of time left

Participants rated their chances of surviving the next 11–15 years. The item was age tailored, asking about “the percent chance that you will live to be [X] or older” with “X or older” being “85 or older” for participants aged 70–74 years, “90 or older” for those aged 75–79 years, “95

or older” for those aged 80–84 years, or “100 or older” for those aged 85–89 years (see Siegel, Bradley, & Kasl, 2003). Ratings were on a 0 (absolutely no chance) to 100 (absolutely certain) scale.

Individual resources

Subjective health was assessed using a single item: “Would you say your health is excellent, very good, good, fair, or poor?” Responses were reverse coded so that higher scores

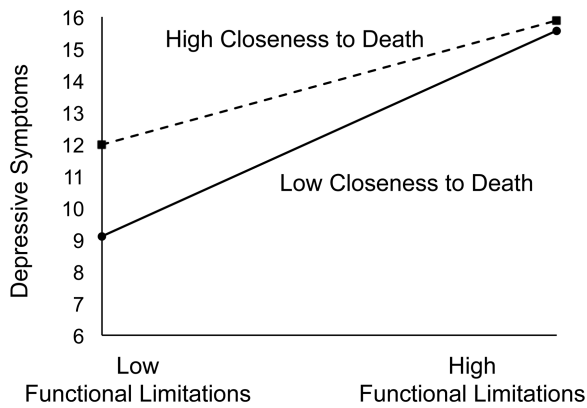


Figure 2. Based on data from the Berlin Aging Study, the figure shows that the differences in well-being (as indexed by depressive symptoms) between those who perceive their time as limited versus not (as indexed by subjective nearness to death) are particularly pronounced when functional limitations are low. For illustration purposes, groups were based on median splits.

indicated better subjective health. Functional limitations covered 10 (instrumental) activities of daily living ($\alpha = .75$; Fonda & Herzog, 2004). Episodic memory comprised the sum of tests of immediate and delayed free recall ($\alpha = .83$; Gerstorf, Hoppmann, Kadlec, & McArdle, 2009).

Covariates

Similar to Study 1, we covaried for sociodemographic (age, gender, and education), social participation as measured by participants' responses to a single item ("Not including attendance at religious services, how often do you attend meetings or programs of groups, clubs, or organizations that you belong to; 1 [*more than once a week*] to 6 [*never*]; Parslow, Jorm, Christensen, & Mackinnon, 2006) and marital status. For the regression analyses, all predictors were grand mean centered (binary variables effect coded).

Results and Discussion

Descriptive statistics and intercorrelations are presented in [Supplementary Table 2](#). Of note, the HRS single item ("the percent chance that you will live to be [X] or older") that was used to capture perceptions of future time showed a pattern of associations with sociodemographic and health indicators that closely resembles what is reported in the literature using other measures of future time perceptions (for details, see table note in [Supplementary Table 2](#)).

Perceptions About Future Time and Subjective Well-Being

Regression-based results ([Table 2](#), left columns) show that subjective future life expectancy was positively associated with subjective well-being, accounting for 3% to 4% of the between-person variance. Specifically, a more extended

future time perspective was associated with higher life satisfaction ($\beta = .16$), more positive affect ($\beta = .21$), lower negative affect ($\beta = -.17$), and fewer depressive symptoms ($\beta = -.17$), including some quadratic curvature in the relation to life satisfaction ($\beta = -.05$), negative affect ($\beta = .08$), and depressive symptoms ($\beta = .06$; [Figure 1](#)).

We then examined whether subjective health and episodic memory moderated the association between subjective life expectancy and subjective well-being ([Table 2](#), right columns). As expected, better health and to some extent episodic memory were associated with higher subjective well-being. Furthermore, functional limitations moderated the association between future life expectancy and negative affect in such a way that participants with few functional limitations did not show the negative association between subjective life expectancy negative affect that older adults with many functional limitations did ($\beta = -.04$). Of note, individual differences in resources and covariates reduced but did not eliminate associations between subjective life expectancy and subjective well-being. Taken together, HRS analyses replicate and extend BASE findings suggesting that extended future time perceptions are associated with higher subjective well-being and that health moderates some of these associations.

Overall Discussion

Our objective was to examine how perceptions about future time and age are associated with subjective well-being in older adulthood and whether the respective associations are moderated by individual resources. Examining associations between two different operational definitions of future time perceptions and subjective well-being, we showed across two aging studies from Germany (BASE) and the United States (HRS) that older adults with extended future time perceptions reported higher subjective well-being (including affective and cognitive-evaluative facets) as compared with older adults with more limited future time perceptions. This association was less pronounced but did not change direction and statistical significance when considering the role of cognitive and health-related resources and other covariates. Particularly striking from our perspective is that the pattern of results obtained in two independent samples was largely consistent despite differences in samples (e.g., BASE: German sample; $M_{\text{age}} = 85$ years; HRS: U.S. sample; $M_{\text{age}} = 77$ years), operational definitions of perceptions about future time (BASE: subjective nearness to death; HRS: subjective future life expectancy), and in outcome variables (e.g., frequency of experiencing positive affect during the past year [BASE] or over the previous 30 days [HRS]).

Perceptions About Future Time and Subjective Well-Being

Perceptions about future time represent a multidimensional construct that has been studied in many different ways, including the use of proxies ([Carstensen et al., 2011](#); [Carstensen](#)

Table 2. The Health and Retirement Study: Standardized Estimates From Regression Analyses Predicting Well-Being From Future Time Perceptions, With and Without the Covariates

| Predictor | Positive affect | | Negative affect | | Depressive symptoms | | Life satisfaction | |
|------------------------------------------------------------|-----------------|--------|-----------------|--------|---------------------|--------|-------------------|--------|
| | M1 | M2 | M1 | M2 | M1 | M2 | M1 | M2 |
| Variables of interest | | | | | | | | |
| Subjective future life expectancy | .21** | .11** | -.17** | -.06** | -.17** | -.06** | .16** | .09** |
| Subjective future life expectancy ² | .02 | .08** | .08** | .02 | .06** | -.00 | -.05* | -.01 |
| Basic individual resources | | | | | | | | |
| Functional limitations | | -.15** | | .21** | | .25** | | -.16** |
| Self-rated health | | .24** | | -.17** | | -.19** | | .19** |
| Memory | | -.00 | | -.08** | | -.03 | | -.03 |
| Covariates | | | | | | | | |
| Age | | .02 | | -.04 | | -.06** | | .10** |
| Men | | -.02 | | .01 | | .06** | | .03 |
| Education | | -.03 | | -.13** | | -.07** | | .00 |
| Being married | | .05 | | -.01 | | -.12** | | .15** |
| Social participation | | .08** | | .00 | | -.01 | | .06** |
| Subjective future life expectancy × functional limitations | | .00 | | -.04* | | -.03 | | -.02 |
| Subjective future life expectancy × self-rated health | | -.02 | | -.02 | | .01 | | -.03 |
| Subjective future life expectancy × memory | | -.02 | | .00 | | .02 | | -.00 |
| ΔR ² | | .12 | | .17 | | .20 | | .11 |
| R ² | .04 | .16 | .04 | .21 | .03 | .23 | .03 | .14 |

Notes: N = 2,596. Model 1 (M1) = zero-order analyses. Model 2 (M2) = covariates included. Predictors were effect coded/centered. We also tested the above models in the full Health and Retirement Study sample that completed the 2006 psychosocial battery. Results are very similar. However, the subjective future life expectancy × subjective health interactions on depressive symptoms and life satisfaction were also significant (*p < .05, **p < .01) in this larger sample.

& Fredrickson, 1998; Fung et al., 1999), the Future Time Perspective Scale (Lang & Carstensen, 2002), perceptions of time left in life (Mirowsky, 1997), or multifactorial inventories (Zimbardo & Boyd, 1999) with the Future Time Perspective Scale being particularly well suited to capture age-related differences in the motivational mechanisms that are thought to contribute to high emotional well-being in old age. Recent evidence suggests that the Future Time Perspective Scale may be composed of more than one factor with the underlying subdimensions following different developmental trajectories (Cate & John, 2007). The BASE used an operational definition of future time perceptions that asked older adults to rate the extent to which they perceived their time as running out. This specific item has been linked to one particular scale factor (focus on limitations) and therefore does not fully describe the richness of the overall construct (neglecting a focus on opportunities; Cate & John, 2007). We further explored the conceptual overlap between the two operational definitions of future time perceptions that were used in the BASE and the HRS. Specifically, exploratory analyses using the 5th wave of the BASE provide initial evidence that the subjective nearness to death and the subjective future life expectancy ratings tap into a similar, but not identical, construct space. Taken together, our findings only address specific subcomponents of a much broader theoretical construct.

Corroborating earlier work (Fung, Lai, & Ng, 2001; Kotter-Gruehn, Gruehn, & Smith, 2010; Mirowsky, 1999),

findings across studies show that age and subjective future life expectancy are only moderately correlated (BASE: $r = .34$ for subjective nearness to death; HRS: $r = -.29$ for subjective life expectancy). This is an important finding in and of itself because it highlights that chronological age may not be a good proxy for future time perceptions, at least when targeting older adults (rather than comparing young and older adults).

Our BASE and HRS findings linking subjective nearness to death and subjective life expectancy with several different facets of subjective well-being add to a growing body of research showing that older adults with extended rather than more limited future life expectancies report, on average, higher levels of subjective well-being (Allemand et al., 2012; Coudin & Lima, 2011; Demiray & Bluck, 2014; Kozik et al., 2015; Yeung et al., 2007) which together paint a less favorable picture of older adults' subjective well-being.

These findings also highlight the importance of considering individual resources (Charles, 2010; Isaacowitz & Blanchard-Fields, 2012). Specifically, according to the model of SAVI (Charles, 2010), older adults typically use a broad spectrum of different strategies and skills to optimize emotional well-being. When older adults experience severe resource losses, for example in the health domain, that render their strategies and skills ineffective, they become vulnerable to experiencing low emotional well-being (Charles, 2010).

Furthermore, emotional experiences and emotion regulation draw on cognitive resources (Isaacowitz & Blanchard-Fields, 2012). Hence, health and cognitive resource limitations may at least in part explain why our findings failed to support the expected positive association between limited future time perceptions and emotional well-being.

Importantly, we note four alternative explanations for the observed negative associations between future time perceptions and subjective well-being. First, the HRS' measure of subjective life expectancy asked about the perceived likelihood of survival over a relatively long period of time (11–15 years or more). This timeframe may in fact be too long to invoke the motivational shifts predicted by SST. It is also possible that it takes a contrast to trigger motivational shifts. One could test such notions using paradigms that specify different time horizons for a specific social ending, for example by prompting healthy young adults who by virtue of their age have relatively open future time perceptions to imagine a move across the country that takes place in 1 month, 1 year, or 5 years (Fredrickson & Carstensen, 1990). Such designs would allow empirical tests of the notion that changes in goal hierarchies as triggered by social endings may depend on the time scale on which they occur.

Second, previous research using data from prior waves of the HRS indicate that limited subjective life expectancy predicts mortality hazards (Siegel et al., 2003). It is conceivable that some study participants may have been subject to mortality-related changes in subjective well-being (see Gerstorf & Ram, 2013). We note, however, that 70-year-olds in the United States still have an average remaining life expectancy of 15 years (Arias, 2010). Furthermore, health-resources were specifically targeted and did moderate future time perception–well-being associations. We also note that motivational shifts have also been reported in chronically ill samples (Carstensen & Fredrickson, 1998).

Third, SST maintains that limited future time perceptions lead to a prioritization of socioemotional goals and preferences for spending time with familiar social partners, which together optimize emotional well-being (Carstensen et al., 2006, 2011). It thus makes sense that previous research in support of SST has primarily targeted social goals and preferences as central outcomes (Fredrickson & Carstensen, 1990; Fung et al., 1999; Lang & Carstensen, 2002) whereas—to our knowledge—only one study addressed future time horizon—emotional well-being links directly (using age as a proxy; Carstensen, Pasupathi, Mayr, & Nesselrode, 2000; Carstensen et al., 2011). Research pointing to associations between expanded future time perceptions and high well-being, in contrast, focuses on other aspects of SST specifically trying to incorporate information about future time perceptions using the future time perspective scale (Allemand et al., 2012; Demiray & Bluck, 2014; Kozik et al., 2015; Lang & Carstensen, 2002; Yeung et al., 2007). The respective findings do not have to be seen as contradicting one another. In fact, it is entirely possible that lower subjective well-being among individuals

with restricted future time perceptions has nothing to do with them not prioritizing emotionally meaningful social goals but that they instead reflect the emotional costs that are associated with setting such priorities at a point in life where their realization may not always be possible.

Finally, and extending the previous point, health and cognitive resources are known to contribute to older adults' abilities to enhance emotional well-being (Charles, 2010). We address this possibility in the next section.

The Role of Individual Resources

Health and cognitive resources decline with aging, making it increasingly difficult to realize valued goals and activities that optimize subjective well-being (Charles, 2010). Findings from the BASE and the HRS converge in showing that health-related resources (self-rated health; functional limitations) were positively associated with subjective well-being across different indices. In addition, health-related resources also moderated the association between future time perceptions and subjective well-being. For example, findings from the BASE demonstrate that older adults high in subjective nearness to death who reported few functional limitations had fewer depressive symptoms than older adults high in subjective nearness to death with many functional limitations.

Furthermore, we found that memory moderated the association between subjective nearness to death and positive affect as well as depressive symptoms in the BASE sample but not in the HRS sample. These findings underscore that an optimization of emotional well-being depends on the availability of cognitive resources, particularly so in very old age (Charles, 2010).

Finally, several covariates were also related to subjective well-being in old age. For example, being married and socially integrated were important predictors of subjective well-being in the BASE and HRS samples (Kunzmann et al., 2000; Lucas, 2007). The association between social participation and well-being varied in size but not in direction across studies, which may be due to measurement differences. Importantly, individual differences in resources and covariates did not fully explain the association between future time perceptions and subjective well-being. In contrast to subjective life expectancy, chronological age was less strongly related to subjective well-being indicators at the zero-order level in both (see [Supplementary Tables 1 and 2](#)). However, once subjective life expectancy, resources, and covariates were taken into account in the HRS and in the BASE there was a positive association between chronological age and subjective well-being (see also Kunzmann et al., 2000). This finding may indicate that, in a resource-equivalent world, factors associated with chronological age (e.g., past experiences in successfully regulating negative emotions) may contribute to higher subjective well-being in old age (Blanchard-Fields, 2007).

Strengths and Limitations

Our findings are unique in that they directly examine the emotional and cognitive-evaluative correlates of future time

perceptions and age across two independent aging studies in Germany and the United States. However, the following limitations should be considered when interpreting the results. First, although both studies allowed us to examine future time perception–subjective well-being links, we were not able to directly address the mechanisms (e.g., prioritization of socioemotional goals) through which future time perceptions influence subjective well-being.

Second, there are many different ways to operationally define future time perceptions (Carstensen & Lang, 1996; Cate & John, 2007; Fung et al., 2001; Kotter-Gruehn et al., 2010; Mirowsky, 1997; Zimbardo & Boyd, 1999). We explored associations between one specific item of the Future Time Perspective Scale and ratings of subjective future life expectancy. We caution against an overinterpretation of our findings because we only examined a very limited aspect of the much broader construct. Furthermore, we draw attention to the possibility that future time perceptions may be shaped by stable trait-like characteristics. For example, correlations between the two indicators of future time perceptions and neuroticism and hopelessness were in the low-to-medium range (r subjective nearness to death–neuroticism in the BASE = .37; r subjective future life expectancy–hopelessness in the HRS = -.20) pointing to the importance of targeting a variety of individual difference factors in future research.

Third, another concern about the future time perception measure in the HRS may be that living another 11–15 years means something different for a 75-year-old than for a 90-year-old. To examine this possibility, we compared the average subjective well-being of participants who were 1 year apart in age but who were presented with different time horizons. These follow-up analyses revealed that subjective well-being differences were negligible [e.g., subjective well-being for 69-year-olds being asked to rate the percent chance that they will live to be 80 years or older: $n = 238$, $M = 4.54$, $SD = 1.17$ vs. subjective well-being for 70-year-olds rating their percent chance to live to age 85 years or older: $n = 228$, $M = 4.56$, $SD = 1.12$, $F(1, 464) = 0.03$, $p > .10$]. We also note that the future time perception items in the BASE did not specify a certain number of years. It is therefore conceivable that a 75-year-old BASE participant would consider living another 15 years as extensive, whereas a 90-year-old BASE participant may think of one or two future years as extensive.

Finally, future time accounted for a relatively small portion of the variance in subjective well-being (2%–12%). This inherently means that other variables with well-established links to subjective well-being need to be taken into account as well (Diener et al., 1999). For example, future research may go beyond the presented evidence on interactions between health and cognitive resources and future time perceptions on subjective well-being to also consider the use of specific emotion-regulation strategies (Charles & Luong, 2013).

Conclusions

Findings from two aging studies in Germany and the United States indicate that perceiving one's future as

extended rather than limited was associated with higher subjective well-being, even after taking into account age, health and cognitive resources, and a variety of covariates. Health and cognitive resources partially moderated these associations. Future research needs to substantiate these findings by unraveling the underlying mechanisms. For example, there might be older adults with limited future time perceptions who prioritize socioemotional goals but who cannot implement them due to resource constraints. Hence, low subjective well-being may have nothing to do with an absence of socioemotional goals but instead reflect difficulties with goal implementation. In addition, it would be intriguing to examine how accurate older adults are in assessing their remaining lifetime (compared with post hoc objective assessments of time left) and what the shared and unique contributions of subjective and objective time left is for (changes in) subjective well-being. Such questions require longitudinal data from relatively large samples. Furthermore, future research needs to examine other factors, for example relating to social resources and losses, that affect older adults' ability to optimize well-being (Huxhold, Miche, & Schüz, 2014; Isaacowitz & Blanchard-Fields, 2012; Pitzer & Bergeman, 2014). In closing, our findings extend the literature by documenting that older adults differ greatly in their future time perceptions and that extended future time perceptions are positively associated with subjective well-being in old age.

Supplementary material

Supplementary material can be found at: <http://psych.socgerontology.oxfordjournals.org/>

Funding

This article reports data from the Berlin Aging Study (BASE; www.base-berlin.mpg.de). The BASE was initiated by the late Paul B. Baltes, in collaboration with Hanfried Helmchen, psychiatry; Elisabeth Steinhagen-Thiessen, internal medicine and geriatrics; and Karl Ulrich Mayer, sociology. Financial support came from the Max Planck Society; the Free University of Berlin; the German Federal Ministry for Research and Technology (1989–1991, 13 TA 011 + 13 TA 011/A); the German Federal Ministry for Family, Senior Citizens, Women, and Youth (1992–1998, 314-1722-102/9 + 314-1722-102/9a); and the Berlin-Brandenburg Academy of Sciences' Research Group on Aging and Societal Development (1994–1999). The HRS study was supported by a cooperative agreement (Grant No. UO1 AG09740) between the National Institute on Aging (NIA) and the University of Michigan.

Acknowledgments

C. Hoppmann gratefully acknowledges the support of the Michael Smith Foundation for Health Research and the Canada Research Chairs program. N. Ram and D. Gerstorff gratefully acknowledge the support provided by the National Institute on Health (RC1 AG035645, R21 AG032379, R24 HD041025, and UL TR000127). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

References

- Allemand, M., Hill, P. L., Ghaemmaghami, P., & Martin, M. (2012). Forgiveness and subjective well-being in adulthood: The moderating role of future time perspective. *Journal of Research in Personality, 46*, 32–39. doi:10.1016/j.jrp.2011.11.004
- Arias, E. (2010). United States life tables. *National Vital Statistics Reports* (Vol. 58, No. 21, pp. 1–40). Hyattsville, MD: National Center for Health Statistics.
- Baltes, P. B., & Mayer, K. U. (1999). *The Berlin Aging Study: Aging from 70 to 100*. New York, NY: Cambridge University Press.
- Benyamini, Y. (2011). Why does self-rated health predict mortality? An update on current knowledge and a research agenda for psychologists. *Psychology & Health, 26*, 1407–1413. doi:10.1080/08870446.2011.621703
- Blanchard-Fields, F. (2007). Everyday problem solving and emotion: An adult developmental perspective. *Current Directions in Psychological Science, 16*, 26–31. doi:10.1111/j.1467-8721.2007.00469.x
- Carstensen, L. L., & Fredrickson, B. L. (1998). Influence of HIV status and age on cognitive representations of others. *Health Psychology, 17*, 494–503. doi:10.1037//0278-6133.17.6.494
- Carstensen, L. L., & Lang, F. R. (1996). *Future Orientation Scale*. Unpublished manuscript. Stanford University, Stanford, CA.
- Carstensen, L. L., Mikels, J. A., & Mather, M. (2006). Aging and the intersection of cognition, motivation and emotion. In J. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 343–362). San Diego, CA: Academic Press. doi:10.1016/b978-012101264-9/50018-5
- Carstensen, L. L., Pasupathi, M., Mayr, U., & Nesselrode, J. R. (2000). Emotional experience in everyday life across the adult life span. *Journal of Personality and Social Psychology, 79*, 644–655. doi:10.1037/0022-3514.79.4.644
- Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershey, H., Samanez-Larkin, G. R., ... Nesselrode, J. R. (2011). Emotional experience improves with age: Evidence based on over 10 years of experience sampling. *Psychology & Aging, 26*, 21–33. doi:10.1037/a0021285
- Cate, R. A., & John, O. P. (2007). Testing models of the structure and development of future time perspective: Maintaining a focus on opportunities in middle age. *Psychology & Aging, 22*, 186–201. doi:10.1037/0882-7974.22.1.186
- Charles, S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin, 136*, 1068–1091. doi:10.1037/a0021232
- Charles, S. T., & Luong, G. (2013). Emotional experience across adulthood: The theoretical model of Strength and Vulnerability Integration. *Current Directions in Psychological Science, 22*, 443–448. doi:10.1177/0963721413497013
- Charles, S. T., Reynolds, C. A., & Gatz, M. (2001). Age-related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology, 80*, 136–151. doi:10.1037//0022-3514.80.1.136
- Clarke, P., Fisher, G., House, J., Smith, J., & Weir, D. (2008). *Guide to content of the HRS psychosocial leave-behind participant lifestyle questionnaires: 2004 & 2006*. Documentation Report v2.0. Ann Arbor, MI: University of Michigan. doi:10.7826/isr-um.06.585031.001.05.0016.2008
- Coudin, G., & Lima, M. L. (2011). Being well as time goes by: Future time perspective and well-being. *International Journal of Psychology and Psychological Therapy, 11*, 219–232.
- Demiray, B., & Bluck, S. (2014). Time since birth and time left to live: Opposing forces in constructing psychological well-being. *Ageing and Society, 34*, 1193–1218. doi:10.1017/S0144686X13000032
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75.
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*, 276–302. doi:10.1037/0033-2909.125.2.276
- Fonda, S., & Herzog, A. R. (2004). HRS/AHEAD documentation report: Documentation of physical functioning measured in the Health and Retirement Study and the asset and health dynamics among the oldest old study. Retrieved from <http://hrsonline.isr.umich.edu/sitedocs/userg/dr-008.pdf>.
- Fredrickson, B. L., & Carstensen, L. L. (1990). Choosing social partners: How old age and anticipated endings make people more selective. *Psychology and Aging, 5*, 335–347. doi:10.1037//0882-7974.5.3.335
- Fung, H. H., Carstensen, L. L., & Lutz, A. M. (1999). Influence of time on social preferences: Implications for life-span development. *Psychology and Aging, 14*, 595–604. doi:10.1037//0882-7974.14.4.595
- Fung, H. H., Lai, P., & Ng, R. (2001). Age differences in social preferences among Taiwanese and Mainland Chinese: The role of perceived time. *Psychology and Aging, 16*, 351–356. doi:10.1037//0882-7974.16.2.351
- Gana, K., Bailly, N., Saada, Y., Joulain, M., & Alaphilippe, D. (2013). Does life satisfaction change in old age: Results from an 8-year longitudinal study. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 68*, 540–552. doi:10.1093/geronb/gbs093
- Gerstorff, D., Hoppmann, C., Kadlec, K., & McArdle, J. (2009). Memory and depressive symptoms are dynamically linked among married couples: Longitudinal evidence from the AHEAD Study. *Developmental Psychology, 45*, 1595–1610. doi:10.1037/a0016346
- Gerstorff, D., & Ram, N. (2013). Inquiry into terminal decline: Five objectives for future study. *The Gerontologist, 53*, 727–737. doi:10.1093/geront/gnt046
- Herzog, R. A., & Rodgers, W. L. (1988). Interviewing older adults: Mode comparison using data from a face-to-face survey and a telephone survey. *Public Opinion Quarterly, 52*, 84–89. doi:10.1086/269083
- Hoppmann, C., & Blanchard-Fields, F. (2010). Goals and everyday problem solving: Manipulating goal preferences in young and older adults. *Developmental Psychology, 46*, 1433–1443. doi:10.1037/a0020676
- Huxhold, O., Miche, M., & Schüz, B. (2014). Benefits of having friends in older ages: Differential effects of informal social activities on well-being in middle-aged and older adults. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 69*, 366–375. doi:10.1093/geronb/gbt029
- Isaacowitz, D. M., & Blanchard-Fields, F. (2012). Linking process and outcome in the study of emotion and aging. *Perspectives on Psychological Science, 7*, 3–17. doi:10.1177/1745691611424750
- Kastenbaum, R., Derbin, V., Sabatini, P., & Artt, S. (1972). 'The ages of me' toward personal and interpersonal definitions of functional aging. *Ageing and Human Development, 3*, 197–211. doi:10.2190/tujr-wtxk-866q-8qu7
- Kessler, E. M., & Staudinger, U. M. (2009). Affective experience in adulthood and old age: The role of affective arousal and perceived affect regulation. *Psychology and Aging, 24*, 349–362. doi:10.1037/a0015352

- Kozik, P., Hoppmann, C., & Gerstorff, D. (2015). Future time perspective: Opportunities and limitations are differentially associated with subjective well-being and hair cortisol. *Gerontology, 61*, 166–174. doi: 10.1159/000357671
- Kotter-Gruehn, D., Gruehn, D., & Smith, J. (2010). Predicting one's own death: The relationship between subjective and objective nearness to death in very old age. *European Journal of Ageing, 7*, 293–300. doi:10.1007/s10433-010-0165-1
- Kotter-Gruehn, D., & Smith, J. (2011). When time is running out: Changes in positive future perception and their relationship to changes in well-being in old age. *Psychology and Aging, 26*, 381–387. doi: 10.1037/a0022223
- Kunzmann, U., Little, T. D., & Smith, J. (2000). Is age-related stability of well-being a paradox? Cross-sectional and longitudinal evidence from the Berlin Aging Study. *Psychology and Aging, 15*, 511–526. doi:10.1037/0882-7974.15.3.511
- Lachman, M. E. (2006). Perceived control over aging-related declines. *Current Directions in Psychological Science, 15*, 282–286. doi:10.1111/j.1467-8721.2006.00453.x
- Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging, 17*, 125–139. doi:10.1037/0882-7974.17.1.125
- Lawton, M. P. (1975). The Philadelphia Geriatric Center Morale Scale: A revision. *Journal of Gerontology, 30*, 85–89. doi:10.1093/geronj/30.1.85
- Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *Gerontologist, 9*, 179–186.
- Lindenberger, U., Gilberg, R., Little, T. D., Nuthmann, R., Pötter, U., & Baltes, P. B. (1999). Sample selectivity and generalizability of the results of the Berlin aging study. In P. B. Baltes & K. U. Mayer (Eds.), *The Berlin Aging Study: Aging from 70 to 100* (pp. 56–82). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511586545.003
- Lindenberger, U., Mayr, U., & Kliegl, R. (1993). Speed and intelligence in old age. *Psychology and Aging, 8*, 207–220.
- Lindenberger, U., Singer, T., & Baltes, P. B. (2002). Longitudinal selectivity in aging populations: Separating mortality-associated versus experimental components in the Berlin Aging Study (BASE). *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 57*, 474–482. doi:10.1093/geronb/57.6.p474
- Lövdén, M., Ghisletta, P., & Lindenberger, U. (2005). Social participation attenuates decline in perceptual speed in old and very old age. *Psychology and Aging, 20*, 423–434. doi:10.1037/0882-7974.20.3.423
- Lucas, R. E. (2007). Adaptation and the set-point model of subjective well-being: Does happiness change after major life events? *Current Directions in Psychological Science, 16*, 75–79. doi:10.1111/j.1467-8721.2007.00479.x
- Mirowsky, J. (1997). Age, subjective life expectancy, and sense of control: The horizon hypothesis. *Journal of Gerontology: Social Sciences, 52*, 125–134. doi:10.1093/geronb/52b.3.s125
- Mirowsky, J. (1999). Subjective life expectancy in the US: Correspondence to actuarial estimates by age, sex and race. *Social Science & Medicine (1982), 49*, 967–979. doi:10.1016/s0277-9536(99)00193-8
- Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality and Social Psychology, 75*, 1333–1349. doi:10.1037/0022-3514.75.5.1333
- Parslow, R. A., Jorm, A. F., Christensen, H., & Mackinnon, A. (2006). An instrument to measure engagement and in life: Factor analysis and associations with sociodemographic, health and cognition measures. *Gerontology, 52*, 188–198. doi:10.1159/000091829
- Pitzer, L. M., & Bergeman, C. S. (2014). Synchrony in affect among stressed adults: The Notre Dame widowhood study. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 69*, 29–39. doi:10.1093/geronb/gbt026
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401. doi:10.1177/014662167700100306
- Ram, N., Gerstorff, D., Fauth, E., Zarit, S., & Malmberg, B. (2010). Aging, disablement, and dying: Using time-as-process and time-as-resources metrics to chart late-life change. *Research in Human Development, 7*, 27–44. doi:10.1080/15427600903578151
- Roberts, B. W., Smith, J., Jackson, J. J., & Edmonds, G. (2009). Compensatory conscientiousness and health in older couples. *Psychological Science, 20*, 553–559.
- Siegel, M., Bradley, E. H., & Kasl, S. V. (2003). Self-rated life expectancy as a predictor of mortality: Evidence from the HRS and AHEAD surveys. *Gerontology, 49*, 265–271. doi: 10.1159/000070409
- Smith, J., Fleeson, W., Geiselman, B., Settersten, R. A., Jr., & Kunzmann, U. (1999). Sources of well-being in very old age. In P. B. Baltes & K. U. Mayer (Eds.), *The Berlin Aging Study: aging from 70 to 100* (pp. 450–471). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511586545.018
- Yeung, D. Y., Fung, H. H., & Lang, F. R. (2007). Gender differences in social network characteristics and psychological well-being among Hong Kong Chinese: The role of future time perspective and adherence to renqing. *Aging & Mental Health, 11*, 45–56. doi:10.1080/13607860600735820
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070. doi:10.1037/0022-3514.54.6.1063
- Windsor, T. D., Burns, R. A., & Byles, J. E. (2013). Age, physical functioning, and affect in midlife and older adulthood. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 68*, 395–399. doi: 10.1093/geronb/gbs088
- Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology, 77*, 1271–1288. doi:10.1037/0022-3514.77.6.1271