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BRIEF REPORT

When Time Is Running Out: Changes in Positive Future Perception and Their Relationships to Changes in Well-Being in Old Age

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How optimistically individuals view their future and what they expect from it has often been studied in younger adults. Less attention has been paid to future perceptions in older adults whose future is temporally limited. Using longitudinal data from the Berlin Aging Study, the authors examined whether future orientation and optimism change in older adults (70–104 years) and whether changes in future perception precede changes in well-being. With advancing age participants reported fewer future plans and less optimism. Those changes were related to changes in well-being with partial support for a lead-lag relationship.

Keywords: future perception, future orientation, optimism, Berlin Aging Study, well-being paradox

How humans perceive their future influences their attitudes, motivation (Carstensen, 2006; Gollwitzer, 1996; Nuttin & Lens, 1985) and behavior (Björgvinsson & Wilde, 1996; Shell & Husman, 2001). Many studies have investigated concepts of *future perception* (e.g., future plans, future expectations, future identities) in relatively young individuals (e.g., adolescents and young adults) who have many more years to live and multiple developmental milestones ahead of them (e.g., Nurmi, 1991). In contrast to the comprehensive data on future perception in younger adults, the question of what older adults expect from their future has received less attention (but see Rakowski, 1979).[1] Making plans and having an optimistic outlook for the future may be examples of positive development in advanced age given that older adults' remaining lifetime is particularly limited. The question remains whether positive future perceptions are maintained in very old age in the face of challenges to well-being such as cognitive and health declines and a steadily decreasing remaining lifetime. As a first step toward investigating this question, the present study examines how two indicators of future perception (*future orientation* and *optimism*) change in very old age and how this change is related to changes in well-being.

In age-group comparative approaches, the construct of *future orientation* has been operationalized and investigated in multiple ways (e.g., future planning, thinking about the future, the future self). There is empirical evidence that, compared to younger adults, older adults make fewer plans (Prenda & Lachman, 2001) and think less about the very distant future (Fingerman & Perlmutter, 1995). However, no age differences have been found for the time period (past, present, future) younger and older adults think about most frequently. On average older adults' concepts of their selves in the future, or "possible selves" (Markus & Nurius, 1986) cover fewer domains than the possible selves of younger adults (Cross & Markus, 1991; Hooker, 1992), but the future scenarios that older individuals construct are also subject to change over time (Frazier, Hooker, Johnson, & Kaus, 2000; Smith & Freund, 2002). The present study extends the mainly cross-sectional results on future orientation by examining age-related changes. Following the reported age-group differences for several future orientation constructs, we assume that future orientation declines in very old age.

Being positive and feeling confident when thinking about one's future are expressions of *optimism*. Holding a positive outlook not only influences behavior (e.g., health behavior; Schwarzer, 1994,

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[1] Note that in the present study we do not refer to the concept of future time perspective (i.e., the perception that one's remaining lifetime is limited), which has been studied in older adults (e.g., Lang & Carstensen, 2002), particularly in the context of socioemotional selectivity theory (Carstensen, 2006).

1999) and information processing (e.g., Isaacowitz, 2005b) but also facilitates psychological adjustment when individuals are confronted with difficult situations (Carver & Scheier, 2002). Some studies find that optimists report higher well-being and better adjustment to health problems than people with more negative expectations of their future (Rasmussen, Wrosch, Scheier, & Carver, 2006). So far, studies on age-related differences or changes in optimism are rare, and the existing results are inconsistent. Whereas some studies reveal a positive relationship between age and optimism (Chapin, 2001; Lennings, 2000), others find no association between those variables (Isaacowitz, 2005a). The pattern is even more complex in that the relationship between age and dispositional optimism is moderated by variables such as culture or religion (for an overview, see You, Fung, & Isaacowitz, 2009). Less is known about optimism and its change trajectory in very old age. It can be assumed that optimism plays a crucial facilitating role in older adults' experience of negative age-related changes. However, an accumulation of such changes, which is likely to occur in very old age, might eventually leave little space for optimistic expectations for the future. In the present study, we therefore expect that optimism declines in very old age.

Positive perceptions of the future can be considered expressions of self-regulation. In the context of this study we understand self-regulation as "any effort by the human self to alter any of its own inner states or responses" (Vohs & Baumeister, 2004, p. 2). Planning for the future can be considered a self-regulatory process because it is a way to actively shape one's own development (Bandura, 2006; Smith, 1999). Given that optimism represents individuals' efforts to look at things in a positive light and to expect positive outcomes even in the face of adversity it is also indicative of self-regulation (Carver & Scheier, 2002). The use of such self-regulatory strategies is one explanation for the frequent finding that older adults maintain relatively high levels of well-being despite negative changes in several domains of functioning (e.g., George, 2010; Staudinger, 2000). Specifically, it has been proposed that (a) well-being remains high when older adults are able to psychologically adapt to the negative changes (i.e., losses) they experience (e.g., cognitive and physical decline) and (b) well-being eventually decreases when older adults are no longer able to regulate (i.e., adapt to) those losses. Such limitation of the adaptive capacity is most likely to occur in very old age or close to death (Baltes & Smith, 2003; Gerstorf & Ram, 2009). Those propositions imply that a dynamic relationship exists between well-being and self-regulation, such that changes in self-regulation precede changes in well-being. Even though those propositions are frequently made, to the best of our knowledge, the temporal relationship between self-regulation and well-being has not yet been empirically tested. In the present study, we attempted to fill this gap by using future perception as an indicator of self-regulation and examining whether changes in future perception are related to changes in well-being.

So far, empirical evidence for the relationship between future perception and well-being is scarce and it mainly focuses on the static association as opposed to the time-dynamic approach we used in the present study. Research has shown that making plans and having positive expectations for the future are positively related to well-being in middle-aged and older adults (e.g., Chang & Sanna, 2001; Cheng, Fung, & Chan, 2009; Prenda & Lachman, 2001). However, Cheng and colleagues also demonstrated that persons who had overly positive expectations for the future at the first measurement point had lower levels of well-being 12 months later than those whose future expectations were less positive. Those findings suggest that (a) the relationship between future perception and well-being is complex and (b) the temporal order in which changes in future perception and well-being occur plays a crucial role in understanding that association. Consistent with the propositions in the literature, we assume that changes in future perception are related to changes in well-being.

In sum, in the present study we addressed two research questions. First, we investigated the extent to which future orientation and optimism change in very old age. Previous studies have shown that older adults report relatively high levels of well-being and self-regulation, but those indicators of positive development become more negative with advancing age, particularly after age 85 (e.g., Gerstorf, Ram, Röcke, Lindenberger, & Smith, 2008). A similar pattern was expected for future perception. Given older adults' awareness that their lifetime is steadily decreasing and their experience of negative age-related changes, we hypothesized that their plans and optimistic expectations for the future decline with advancing age. Second, we examined whether changes in future perception are related to changes in well-being. Following the proposition that a decrease in well-being at the end of life can in part be explained by the decreasing use and/or efficacy of self-regulation strategies, we hypothesized that changes in well-being are preceded by changes in future perception.

Method

Participants and Procedure

We used longitudinal data from the Berlin Aging Study (BASE) collected over five measurement occasions (T1, T3, T4, T5, T6) covering a 14-year period. Detailed descriptions of the longitudinal design, samples, and procedures are published elsewhere (Baltes & Mayer, 1999; Smith & Delius, 2010). At the first measurement occasion (baseline/T1), the locally representative longitudinal BASE sample consisted of 516 participants (mean age = 84.92 years, *SD* = 8.66, range: 70 – 103), stratified by age and gender (43 men, 43 women in each of six age brackets: 70–74, 75–79, 80–84, 85–89, 90–94, 95+ years). These 516 persons completed a 14-session intensive assessment protocol.[2] As expected with the advanced age of participants, over time sample attrition was due primarily to mortality. In addition, at each measurement occasion, an average of 10% of participants voluntarily dropped out of the study, primarily because of poor health and proximity to death.

Trained interviewers and medical personnel tested participants in individual face-to-face sessions. The sessions lasted on average 90 minutes and, except for medical assessments, took place at the participant's place of residence. Individuals received 50 Deutsche Mark/25 Euro ($25/$30) for their participation in each session.

Measures

Future perception. Future orientation and optimism were assessed with single items on a 5-point scale ranging from 1 (*does*

[2] Initially 1,908 persons were surveyed and beyond the 516 who completed the 14-session intensive protocol an additional 412 completed a 90-minute single-session protocol and 336 a 30-minute protocol.

Table 1
Descriptive Statistics for the Indicators of Future Perception and Well-Being at Five Measurement Occasions

	Future orientation	Optimism	Well-being
T1 (1990–1993)	2.77 (1.30) $n = 514$	3.51 (1.06) $n = 515$	3.55 (0.65) $n = 514$
T3 (1995–1996)	2.86 (1.23) $n = 206$	3.32 (1.03) $n = 205$	3.52 (0.65) $n = 244$
T4 (1997–1998)	2.89 (1.17) $n = 132$	3.11 (1.08) $n = 132$	3.43 (0.64) $n = 164$
T5 (2000)	2.65 (1.15) $n = 82$	3.29 (0.94) $n = 82$	3.52 (0.70) $n = 88$
T6 (2004–2005)	2.52 (1.05) $n = 46$	3.36 (0.87) $n = 44$	3.56 (0.51) $n = 48$

Note. Means, standard deviations (in brackets), and sample sizes are reported.

not apply to me at all) to 5 (*applies very well to me*). Future orientation was measured with the item "*I have made plans for things I'll be doing a month or a year from now."* and optimism was measured by the item "*I feel confident when I think about my future."* High scores indicate positive future perceptions. The moderate correlation between future orientation and optimism ($r = .26$, $p < .001$) suggested that the constructs could be treated separately. Table 1 provides the number of participants and raw scores for future orientation and optimism at each measurement occasion. Because the raw scores are based on a positively selected sample of participants who remained in the study over time, they show minimal changes. The statistical analyses used in this study estimated average within-person change for all participants. Note that participants who provided the most longitudinal information also represent a subset of the baseline sample who were younger in 1990–1993 and possibly positively selected for longevity.

Time-varying variables. *Age* was treated as a continuous variable (grand-mean centered at 85 years). *Well-being* was assessed with the revised 15-item version of the Philadelphia Geriatric Center Morale Scale (Lawton, 1975) on a 5-point scale ranging from 1 to 5. High scores indicate high levels of well-being (raw scores are presented in Table 1). As a measure of *cognitive functioning*, we used a unit-weighted composite score (second-order factor) of five intellectual abilities (first-order factors) assessed with 14 cognitive tasks (cf. Lindenberger & Baltes, 1997). Subjective health was assessed on a 5-point scale with the item *"How would you rate your present physical health"?* High scores indicate high levels of subjective health.

Time-invariant covariates. In addition to the time-varying variables subjective health and cognitive functioning, we included the baseline (T1) measures of gender, socioeconomic status (SES), and comorbidity as time-invariant covariates to statistically control for their associations with level and age-related change in future perceptions.[3] *Gender* was coded as 0 = men and 1 = women. *SES* was measured using a unit-weighted composite including (a) net household income weighted by the number of household members, (b) occupational prestige, and (c) years of education (Mayer, Maas, & Wagner, 1999). *Comorbidity* was assessed by the number of physician-determined medical diagnoses of moderate to severe chronic physical illnesses, as defined by the International Classification of Diseases-9. Diagnoses at baseline were based on standardized physical exams (Steinhagen-Thiessen & Borchelt, 1999), medical information obtained from the family doctor, medication information, and pathology findings. To reach consensus about diagnoses, BASE physicians and psychiatrists discussed all medical information in case-by-case conferences.

Data Analysis

To examine age- and well-being-related changes in future perception we used multilevel analyses (Raudenbush & Bryk, 2002) as implemented in SAS PROC MIXED (Littell, Miliken, Stoup, & Wolfinger, 1996) with incomplete data being treated as missing at random (Little & Rubin, 2002). For the first research question, chronological age (centered at 85 years) was designated as the time-varying variable (i.e., it represented the passage of time) to test whether future perception changed over age. For the second research question, well-being was designated as the time-varying variable to test whether future perception changed in relation to well-being. Models were parameterized as follows: $fp_{it} = L_i + S_i(time_{it}) + e_{it}$, (1).

Future-perception (future orientation or optimism) for person i at time t, fp_{it}, is a function of an individual-specific intercept parameter, L_i, an individual-specific slope parameter, S_i, that captures change over the selected time dimension (age or well-being), and residual error, e_{it}. To test the specific hypothesis that changes in future perception precede changes in well-being, we conducted lagged analyses in which future perception at measurement point t predicted change in well-being from t to t + 1. Note that for the lagged analyses well-being was the outcome variable and future perception was designated as the time-varying variable.

Results

In our first research question, we investigated whether future perception changes over chronological age. For each future perception indicator, we first tested a fully unconditional model. Those models revealed that 53% of the variation in future orientation and 57% of the variation in optimism was within-person variance, with the remainder being between-person variance. To examine to what extent chronological age explained the within-person variance, we used random-coefficient regression models (Raudenbush & Bryk, 2002) with age as the time-varying variable. That is, both future orientation and optimism were modeled as a function of age. Age explained 24% of the within-person variance in future orientation and 6% of the within-person variance in optimism. Consistent with our expectations, the significant fixed effects estimates for the slope parameter in Table 2 (left columns) indicate that future orien-

[3] Because longitudinal data on clinical diagnoses were available only over two waves, comorbidity was entered as a static (T1) rather than time-varying covariate.

Table 2
Linear Growth Models: Future Orientation and Optimism as a Function of Chronological Age (Left) and in Covariation With Well-Being (Right)

	Age				Well-Being			
	Future orientation		Optimism		Future orientation		Optimism	
Parameter	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*
Fixed effects estimates								
Intercept	2.73***	(0.05)	3.41***	(0.04)	1.53***	(0.24)	1.40***	(0.20)
Slope	−0.064***	(0.01)	−0.021**	(0.01)	0.327***	(0.07)	0.567***	(0.05)
Random effects estimates								
Variance intercept[a]	0.63***	(0.08)	0.50***	(0.06)	1.71	(1.22)	1.49	(0.95)
Variance slope[a]	0.003**	(0.001)	0.00***	(0.00)	0.15	(0.11)	0.06	(0.07)
Covariance intercept, slope[b]	−0.01	(0.01)	0.01***	(0.003)	−0.41	(0.36)	−0.28	(0.26)
Residual variance[c]	0.63***	(0.05)	0.59***	(0.04)	0.80***	(0.05)	0.63***	(0.04)
AIC	2,930		2,729		3,053		2,654	
–2LL	2,918		2,719		3,041		2,642	

Note. Whereas the left columns present results pertaining to age-related changes in future perception, the right columns present results pertaining to the relationship between changes in future perception and changes in well-being.
Unstandardized estimates and standard errors are presented. *AIC* = Akaike Information Criterion; *–2LL* = –2 Log Likelihood, relative model fit statistics. [a] Significant effects for the variance of the intercept (or slope) indicate that participants show interindividual differences in the intercept (or slope). [b] Covariance = interaction between the random intercept and the random slope. [c] Residual variance = portion of the outcome variation that is not explained by the predictors in the model.
** $p < .01$. *** $p < .001$.

tation and optimism showed age-related changes. On average at the age of 85 years, participants reported a future orientation score of 2.73, and this score significantly decreased by 0.064 points per year. The average optimism score at age 85 was 3.41, and this score decreased by 0.021 points per year. We also tested for curvilinear relationships but did not find significant effects for the quadratic or cubic terms of age. The random effects estimates for the intercepts were significant, indicating that individuals differed from each other with respect to their future perception level. The random effect for the slope was only significant for future orientation. This means that participants showed interindividual differences in their age-related change in future orientation but they did not differ in their age-related trajectories for optimism.

In a second set of multilevel analyses age was again used as level 1 predictor but we included cognitive functioning and subjective health as additional time-varying variables and gender, SES, and comorbidity as time-invariant covariates (level 2 predictors). The above reported effects (i.e., changes in future perception) remained robust when controlling for those covariates; future orientation: intercept = 1.70 (SE = 0.29), slope = −0.052 (SE = 0.01), all ps < .001; optimism: intercept = 3.00 (SE = 0.24), slope = −0.017 (SE = 0.01), all ps < .001. The model including the additional time-varying and time-invariant covariates accounted for 28% of the between-person variability in future orientation and 23% of the between-person variability in optimism. A decrease in future orientation was related to a decrease in cognitive functioning (fixed effects estimate = .014, SE = .01, p = .006) and subjective health (fixed effects estimate = .130, SE = .04, p < .001). Similarly, a decrease in optimism was related to a decrease in subjective health (fixed effects estimate = .292, SE = .03, p < .001). Men reported higher optimism than women (fixed effects estimate = −.213, SE = .08, p = .006). To test whether the covariates explained interindividual differences in change in future orientation, we tested a third model in which we entered age, subjective health, and cognitive functioning as level 1 predictors, SES, gender, and comorbidity as level 2 predictors, and the interaction terms between age and each level 2 predictor. Only SES was a significant predictor of interindividual differences in change in future orientation (fixed effect estimate for Age × SES = −.002, SE = 0.00, p = .003). Persons with higher SES status showed a slightly steeper decrease in future orientation over chronological age. It is noteworthy that age at the first measurement occasion (when included as an additional level 2 variable) did not predict differential change trajectories.

In our second research question, using random-coefficient regression models we examined whether changes in future perception were related to changes in well-being. In a preliminary analysis, we tested whether well-being changed as a function of chronological age. On average at the age of 85 years, participants reported a well-being score of 3.53 (SE = .003, p < .001), and this score decreased by 0.023 points per year (SE = .003, p < .001). We then used well-being as the time-varying variable (level 1 predictor) to test whether changes in both future orientation and optimism covaried with changes in well-being (see Table 2, right columns). The significant fixed effects estimates for the slopes indicate that when future perception decreased well-being decreased, and vice versa. Specifically, when well-being decreased by one point, future orientation decreased by 0.327 points and optimism decreased by 0.567 points.

To further explore the sequential order of change in future perception and well-being, we conducted lagged analyses with either future orientation or optimism at time point t predicting changes in well-being from t to the next time point (t + 1),

controlling for level of well-being at t. Results indicate that lower levels of future orientation or optimism at t are associated with a decrease in well-being from that time point (t) to the next (t + 1); fixed effects slope coefficients for future orientation and optimism at t are 0.042 ($SE = 0.02$, $p = .02$) and 0.058 ($SE = 0.02$, $p = .01$) respectively. We also tested the alternative time-sequential order (i.e., well-being at t predicting change in future perception from t to t + 1). This alternative order was significant for optimism (fixed effects slope coefficient = 0.40, $SE = 0.09$, $p < .001$) but not for future orientation (fixed effects slope coefficient = 0.148, $SE = 0.08$, $p = .07$).

Discussion

The aim of the present study was to examine whether indicators of future perception change in old age and in relation to well-being. As expected and consistent with cross-sectional age-differences found in other studies (e.g., Lennings, 2000; Prenda & Lachman, 2001), with each additional year lived, older adults made fewer plans for the future and were less optimistic. For very old adults, this decreasing level of positive future perception represents a highly realistic view that might be more appropriate and functional than having an overly positive and rather unrealistic outlook for the future (cf. Schwarzer, 1999). Even though this was not directly tested in the present study, we speculate that the experience of continuous deterioration of physical and psychological functionality and resources that is likely to occur in very old age (Baltes & Smith, 2003) might impede remaining optimistic and making plans for the future. Some older adults also might simply come to terms with their finitude and therefore no longer make plans for the future.

Consistent with other studies (e.g., Padawer, Jacobs-Lawson, Hershey, & Thomas, 2007), we found that men reported more positive future perceptions than women and that decreases in future perception were associated with decreases in cognitive functioning and subjective health. High cognitive functioning and good subjective health are considered valuable resources that can contribute to a generally more positive outlook in old age. Those who perceive their health to be poor might in fact not even want to make plans for the future and instead rather hope for their life to end before further deterioration (see Lang, Baltes, & Wagner, 2007 for the relationship between health and desired lifetime duration). Our finding that men reported higher optimism than women might be explained by the fact that (a) men in our sample are more positively selected than women (especially for physical frailty), and (b) men tend to show more positive perceptions of their health (e.g., Baltes, Freund, & Horgas, 1999).

Studies have demonstrated that despite the experience of negative changes in functioning, older adults report high levels of well-being and that well-being only declines in very old age (e.g., Kunzmann, Little, & Smith, 2000; Mroczek & Spiro, 2005). This well-being paradox has often been explained with older adults' self-regulation abilities (e.g., Brandtstädter & Greve, 1994; Staudinger, Marsiske, & Baltes, 1995). The present study explicitly tested the hypothesis that well-being declines when self-regulation abilities decline by examining the lead-lag relationship between changes in well-being and changes in future perception (as an indicator of self-regulation). Confirming our hypothesis, we found that, on average, a decrease in future orientation or optimism was related to a decrease in well-being over time. Evidence for a lead-lag relationship was found for future orientation: those who reported lower levels of future orientation at a previous measurement point showed a decrease in well-being from that time point to the next. In contrast, well-being at a previous time point did not predict change in future orientation from that time point to the next. For optimism, the result pattern yielded support for both directions (well-being predicting subsequent change in optimism and optimism predicting subsequent change in well-being). The time-dynamic relationship and the lead-lag relationship for future orientation confirm the theoretical proposition that changes in self-regulation abilities are related to and in some cases even precede changes in well-being.

A strong limitation in this study is the use of single-item measures. Furthermore, asking older participants for their plans for the next month or year is rather ambiguous because their response depends on the time frame they focus on (year vs. month). Thus, more precise items and comprehensive questionnaires to assess future perception are essential for future studies.

In conclusion, our findings demonstrate that older adults' positive perception of the future shows substantial decrease with advancing age. Future research needs to identify factors that further explain interindividual differences in older adults' optimism or future orientation. For instance, it would be intriguing to explore how personal wishes and expectations for the length of life relate to older adults' future perceptions. To the best of our knowledge, the present study is among the first to provide empirical support for the frequently stated assumption that older adults maintain high levels of well-being because of their self-regulation abilities. Replications of this finding with other self-regulation indicators and samples need to be on the agenda for future research.

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