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Subjective Age Across the Life Span: A Differentiated, Longitudinal Approach

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Abstract

Objectives: How old people feel compared with their actual age, their so-called "subjective age" (SA), is a central indicator of individual aging experiences and predicts developmental outcomes, such as health and mortality, across the life span. We investigated the multidimensional structure of SA with respect to specific life domains, focusing on domain differences as well as age group differences and age-related changes. Furthermore, we inspected the relationship between SA and how people perceive their future as old persons (future self-views).
Method: We assessed these variables in a sample of 593 persons who completed a questionnaire at two time points 4 years apart (baseline—T_1; follow up—T_2) and who were aged 30–80 years at T_1.
Results: SA differed across life domains and age groups, and the amount of change in SA across time was also contingent on life domain. Future self-views at T_1 predicted subsequent changes in SA, with more negative self-views being associated with an increase in SA, especially for middle-aged participants for whom the transition to older age is imminent.
Discussion: Our results provide support for a multidimensional view of subjective aging experiences. They highlight the importance of a differentiated investigation of subjective aging constructs and their relations for understanding how these variables shape the aging process.

Keywords: Future self-views—Life domains—Life span—Subjective age—Subjective aging

Even though chronological time and, by implication, chronological aging seem to "work the same way" for everyone, subjective perceptions of aging are by no means invariant across persons and ages (Graefe, 2013; Miche et al., 2014). In that regard, chronological age is only of limited value for studying individual differences in development because it cannot explain the variance in subjective perceptions of aging and age-related processes. Thus, investigating subjective aging experiences is crucial in order to better understand developmental processes and outcomes (Diehl et al., 2014). One variable that is frequently used as a marker of subjective aging is to ask people how old they feel. Subtracting a person's chronological age from the age

they feel like is commonly referred to as subjective age (SA), with negative values indicating feeling younger and positive values indicating feeling older than one actually is.

A considerable amount of research in recent years (for overviews, see Barrett & Montepare, 2015; Diehl et al., 2014; Kotter-Grühn, Kornadt, & Stephan, 2015) has provided a wealth of information on SA and its role in life-span development, for example with regard to identity formation, health maintenance, and functioning: A younger SA has been shown to contribute to positive personality development (Stephan, Sutin, & Terracciano, 2015b), more positive expectations of and better actual cognitive functioning in older age (Schafer & Shippee, 2010; Stephan, Caudroit,

Jaconelli, & Terracciano, 2014), better psychological (Westerhof & Barrett, 2005) and physiological health, and even reduced mortality (Westerhof et al., 2014). However, there is still a lack of knowledge about the nature of SA, its developmental timeline, and variables that contribute to feeling younger or older (Kotter-Grühn et al., 2015). The goal of our study is thus to address some of the open questions and add to the understanding of SA.

SA Across the Life Span

One central finding with regard to SA is that, starting in younger/middle adulthood and proceeding up to late life, people feel younger than their chronological age (e.g., Kastenbaum, Derbin, Sabatini, & Artt, 1972; Montepare, 2009; Montepare & Lachman, 1989), and those who feel younger are usually better off than those who feel their age or even older than they actually are. With regard to stability and change of SA over the life span, previous studies have noted two apparently inconsistent results. On the one hand, older adults typically exhibit a larger difference between felt age and chronological age when compared with younger adults (Montepare & Lachman, 1989). On the other hand, there is also evidence for stability in SA: Some studies failed to show an age-related decrease in SA after a certain age (Kleinspehn-Ammerlahn, Kotter-Grühn, & Smith, 2008; Ward, 2013), or it was noted that despite an absolute decrease in SA, the proportion of underestimating one's age relative to one's actual age remained constant above the age of 40 (Rubin & Berntsen, 2006).

These studies differed with regard to the age range that was covered and also with regard to whether they focused on cross-sectional comparisons or on longitudinal changes in SA. Furthermore, SA was operationalized as a unidimensional construct in most studies, neglecting the multidimensionality of subjective aging experiences (Diehl et al., 2014; Kornadt & Rothermund, 2015).

SA as a Multidimensional Construct

In early conceptualizations, SA was seen as a multidimensional construct, with differences in felt emotional (feel-age), biological (look-age), societal (do-age), and intellectual (interest-age) age (Kastenbaum et al., 1972). In a German study, SA was assessed in different domains (physical and mental performance, social, and psychological age) and the authors found differences between measures of SA in those domains (Filipp & Ferring, 1989). Despite this early advocacy for multidimensional approaches (see also Montepare, 1996), most studies have continued to rely on a unidimensional approach by simply asking people how old they feel. This might fall short of capturing relevant complexities in the experience of SA, because such a unidimensional construct may be more reflective of health and physical aging than of other domains that are relevant for and in the aging process. Thus, as pointed out by Barrett and Montepare

(2015) and Diehl and colleagues (2014), a multidimensional approach might extend the study of SA beyond a rather "simplistic and restrictive view" (Diehl et al., 2014, p. 98). This is in line with research on other subjective aging constructs, such as personal age stereotypes and self-perceptions of aging, where multidimensional approaches have been fruitfully applied (e.g., Kornadt & Rothermund, 2011; Kornadt, Voss, & Rothermund, 2015a; Levy & Leifheit-Limson, 2009; Voss, Wolff, & Rothermund, in press; for an overview, see Kornadt & Rothermund, 2015).

Furthermore, when adopting a life-span perspective one has to take into account that age-related experiences and expectations depend on the affordances and constraints of different life domains (e.g., bodily changes in the physical domain, retirement in the work and leisure domains, and empty nest transitions in the family domain) and their interaction with life stages (Barrett & Montepare, 2015; Kornadt, Voss, & Rothermund, 2015b). This might not only affect the manifestation of SA and its relation to specific outcome variables but also influence which variables predict changes in certain aspects of SA at what part of the life span. We thus think that to pursue a life-span approach and get closer to the understanding of SA and its determinants, a multidimensional approach is warranted (Diehl et al., 2014; Hess et al., 2016; Kornadt & Rothermund, 2015).

Future Self-views as Predictors of SA

Besides the characteristics and developmental dynamics of SA, another research question pertains to the origin of the discrepancy between felt and chronological age. A variety of variables, such as personality (e.g., Stephan, Demulier, & Terracciano, 2012), health (e.g., Spuling, Miche, Wurm, & Wahl, 2013), awareness of interoceptive processes (Stephan, Sutin, & Terracciano, 2015a), and the experience of age-related events (Barrett & Montepare, 2015), have been proposed as predictors of SA, and some of them have also been tested in longitudinal and experimental studies (for overviews, see Barrett & Montepare, 2015; Kotter-Grühn et al., 2015). In addition, it has been assumed that a younger age identity is adopted in order to protect against and distance oneself from negative stereotypes of older persons (e.g., Weiss & Lang, 2012). Such defensive distancing of one's subjective from one's chronological age would imply a positive relation between the valence of an age stereotype and a person's SA (i.e., more negative stereotypes should give rise to a younger SA). However, evidence for this assumption is mixed (e.g., Kotter-Grühn & Hess, 2012). Instead of serving as a comparison standard against which the self is contrasted, age stereotypes and other perceptions of aging influence people's self concepts via cognitive (e.g., interpretation of experiences, expectations), motivational (e.g., self-efficacy), and behavioral (e.g., health behavior) processes (e.g., Levy, 2009; Westerhof & Wurm, 2015). This often results in congruent rather than incongruent relationships

between stereotypes and self-views (Kornadt et al., 2015a; Levy, 2009; Rothermund & Brandtstädter, 2003).

Thus the question occurs under what circumstances congruent versus incongruent relationships exist. In our view, both types of relations can be explained on the basis of a distinction between societally salient age stereotypes and personally held views of old persons and one's own aging. Both conceptualizations might be of importance in predicting SA across the life span (cf. Hess et al. 2016). Specifically, whereas distancing oneself from common negative age stereotypes perceived to be prevalent for most (other) people may be a natural response (Weiss & Lang, 2012), processes of internalization and other mechanisms leading to congruent relationships may be the rule with regard to individually held views of aging (e.g., Kornadt et al., 2015a; Levy, 2009; Rothermund & Brandtstädter, 2003), such as future self-views.

Future self-views are a form of self-perceptions of aging that represent future-related elements of the self-concept, here with regard to old age (Kornadt et al., 2015b). They serve two main functions that might be relevant for their relation to SA. First, they serve as motivational incentives for behavior and activities (e.g., Hoppmann, Gerstorf, Smith, & Klumb, 2007). It is therefore possible that people with more positive future self-views engage in more behaviors that might be indicative of a "younger" self and youthful agency, for example, health behaviors but also social and recreational activities. This could in turn result in a younger SA (Barrett & Montepare, 2015; Stephan et al., 2012). Furthermore, future self-views also serve as an interpretational frame for actual experiences (e.g., Freund, 1997; Hoyle & Sherrill, 2006; Kornadt & Rothermund, 2012), and thus influence SA through more "psychological" pathways: People with more positive future self-views might construe changes, situations, and experiences less in terms of "getting older," which might help them to maintain a youthful identity even in the face of losses and deficits (Barrett & Montepare, 2015; Westerhof, Whitbourne, & Freeman, 2012). Taken together, previous research indicates a negative relation between future self-views and SA across the life span (i.e., more positive future self-views should be related to a more negative/younger SA).

The Current Study

With the current study, we address some of the gaps in subjective aging research that have been pointed out in recent reviews (e.g., Barrett & Montepare, 2015; Diehl et al, 2014; Kotter-Grühn et al., 2015). First of all, we assume that SA is a multidimensional, domain-specific construct, similar to other subjective aging variables (Kornadt & Rothermund, 2015; see also O'Brien, Hess, Kornadt, & Rothermund, 2016). We want to systematically explore and compare SA estimates in different life domains and age groups (age range 30–80 years). Although we expect people to generally

feel younger than they are across domains and age groups, we also predict systematic differences with regard to the degree to which people feel younger. Specifically, we expect larger age group differences in SA for domains in which negative societal age stereotypes have been shown to be highly salient (e.g., deteriorating health, or lack of flexibility and competence in the work domain; Bowen, Noack, & Staudinger, 2011; Filipp & Mayer, 1999; North & Fiske, 2015). In those domains, we predict relatively younger SA scores for older participants due to an age-related increase in processes of distancing themselves away from these negative age stereotypes (Weiss & Lang, 2012). These age differences should be less pronounced in domains that are characterized by common positive views on aging (e.g., for the family and leisure domains, e.g., Kessler, Schwender, & Bowen, 2010; Kornadt, Meissner, & Rothermund, 2016).

Furthermore, we want to analyze changes in SA in a longitudinal design. Combining findings indicating a certain degree of stability of SA (e.g., Kleinspehn-Ammerlahn et al., 2008; Rubin & Berntsen, 2006; Ward, 2013) with knowledge about different developmental processes of subjective aging depending on age group and life domain (Kornadt & Rothermund, 2015; Kornadt et al., 2015a,b), we expect stability as well as change in domain-specific indicators of SA. Specifically, although we assume generally high degrees of stability for indicators of SA, we also predict stronger distancing from actual age over time for those domains in which growing older is prevalently associated with (mostly) negative changes (e.g., changes in physical functioning that affect health and fitness or changes resulting from institutionalized transitions with regard to work and finances [retirement]). Experiencing a discrepancy between one's own age-related changes or experiences (or the lack thereof) and salient expectations of (negative) age-related changes can be used to exclude oneself from the group of old persons and thus lead to contrast effects, that is, feeling younger than one's actual age. For domains in which age-related changes are not part of societally prevalent age stereotypes, however, we expect less or no decrease in SA over time.

A different picture, however, is expected to emerge with regard to the influence of personally held views on one's own aging on changes in SA. Drawing on previous research that shows the congruent influence of future self-views on developmental outcomes via several pathways, we assume that more positive future self-views should predict feeling younger. Considering the multidimensional, life-span approach described earlier, a central issue of our study also consists in identifying differences with regard to the influence of domain-specific future self-views on SA between domains.

We expected associations between future self-views and SA to be strongest for the group of middle-aged participants, especially for those domains in which developmental changes are assumed to be linked to the transition to older age (e.g., empty nest in the family domain and

decreasing physical fitness; Kornadt et al., 2015a,b). This proposal is based on previous observations that an activation and internalization of age-related self-conceptions and stereotypes is most prevalent in middle age (Kornadt et al., 2015a). When it comes to identity-relevant processes with regard to age, middle age is probably a central life phase in which impending age-related changes and transitions become most salient and relevant, and thus age-related conceptions should influence SA most strongly during this age period. On a more exploratory note, we also investigated whether there is a bidirectional relationship between future self-views and SA. Such a relation seems possible based on the assumption that feeling younger than one's chronological age might also be related to more positive perceptions of future functioning (Schafer & Shippee, 2010).

Method

Sample

We used data from a large, longitudinal questionnaire study covering various aspects of perceptions of aging (e.g., Kornadt & Rothermund, 2011, 2012; Kornadt et al., 2015a,b). Via random sampling through local registry offices $N = 593$ persons (49.9% women) were recruited in two middle-sized cities in Germany (Jena and Erlangen) and participated in a questionnaire study at two time points (baseline—T_1; follow up—T_2), 4 years apart (78% of the initial sample of 769 persons). At T_1, participants were aged 30–80 years and the sample was stratified for birth cohort, gender, and place of residence. No significant differences emerged between persons participating at both time points and those who only participated at the first measurement occasion with regard to age, $t(766) = -1.28$, $p = .20$, gender, $\chi^2(1) = 0.20$, $p = .66$, marital status (married vs. not married), $\chi^2(1) = 2.40$, $p = .12$, education, $t(757) = -1.53$, $p = .13$, household income, $t(733) = -0.08$, $p = .94$, and self-rated health, $t(761) = -1.11$, $p = .27$. To test our assumption regarding the relevance of certain life domains at specific stages of the life span, we divided the sample into three age groups of roughly equivalent sample size: A younger subsample aged 30–49 years at T_1 ($n = 222$, $M_{age} = 39.79$ years), a middle-aged subsample aged 50–65 years ($n = 181$, $M_{age} = 57.27$ years), and an older subsample aged 66–80 years ($n = 190$, $M_{age} = 72.61$ years). More detailed information on sample characteristics for the total sample and the three age groups is presented in Table 1.

Measures

All variables were assessed within a questionnaire study on perceptions of old age and attitudes toward life in old age. The variables used for the current study were assessed in separate blocks referring to seven (Supplementary Appendix 1) different life domains (see *Subjective age*), respectively. Ratings for future self-views were always assessed before SA, and ratings for both constructs were separated by several other variables.

Subjective age
SA was assessed in seven life domains that have been described in other studies (e.g., Kornadt & Rothermund, 2011): family, friends/social relations, leisure, personality, finances, work, and physical/mental fitness/health/appearance. For each domain, participants were asked how old they felt: "What age group would you compare yourself with in the domain of xxx? In the domain of xxx, I feel as though I am _____ years old." At T_2 only, felt age for the domain health was split up in four different questions with regard to mental and physical fitness, appearance, and health. To be comparable with T_1 ratings and also with the other domains, these four estimates were averaged into a single indicator of felt age for the health domain. In order to establish a metric for indicators of SA that takes participants chronological age into account, a proportion score was computed [(felt age – age) / age] that represents how much younger/older people feel with reference to their age (Kotter-Grühn et al., 2015). Higher values indicate a larger discrepancy between felt and actual age, and more negative values indicate that people feel younger than they actually are. Extreme outliers and meaningless values on the resulting proportion scores (values $\geq |1|$, indicating that a person either reported feeling more than twice as old as their actual chronological age, or reported 0 or negative values for their felt age) were deleted (less than 1% per variable).

Future self-views
Future self-views were assessed at both time points with a questionnaire developed by Kornadt and Rothermund (2011, 2012), also described in detail in Kornadt and colleagues (2015b). For each of the seven domains named

Table 1. Sample Characteristics for the Total Sample and the Three Age Groups

	Total ($N = 593$)	Younger ($n = 222$)	Middle-aged ($n = 181$)	Older ($n = 190$)
Age in years, M (SD)	55.64 (14.50)	39.79 (5.50)	57.27 (4.74)	72.61 (3.89)
Gender (% women)	49.9	47.3	50.3	52.6
Marital status (% in relationship)	73.9	72.1	75.7	74.2
Subjective health, M (SD)	2.66 (0.95)	2.91 (0.94)	2.63 (0.94)	2.40 (0.91)
Monthly net household income in €, M (SD)	2,649.77 (1,446.39)	2,909.71 (1,661.96)	2,746.80 (1,442.26)	2,253.97 (1,052.08)

earlier, three to five items were presented that consist of bipolar evaluative statements. Participants had to rate themselves as older persons ("When I am older…") on an 8-point scale in between those statements, respectively. Higher values indicated more positive evaluations of one's future self in the respective domains. Example items are as follows: "When I am older, …I will have many conflicts in my relationship with my family - …I will have a harmonious relationship with my family" (family); "When I am older, …I will have few friends and acquaintances – …I will have many friends and acquaintances" (friends); "When I am older, …I will participate in few leisure activities - …I will participate in many leisure activities " (leisure); "When I am older, …I will be critical and intolerant - …I will be open and tolerant" (Personality); "When I am older, …I will have little money and will have to be frugal with it – …I will have plenty of money and can spend it freely" (finances); "When I am older, …I will have difficulties doing good work – …I will have no problems doing good work" (Work); "When I am older, …I will frequently by sick – …I will seldom be sick" (health). We computed latent variables for each domain from the respective indicators.

Sociodemographic information and self-rated health

Participants provided sociodemographic information and rated their health status at the beginning of the questionnaire (Table 1). Subjective health status was rated on a single question "How would you rate your current state of health?", with a 5-point scale ranging from 1 (*not good at all*) to 5 (*very good*).

Analytic Procedure

In order to test whether SA differs between domains or age groups, and whether it changes over time, we ran a mixed-model repeated measures analysis of variance (ANOVA) with age group (younger vs. middle-aged vs. older) as a between-subjects factor and domain (family vs. friends vs. leisure vs. personality vs. finances vs. work vs. health) as well as time point (T_1 vs. T_2) as within-subjects factors. Significant overall effects were followed up by pairwise comparisons of estimated marginal means (Sidak-corrected).

To estimate the effects of future self-views on SA and vice versa, we computed cross-lagged structural equation models (SEMs) for each domain (Figure 1). SA at T_2 in one domain was predicted by future self-views at T_1 in the same domain, and future self-views at T_2 were predicted by corresponding SA at T_1. Stability paths, within-time point correlations, and change correlations were also included in the model, in order to be able to estimate the prospective effects controlling for these bivariate influences. Because health has been shown to be a strong correlate and predictor of SA (Barrett & Montepare, 2015; Ward, 2013), we additionally controlled the cross-lagged effects for participants' self-reported health status at T_1 (Supplementary
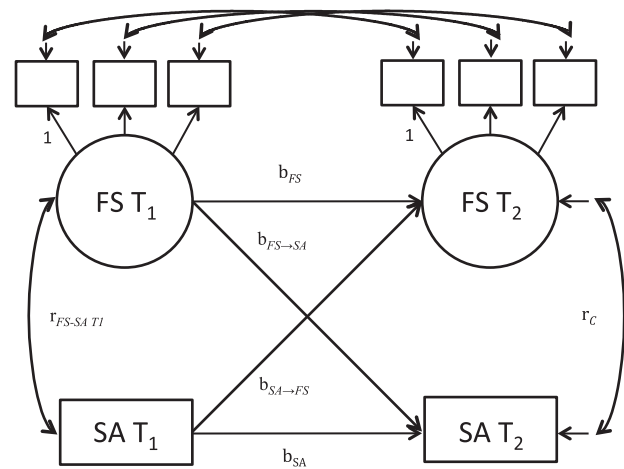
Figure 1. Cross-lagged regression model for the assumed influence of future self-views (FS) on subjective age (SA) across the two time points that was estimated for all domains and for the multigroup analyses also for all age groups. Factor loadings were constrained to be equal across time (and age groups). The model estimates initial correlations between variables ($r_{FS-SA\ T1}$), cross-time point stability (b_{FS} and b_{SA}), prospective effects of FS ($b_{FS\rightarrow SA}$), prospective effects of SA ($b_{SA\rightarrow FS}$), and change correlations (r_C).

Appendix 2). To address age effects, we estimated the same models as multigroup models for the three age groups. We constrained all corresponding factor loadings for future self-views to be equal across time (and age groups for the multigroup models; cf. Kornadt et al., 2015b).

ANOVAs were computed with IBM SPSS Statistics 21, and for those analyses missing values (less than 3% per variable) were imputed with the Expectation Maximization method (Dempster, Laird, & Rubin, 1977). SEM analyses were computed with AMOS 21 (Arbuckle, 2012) based on full information maximum likelihood (Little & Rubin, 2002) estimates.

Results

SA in Different Life Domains, Age Groups, and Over Time

The mixed-model ANOVA yielded main effects for all three factors: time, $F(1, 590) = 10.18$, $p \leq .01$, $\eta_p^2 = .02$, age group, $F(2, 590) = 87.46$, $p \leq .001$, $\eta_p^2 = .23$, and domain, $F(6, 585) = 15.69$, $p \leq .001$, $\eta_p^2 = .15$. These main effects were qualified by two significant interactions (Figure 2). First, we found a significant Domain × Age group interaction, $F(12, 1172) = 7.02$, $p \leq .001$, $\eta_p^2 = .07$, indicating large and significant age group differences in SA between all three age groups for the domains work (Supplementary Appendix 3), finances, and personality (Figure 2). Age group differences in SA were smaller for the domains family, friends, health, and leisure; in particular, no significant differences in SA were found between the middle-aged and old age groups for these domains. In addition, the Domain × Time interaction was significant, $F(6, 585) = 2.29$, $p \leq .05$, $\eta_p^2 = .02$, indicating significant decreases in SA from T_1 to T_2 in the
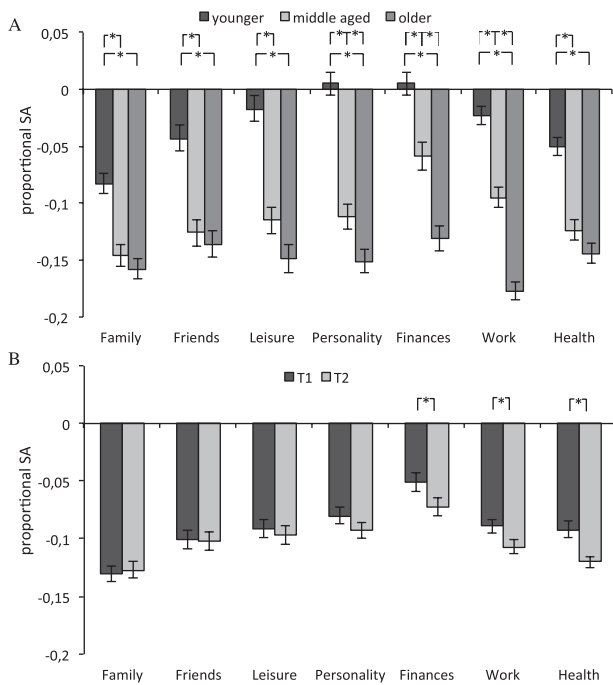
Figure 2. Mean values and standard errors for subjective age (**A**) across age groups and domains and (**B**) across time and domains. *$p ≤ .05$ (pairwise comparisons, Sidak-corrected).

domains finances, work, and health, whereas average levels of SA remained stable for the remaining domains across the 4-year interval. No other interaction effect reached significance (all other $F ≤ 1.58$, all other $p ≥ .09$).

The Relation of SA and Future Self-views Over Time

Model fit indices and path estimates for the cross-lagged SEMs are presented in Table 2. All estimated models yielded good-to-just acceptable model fit (all $χ^2/df ≤ 4.69$, all comparative fit index [CFI] $≥ .951$, all root mean square error of approximation [RMSEA] $≤ .079$; see Little, 2013). Future self-views and SA showed considerable but not perfect rank-order stability over the course of 4 years, with stability coefficients being on average slightly higher for future self-views (b_{FS}) compared with SA (b_{SA}). For all domains except Personality, SA and future self-views were negatively correlated at T_1, indicating that more positive future self-views go hand in hand with feeling younger ($r_{FS-SAT1}$). Most interesting for our research question were the longitudinal cross-lagged effects ($b_{FST1-SAT2}$ and $b_{SAT1-FST2}$). We found that future self-views at T_1 predicted changes in SA over the subsequent 4-year time interval in the domains family, friends, leisure, and health. All these significant cross-lagged effects were negative, indicating that the more positive people expected their future self-views to be at T_1, the younger they felt relative to their chronological age at T_2. These effects were also mostly mirrored by significant negative correlated change coefficients (r_C). Our findings also indicate that the influence between future self-views and SA is

asymmetrical rather than mutual: SA at T_1 did not have a significant influence on subsequent changes in future self-views for any of the seven domains under investigation.

In order to test whether the relationship between future self-views and SA differed by age group, we repeated the same analyses in a multigroup framework to compare the pattern of effects between younger, middle-aged, and older participants. Model fit indices and path estimates for these models are presented in Table 3. Again, all estimated models yielded good-to-acceptable model fit (all $χ^2/df ≤ 2.76$, all CFI $≥ .937$, all RMSEA $≤ .055$). For the cross-lagged effects, pronounced age group differences were found. Most significant effects of future self-views at T_1 on subsequent changes in SA were obtained for the middle-aged group, for which we found significant negative cross-lagged effects in the domains family, friends, personality, and health. For the leisure and health domains, the respective cross-lagged effects were significant for the youngest group. We did not find any strong effects for the oldest age groups of our sample. However, there were two marginally significant effects from future self-views to SA for the domains friends and leisure. Findings for the correlated change scores yielded a similar pattern of negative relations between changes in future self-views and SA that was confined to the youngest and middle-aged age groups.

Discussion

Building on research that has shown the importance of SA for developmental outcomes (e.g., Kotter-Grühn et al., 2015), we wanted to address some of the gaps in knowledge about SA by investigating its manifestations in different life domains, different age groups, and over time, as well as its relationship to another indicator of subjective aging, namely future self-views. Several aspects of our findings support the notion that SA is a multidimensional construct, as was suggested by other authors (Filipp & Ferring, 1989; Kastenbaum et al., 1972). How old people feel, how discrepant this feeling is from their actual chronological age, and how much SA changes over time depends on the life domain as well as the participants' chronological age.

In accordance with the view that estimates of SA reflect a process of dissociating oneself from salient societal negative stereotypes of old age or aging (Weiss & Lang, 2012), we found that people felt younger over time for those domains for which negative age stereotypes have been shown to be common and highly prevalent (work, finances, and health), but not for domains in which prevailing views on aging are less negative or even positive (family, friends, and leisure) (e.g., Filipp & Mayer, 1999; Kornadt et al., 2016; North & Fiske, 2015). Growing older thus seems to increase the probability that people evaluate their own aging experiences against reference standards that are influenced by age stereotypes perceived to be prevalent in a society, leading to deidentification with one's chronological age group in those domains in which negative standards are highly salient (cf. Pinquart, 2002; Weiss & Lang, 2012).

Table 2. Results of the Cross-lagged SEM: Standardized Model Parameter Estimates and Fit Indices

| | Initial correlation | Stability | | Cross-lagged effects | | Correlated change | | | | | |
	$r_{FS-SA\,T1}$	b_{FS}	b_{SA}	$b_{FS\,T1-SA\,T2}$	$b_{SA\,T1-FS\,T2}$	r_C	$\chi^2\,(\chi^2/df)$	df	p	RMSEA (90% CI)	CFI
Family	**−.24**	**.61**	**.30**	−.08	.02	**−.13**	36.66 (1.93)	19	.01	.040 (.020, .059)	.989
Friends	**−.26**	**.66**	**.51**	−.09	−.01	**−.19**	42.64 (2.24)	19	.001	.046 (.027, .064)	.990
Leisure	**−.23**	**.52**	**.49**	*−.10*	−.02	−.03	89.88 (2.50)	36	.00	.050 (.037, .063)	.981
Personality	.02	**.54**	**.44**	−.03	−.03	−.08	22.51 (1.19)	19	.26	.018 (.00, .042)	.998
Finances	*−.11*	**.68**	**.32**	.02	.02	−.08	23.78 (1.25)	19	.21	.021 (.00, .044)	.998
Work	**−.26**	**.50**	**.53**	−.03	.03	**−.14**	21.53 (1.13)	19	.31	.015 (.00, .040)	.998
Health	**−.28**	**.54**	**.43**	**−.18**	−.03	**−.19**	267.40 (4.69)	57	.00	.079 (.070, .089)	.951

Notes: Values in bold are significant at $p ≤ .05$ and values in italics are significant at $p ≤ .10$ (two tailed). All estimates are based on FIML estimation.
CFI = comparative fit index; CI = confidence interval; FIML = full information maximum likelihood; FS = future self-views; RMSEA = root mean square error of approximation; SA = subjective age.

With regard to age group effects, we found that in all domains, younger participants' SA differed less from their actual age than it did for middle-aged and older participants. This effect is perhaps not surprising, considering that those participants are only 30 to 49 years old, so their chronological age is no "threat" to their elaborated adult identity. Furthermore, in the majority of domains, middle-aged and older participants did not differ in how much they felt younger/older than their actual age, suggesting that after a shift in SA by late middle age, chronological age might not play a major role. However, there were differences between the middle-aged and older age groups for the domains work, finances, and personality. Stressing the importance of a multidimensional assessment, this pattern of differences (or lack thereof) was contingent on the characteristics of life domains. Older people felt younger compared with the middle-aged groups in domains for which negative age stereotypes are salient (work and finances), whereas average estimates of SA showed much smaller differences between the old and middle-aged groups for domains that are characterized by more positive attitudes toward older people (family and friends).

Contrary to our expectations was the lack of differences in the health domain. Also somewhat unexpectedly, we did find that older participants felt younger compared with the middle-aged group in the domain Personality. Apparently, general stereotypes are not the only relevant factor that determines age-related changes and age group differences in SA, and other factors must be assumed to also influence these evaluations (Kotter-Grühn & Hess, 2012; Montepare, 2009). Though speculative, we presume that actual age-related changes in these domains might be a possible key to explain these findings. Experiences of actual growth in the personality domain may lead to feeling younger, whereas experiencing losses and declines in the health domain might conform to the salient negative stereotype of old persons in this domain and thus limit the possibility of older participants to describe themselves as feeling much younger than they are. For the personality domain, it might also be the case that our items (tolerance, wisdom with regard to life problems) are closest to the dimension of openness. Because openness is a personality trait usually not ascribed to older people (Chan et al., 2012) but positively valued, feeling younger in this domain might actually foster deidentification of older persons with their age group in this domain.

Intriguingly, however, and in direct opposition to the effects of more general age stereotypes, holding more positive/negative self-views of *one's own future as an old person* was predictive of people's feeling younger/older in the corresponding domain. This assimilative influence of future self-views on SA supports findings showing that the content of personally held views on aging influences people's current self-views, and thus also their SA (Rothermund & Brandtstädter, 2003; see also Kornadt & Rothermund, 2012; Kornadt et al., 2015a).

Table 3. Results of the Cross-lagged Multigroup SEM: Standardized Model Parameter Estimates and Fit Indices

Domain	Age group	Initial correlation $r_{FS-SA\ T1}$	Stability b_{FS}	b_{SA}	Cross-lagged effects $b_{FS\ T1-SA\ T2}$	$b_{SA\ T1-FS\ T2}$	Correlated change r_C	χ^2 (χ^2/df)	df	p	RMSEA (90% CI)	CFI
Family	Younger	-.14	.57	.15	-.01	-.01	-.21	171.50 (2.76)	62	.00	.055 (.045, .065)	.937
	Middle-aged	-.47	.53	.37	-.20	.06	-.01					
	Older	-.18	.64	.40	-.07	.02	-.06					
Friends	Younger	-.30	.66	.48	-.06	-.001	-.33	91.04 (1.49)	61	.01	.029 (.015, .041)	.987
	Middle-aged	-.25	.59	.52	-.14	-.07	-.005					
	Older	-.18	.70	.48	-.12	-.02	-.15					
Leisure	Younger	-.26	.39	.39	-.17	-.17	-.20	212.18 (1.86)	114	.00	.038 (.030, .046)	.965
	Middle-aged	-.35	.67	.50	-.08	.09	.05					
	Older	-.24	.50	.40	-.13	-.03	.02					
Personality	Younger	.09	.57	.35	-.02	-.02	-.16	68.60 (1.13)	61	.24	.015 (.00, .30)	.996
	Middle-aged	-.11	.40	.24	-.16	-.11	-.01					
	Older	-.03	.61	.48	.03	-.10	-.11					
Finances	Younger	-.04	.68	.27	.05	.01	-.03	79.29 (1.30)	61	.58	.023 (.00, .036)	.992
	Middle-aged	-.14	.67	.08	.05	-.04	-.17					
	Older	-.08	.67	.46	-.02	.12	-.13					
Work	Younger	-.12	.55	.53	.004	.12	-.15	91.99 (1.51)	61	.01	.029 (.016, .041)	.979
	Middle-aged	-.39	.52	.27	-.06	.04	-.18					
	Older	-.26	.40	.41	-.03	-.07	-.06					
Health	Younger	-.20	.61	.36	-.19	-.07	-.32	416.43 (2.33)	179	.00	.047 (.041, .053)	.945
	Middle-aged	-.35	.49	.32	-.21	-.02	-.19					
	Older	-.22	.44	.43	-.12	-.07	-.14					

Notes: Values in bold are significant at $p \leq .05$ and values in italics are significant at $p \leq .10$. All estimates are based on FIML estimation. For the family domain, the residual variance of Item c was set equal across time for the oldest group due to a nonsignificant negative residual variance of Item c at T_1 in this group.

CFI = comparative fit index; CI = confidence interval; FIML = full information maximum likelihood; FS = future self-views; RMSEA = root mean square error of approximation; SA = subjective age.

In line with this theoretical framing, we found that the effects of future self-views on SA were strongest for the middle-aged group of our sample. This is not surprising given the fact that for the middle-aged participants age-related changes and transitions might be most imminent and relevant. The ages between 50 and 65 years can be considered the transition period between late middle adulthood and young old age, and thus most sensitive for identity processes that are related to getting older. Thus, expectations regarding one's older age might be especially relevant for the adjustment of SA in these periods. This is in accordance with other recent findings showing that, for example, stereotype internalization typically occurs before the ages in which age-related changes are expected (Kornadt et al., 2015a). Furthermore, older adults are, in some ways, already living their future as an older adult in most domains; thus future self-views that are, per definition, directed to the future might be somewhat more predictive for SA in midlife than in older age.

Our present findings add an important new piece of evidence to this literature by showing a direct link between domain-specific future self-views and SA. Previous studies have identified several pathways through which views on aging influence developmental outcomes (e.g., Kornadt et al., 2015b; Levy, 2009; Voss et al., in press; Westerhof et al., 2014; Westerhof & Wurm, 2015). Future studies should more specifically address the pathways that mediate between the content of future self-views and SA. It might be the case that more positive future self-views lead to the engagement in more activities that contribute to feeling younger (such as preparation for age-related changes, Kornadt et al., 2015b). They might also influence the perception of situations as age related and identity relevant or not (e.g., Hoyle & Sherrill, 2006), and even affect the interpretation of bodily signals that have been proposed to be influential with regard to SA (Stephan et al., 2015a). SA itself, in turn, then influences other more distal developmental outcomes, such as health and mortality. However, these pathways and mechanisms require further testing in future studies.

There were two domains where we did not find significant effects from future self-views to SA, namely the work and finances domains, indicating that a general internalization process seems not to work the same way for those domains as for the others. In the finances domain, the general trend of feeling younger than one's age was also the least distinctive. Maybe this domain is not as central for a person's identity, and thus, psychological processes such as internalization do not play a major role (cf. Kornadt et al., 2015a). The Work domain, however, seems to be special because for this domain, again, at least in Germany, strong external regulations (e.g., mandatory retirement age) are responsible for whether people are considered "old", which might render individual future perceptions of this domain more or less irrelevant for feeling older or younger. The fact that we found contrast effects for exactly those domains, especially for older people, further supports the distinction

between congruent and contrast effects and their respective precursors. In future studies, domain-specific SA should be examined cross-culturally, in order to better understand these (lack of) effects (Hess et al., 2016).

In addition to the longitudinal effects of future self-views on SA, we did not find any effects in the other direction, namely SA predicting future self-views. This is interesting considering the directional (longitudinal) or causal (as demonstrated in experimental studies) effect SA has on a plethora of developmental outcomes such as, for example, health (e.g., Spuling et al., 2013). Our results shed further light on the relationship between different subjective aging constructs (Brothers, Miche, Wahl, & Diehl, 2015), suggesting that SA seems to be a product of expectations and self-views regarding ones identity as an older person rather than the other way around.

Our study comes with limitations that at the same time point to interesting directions for future research. In order to investigate the effects of life stages on SA, we divided our sample into three age groups. This division can of course only be seen as a proxy for the developmental tasks and age-related changes that are relevant in specific life periods, which is what we think is important for our research question (rather than age per se). Also, the labels "young," "middle-aged," and "older" only make sense in relative reference to the age range of our sample, for example, the younger category might be more representative of "young middle age" rather than "younger" persons. Future studies should include direct measures of developmental transitions that can be used as predictors of SA instead of participant age.

Furthermore, we limited our analyses to within-domain effects of future self-views on SA, based on the theoretical assumption that these relations should be strongest if the content of future self-views and SA matches closely (evidence for domain specificity of effects of views on aging has been reported in previous studies, e.g., Levy & Leifheit-Limson, 2009). Still, this focus does not rule out the possibility of cross-domain effects, indicating generalization from one domain to another. A detailed and differentiated investigation of these cross-domain effects is beyond the scope of this article, but should be an important focus of future research that addresses questions of overlap or dependencies between domains (e.g., generalization effects should more likely emerge for central life domains that tend to permeate and influence other domains).

Another limitation pertains to our longitudinal design. Even though it goes beyond most previous studies of SA by including two measurement points 4 years apart, including more time points and also shorter time intervals might further illuminate developmental processes of changes in SA, and it might also allow for an analysis of short-term fluctuations in domains where no significant change in SA was detected. A closer inspection of longitudinal effects is also warranted for the health domain. Because the indicator of SA at T_2 combined several health-related subdomains (e.g., appearance and physical fitness), future studies should investigate which of those subdomains drive the longitudinal effects.

Despite these limitations, the findings of our study reveal that analyzing changes and age group differences in SA from a domain-specific perspective is theoretically and empirically illuminating. The domain-specific pattern of age-related changes and age group differences in SA provides compelling evidence for the influence of processes of distancing oneself from prevalent negative age stereotypes in certain domains. At the same time, the domain-specific assessment of SA allowed us to detect a congruent influence of personal views of one's own aging in the corresponding domains. Taken together, the distinction between public and personal views on aging and their opposing influence on domain-specific indicators of SA may account for the heterogeneity of previously reported findings regarding the relation between views on aging and SA. Considering the impact global SA has on developmental processes, it might be interesting to see whether domain-specific SA facets are better predictors of outcomes in corresponding domains, similar to what has been shown for age stereotypes (Levy & Leifheit-Limson, 2009). In addition, knowing that the malleability of SA might depend on age and life domain might be helpful when designing interventions to change SA across the life span (cf. Kotter-Grühn et al., 2015).

Supplementary Material

Supplementary material is available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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