

Original Research Report

Optimism for the Future in Younger and Older Adults

Kelly A. Durbin, MA,¹ Sarah J. Barber, PhD,² Maddalena Brown,¹ and Mara Mather, PhD¹

¹Department of Psychology, University of Southern California, Los Angeles. ²Department of Psychology, San Francisco State University, California.

Address correspondence to: Kelly A. Durbin, MA, Department of Psychology, University of Southern California, 3620 McClintock Avenue, Los Angeles, CA 90089. E-mail: kadurbin@usc.edu

Received: May 5, 2017; Editorial Decision Date: November 19, 2017

Decision Editor: Nicole Anderson, PhD

Abstract

Objectives: Research has suggested that older adults are less optimistic about their future than younger adults; however, a limitation of prior studies is that younger and older adults were forecasting to different ages and stages of life. To address this, we investigated whether there are age differences in future optimism when people project to the exact same age. We also tested whether optimism differs when projecting one's own future versus another person's future.

Method: Participants were 285 younger and 292 older adults recruited from Amazon Mechanical Turk. Participants completed writing and word-rating tasks in which they imagined their own future in 15 years, their own future at age 85, or the average person's future at age 85.

Results: Younger adults were more optimistic than older adults about their own future in 15 years. In contrast, both age groups were similarly optimistic about their future at age 85 and expected it to be more positive than others' future at age 85.

Discussion: Contrary to previous research, younger and older adults had comparable future forecasts when projecting to the exact same age. These findings emphasize the need to consider age and stage of life when examining age differences in future optimism.

Keywords: Forecasting, Future, Imagining, Optimism, Positivity

Imagining the future is an essential part of everyday life that allows individuals to engage in goal-directed planning and visualize what novel experiences might be like in the distant future. Over the past decade, there has been considerable interest in understanding how people imagine the future (for reviews and discussions, see [Atance & O'Neill, 2001](#); [Schacter, Addis, & Buckner, 2008](#); [Szpunar, Spreng, & Schacter, 2014](#)). Although thoughts about the future can be positive or negative, research has shown that younger adults tend to be positive and optimistic when thinking about their future ([D'Argembeau, Renaud, & Van der Linden, 2011](#); [Newby-Clark & Ross, 2003](#); [Sharot, Riccardi, Raio, & Phelps, 2007](#)). In general, optimism for the future is beneficial and has been associated with improvements in physical health, protective health behaviors, caregiver health, recovery after surgery, and coping

with difficult situations (for reviews and a meta-analysis, see [Carver, Scheier, & Segerstrom, 2010](#); [Rasmussen, Scheier, & Greenhouse, 2009](#); [Rasmussen, Wrosch, Scheier, & Carver, 2006](#); [Solberg Nes & Segerstrom, 2006](#)). The health benefits of future optimism also extend into older adulthood. For example, in older adult samples, optimism for the future is associated with lower incidence of cognitive impairment ([Gawronski, Kim, Langa, & Kubzansky, 2016](#)) and lower rates of cardiovascular mortality ([Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004](#)).

Although the functional implications of being optimistic about the future are relevant to both younger and older adults, it is unclear how optimism for the future changes, if at all, across the adult life span. On one hand, older age has been associated with declines in subjective functioning relative to previous stages of life (e.g., life satisfaction, [Baltes &](#)

Smith, 2003; Heckhausen & Baltes, 1991; Kornadt & Rothermund, 2014). In fact, when older adults forecast the future, they anticipate declines in various aspects of well-being (Ryff, 1991). Thus, older adults may be less optimistic about the future than younger adults since they are, on average, projecting to older ages. On the other hand, socioemotional selectivity theory posits that as individuals become older and realize that time remaining in life is limited, they are motivated to prioritize emotion regulation and maintain emotional well-being (Carstensen, 2006; Carstensen, Isaacowitz, & Charles, 1999). Consistent with this theory, older adults tend to experience fewer negative emotions than younger adults (Carstensen, Pasupathi, Mayr, & Nesselrode, 2000). Numerous studies have also documented an age-related shift in attention and memory, such that older adults tend to focus relatively more on positive and/or less on negative information as compared to younger adults (Mather & Carstensen, 2005; Reed & Carstensen, 2012). Thus, given this theoretical framework, one might expect that older adults would remain positive and optimistic about the future in order to preserve their emotional well-being.

However, several studies investigating possible age-related differences in future optimism have found that older adults are less optimistic about their future and their future selves than younger adults (Chessell, Rathbone, Souchay, Charlesworth, & Moulin, 2014; Kotter-Grühn & Smith, 2011; Ryff, 1991), which the authors explained within the context of older age reflecting more age-related deteriorations. However, this finding of decreased optimism among older adults has not been consistently replicated. Other studies have shown that valence ratings for imagined future events either do not differ between the two age groups (Grysmann, Prabhakar, Anglin, & Hudson, 2015) or that older adults actually have more positive ratings (Gallo, Korthauer, McDonough, Teshale, & Johnson, 2011), a finding that was contextualized within the framework of the socioemotional selectivity theory.

One potential reason for these discrepant findings is that almost all prior studies have either placed no constraints on the age being considered (Chessell et al., 2014; Gallo et al., 2011; Kotter-Grühn & Smith, 2011) or have explicitly instructed younger and older participants to focus on different ages and stages of life (Grysmann et al., 2015; Ryff, 1991). For example, Chessell et al. (2014) asked younger and older adults to generate future self-images. Although younger adults were more optimistic, they generated self-images that would occur in their late 20s, whereas older adults generated self-images that would occur in their early 70s (cf. Ryff, 1991). It is possible that when younger and older adults are projecting to vastly different ages, optimism for the future differs because of the negative stereotypes about old age and realistic expectations of physical and cognitive decline in later life.

To our knowledge, only one study has examined age differences in future optimism when participants forecast to the same age. In that study, Celejewski and Dion (1998)

asked younger and older adults to either evaluate themselves or an unfamiliar adult (i.e., "other") at three different target ages (i.e., "young," "middle-aged," and "elderly"). Although their results did not reveal a three-way interaction between participant's own age group (younger adult, older adult), evaluative target (self, other), and target age (young, middle-aged, elderly), follow-up analyses did show that older adults had more favorable ratings of "other" adults in old age than younger adults did. Critically, the authors did not report whether or not there was an age difference in how younger and older adults perceived themselves in old age. Thus, it remains unclear whether younger and older adults' future optimism would differ, if at all, when both age groups forecasted to the exact same age and stage of life. In the current study, we directly examined this issue. We also examined how these methodological choices affect conclusions about age differences in future optimism. Specifically, we investigated whether requiring all participants to project to the exact same age (i.e., age 85) versus allowing participants to envision different ages (i.e., 15 years from now) would affect age-related differences in optimism for the future. We hypothesized that younger adults would show greater optimism than older adults when projecting 15 years into the future, but that this age difference would be eliminated when both age groups forecasted to the same age (i.e., age 85).

Second, we also examined whether younger and older adults differ in optimism for others' future, as opposed to their own future. Given that people tend to be optimistic about their own future (D'Armentau et al., 2011; Newby-Clark & Ross, 2003; Sharot et al., 2007), we anticipated that both age groups would be more optimistic about their own future than someone else's future in very old age. Furthermore, given that appraisals of others might be more reliant on age stereotypes (Renoult, Kopp, Davidson, Taler, & Atance, 2016; Schulz & Fritz, 1987; Thomas, 1981), and that younger and older adults have similar negative implicit biases towards older adults (Levy & Banaji, 2002; Nosek, Banaji, & Greenwald, 2002), we predicted that both age groups would be more negative about the average person's future compared to their own future in very old age (i.e., age 85).

Finally, we explored whether participants' beliefs about becoming older (i.e., the participants' expected health at age 85, the perceived valence and saliency of age), future time perspective, and age group identification would potentially moderate these effects. We reasoned that these factors might be particularly relevant for older adults since they are much closer to very old age. If older adults have a negative attitude about their age and becoming an older adult, they may be significantly less optimistic about their future in very old age than those who have a positive outlook. In contrast, these factors may play less of a role for younger adults, for whom old age may always be seen in an abstract and more stereotypical manner. We also tested whether our effects were moderated by participants' frequency and quality of contact with the very old. People who have frequent positive interactions

with the very old may be more optimistic about becoming older themselves. On the contrary, individuals who have no contact with the very old may be more inclined to rely on age stereotypes and implicit negative biases.

Method

Participants

Participants were 285 younger adults (age = 18–25 years, $M = 22.4$, $SD = 1.7$, 122 female) and 292 older adults (age = 59–70 years, $M = 63.3$, $SD = 2.9$, 202 female). Only participants between the ages of 18–25 and 59–70 were invited to complete the study. An additional 109 people consented to participate, but dropped out of the study before any demographic information was obtained. An additional 12 younger and 10 older adults were excluded because their reported age was outside of the predetermined age range. Lastly, 8 younger adults and 1 older adult were also excluded for answering the validity question incorrectly (i.e., “If you are reading this question, please select the number 4 as your answer.”). For participants who are exactly age 70, projecting 15 years into the future is the same as projecting to age 85. To determine whether any potential overlap between conditions influenced our reported results from the word-rating task, we excluded older adults in their late 60s (i.e., ages 67–70) and reran our analyses. The three-way interaction between age, condition, and valence remained significant ($p = .015$). Follow-up analyses also revealed the same pattern of results. The Age \times Valence interaction remained significant when participants imagined themselves in 15 years ($p = .016$) and the Age \times Valence interaction was not significant when participants either imagined their own future or the average person’s future at age 85 (both $ps > .10$). To further analyze older adults’ pattern of responding, we next categorized older adults into “younger old” (M age = 60.8 years) and “older old” (M age = 65.8 years) groups via median split. We compared the pattern of responding between these two age groups within each of the three conditions (i.e., self in 15 years, self at age 85, other at age 85). There were no significant differences between these two groups of older adult participants (all $ps > .10$). Of particular note, there was no evidence of a difference in future optimism for the self in 15 years between the “younger old” adults (who were, on average, projecting to age 76) and the “older old” adults (who were, on average, projecting to age 81). Given that there were more females in the older adult group, we re-ran the main analysis of variance (ANOVA) separately for males and females to determine if participants’ gender could have influenced our results. For both males and females, our pattern of results remained the same and the three-way interaction remained significant; however, among males, a main effect of Age did emerge, $F(1, 245) = 4.05$, $p < .05$, $\eta_p^2 = .02$; younger adult males had overall higher ratings than older adult males. Participants

were recruited from Amazon Mechanical Turk, screened for eligibility by the full-lab panel service from TurkPrime. Of these participants, 45 younger and 55 older adults completed this study along with other unrelated tasks (which occurred after the tasks reported here and will not be discussed further). These participants were paid \$6 and the median completion time was 42.6 min. The remaining 240 younger and 237 older adults only completed the tasks reported here; they were paid \$2 and the median completion time was 17.9 min. To better characterize participants, we collected a variety of measures, including education, baseline mood, current/general physical health, current/general emotional health, expected health at age 85, predicted number of years remaining in life, future time perspective, current life satisfaction, age group identification, age valence, age saliency, and frequency/quality of contact with the very old. See Table 1 for demographic information by age group and experimental condition.

Materials

Stimuli consisted of 240 words (120 positive, 120 negative) from the Affective Norms for English Words database (ANEW; Bradley & Lang, 1999). Based on normative ratings, the mean valence of positive and negative words was 7.25 and 2.65, respectively. Positive and negative words were equated on arousal ($M_s = 5.54$ and 5.65), $t(238) = .95$, $p > .10$, and on letters, syllables, frequency, and part of speech (all $ps > .09$; Coltheart, 1981). There was an equal number of words stereotypical of younger adults, stereotypical of older adults, and not stereotypically related to age within each valence category. Twenty-four younger adults (age range = 18–24 years, $M = 20.08$, $SD = 1.35$, 10 female) and 24 older adults (age range = 59–69 years, $M = 63.46$, $SD = 3.53$, 18 female) were recruited from Amazon Mechanical Turk and randomly assigned to rate either the age stereotypicality of words ($n_{\text{younger}} = 12$, $n_{\text{older}} = 13$) using a 1–5 scale (1 = *more typical of young adults*, 3 = *equally typical, not related to age*, 5 = *more typical of older adults*) or the self-relevance of words ($n_{\text{younger}} = 12$, $n_{\text{older}} = 11$) using a 1–5 scale (1 = *not at all relevant*, 3 = *somewhat relevant*, 5 = *very relevant*). Stimuli consisted of 630 words (350 positive, 280 negative) from the ANEW database. Only words where ratings of age stereotypicality did not differ between younger and older adults were chosen for inclusion in the current study (all $ps > .10$). For words used in the study, ratings for each stereotype category were significantly different from each other, $F(2, 237) = 305.49$, $p < .001$. No one from this sample participated in the main study. Care was taken to equate the self-relevance of positive and negative words; however, self-relevance could not be fully equated since positive words are more likely to be rated as self-relevant than negative words (e.g., Moran, Macrae, Heatherton, Wyland, & Kelley, 2006). Words were divided into two equal lists, matched on all characteristics, and participants rated one of the two lists in the task below, counterbalanced across participants.

Table 1. Means for Younger and Older Adults' Demographic and Self-report Measures by Experimental Condition

	Self in 15 years		Self at Age 85		Other at Age 85	
	Younger	Older	Younger	Older	Younger	Older
	<i>n</i> = 93	<i>n</i> = 95	<i>n</i> = 97	<i>n</i> = 98	<i>n</i> = 95	<i>n</i> = 99
Demographic variables						
Age	22.2 (1.7)	63.2 (3.1)	22.4 (1.7)	63.1 (2.8)	22.6 (1.8)	63.6 (2.9)
Female, <i>n</i> (%)	43 (46.2)	69 (72.6)	39 (40.2)	65 (66.3)	40 (42.1)	68 (68.7)
Years of Education ^a	14.6 (1.5)	15.3 (2.3)	14.7 (1.7)	15.5 (2.6)	14.4 (1.9)	15.2 (2.2)
Baseline mood ^a	68.4 (19.2)	77.8 (18.5)	71.3 (16.6)	79.7 (17.0)	70.5 (21.7)	79.0 (15.4)
Post-task mood ^a	62.2 (25.8)	73.4 (20.9)	61.9 (23.5)	73.7 (23.3)	59.0 (25.2)	73.1 (19.8)
Physical health (current)	3.8 (0.9)	3.7 (1.0)	3.8 (0.9)	3.8 (0.9)	3.8 (1.0)	3.7 (0.9)
Physical health (general)	3.6 (1.0)	3.5 (0.9)	3.6 (1.1)	3.7 (1.0)	3.6 (1.0)	3.6 (1.0)
Emotional health (current) ^a	3.6 (1.0)	3.9 (1.0)	3.6 (1.0)	4.1 (1.0)	3.6 (1.1)	3.9 (0.9)
Emotional health (general) ^{a,c}	3.2 (1.1)	3.7 (1.0)	3.0 (1.1)	3.9 (1.0)	3.3 (1.2)	3.7 (1.0)
Life satisfaction ^a	20.5 (7.9)	21.5 (7.8)	20.0 (7.5)	23.9 (7.4)	19.9 (7.8)	22.0 (7.4)
Potential moderating variables						
Health at age 85 ^b	3.1 (1.0)	3.1 (1.1)	3.2 (0.9)	3.4 (1.0)	2.9 (1.1)	3.1 (1.0)
Years remaining ^{a,b}	61.5 (18.4)	23.8 (10.9)	61.6 (16.3)	24.7 (8.3)	57.0 (16.7)	21.6 (9.6)
FTP ^{a,b}	5.1 (1.1)	3.8 (1.5)	5.1 (1.1)	4.0 (1.5)	4.9 (1.3)	3.6 (1.3)
Age group identification ^a	4.9 (1.2)	4.7 (1.2)	5.0 (1.2)	4.9 (1.2)	5.1 (1.3)	4.8 (1.2)
Age valence ^c	0.65 (1.7)	-0.05 (1.9)	0.19 (1.8)	0.47 (1.8)	0.16 (1.9)	-0.14 (1.8)
Age saliency ^a	-0.02 (1.5)	0.45 (1.5)	0.08 (1.5)	0.22 (1.5)	0.24 (1.5)	0.61 (1.5)
Frequency of OA contact ^a	1.7 (1.7)	2.7 (2.2)	1.5 (1.8)	3.0 (2.4)	1.9 (2.0)	3.0 (2.3)
Quality of OA contact ^a	3.8 (0.9)	4.1 (1.0)	3.5 (1.0)	4.1 (0.9)	3.6 (1.0)	4.2 (0.9)

Note: Mood was assessed using a 0–100 scale (0 = *very negative*, 100 = *very positive*). Current (i.e., today) and general (i.e., over the past year) physical and emotional health was assessed using 5-point scales (i.e., physical: 1 = *poor*, 5 = *excellent* and emotional: 1 = *depressed*, 5 = *nearly always happy and upbeat*). Participants predicted their health at age 85 along three dimensions on a five-point Likert scale (i.e., health and physical well-being, mental and cognitive ability, and emotional well-being). These three scores were then averaged together to compute participants' overall prediction of health at age 85. Participants also estimated the number of years they expect they have remaining in life. Future Time Perspective (FTP) was measured using the FTP scale (Carstensen & Lang, 1996). Current life satisfaction was determined using the Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Other participant factors that were assessed included participants' identification with their own chronological age group (Garstka, Schmitt, Branscombe, & Hummert, 2004), the perceived valence of their own age and the saliency of their age on their self-concept (Weiss & Freund, 2012), and participants' frequency and quality of contact with older adults over the age of 80 (Schwartz & Simmons, 2001). Standard deviations are given in parentheses. OA = older adult.

^aSignificant main effect of age group; ^bSignificant main effect of experimental condition; ^cSignificant interaction between age group and experimental condition.

Procedure

After providing informed consent and rating their baseline mood, participants were randomly assigned to one of three experimental conditions; imagining their own future in 15 years ($n_{\text{younger}} = 93$, $n_{\text{older}} = 95$), their own future at age 85 ($n_{\text{younger}} = 97$, $n_{\text{older}} = 98$), or the average person's future at age 85 ($n_{\text{younger}} = 95$, $n_{\text{older}} = 99$). Next, participants completed an open-ended writing task in which they described one of these imagined futures in as much detail as possible, depending upon their assigned condition. Participants were asked to reflect upon the type of person that they would be, how they would feel, the types of things they would be doing, and to consider all aspects of life including family, relationships, career, health, leisure, and finances. Participants spent 2 min on this task and when this time limit was reached, participants were able to advance the screen to start the next task.

Next, participants completed a word-rating task, which was our primary measure of future optimism. During this task, participants were shown a series of 120 words

(60 positive and 60 negative, matched for self- and age-relevance; see Materials above). Words were presented one at a time, in random order. Participants were instructed to rate on a five-point scale (0 = *not at all relevant*, 4 = *very relevant*) how relevant each word would be to the imagined future associated with their randomly assigned condition (see Figure 1). For example, if the word "lonely" appeared on the screen, participants in the "self at age 85" condition would rate how self-relevant this word would be to their own life at age 85. When judging how relevant each word would be to one of these futures, participants were asked to take multiple factors into account (e.g., personality, social, career, health, leisure). All relevance ratings were self-paced.

This word-rating task differs from previous experimental tasks in several important and distinct ways. Prior research has assessed future optimism by asking participants to generate written narratives about possible future events (as was done in our first task; see also Chessell et al., 2014; Gallo et al., 2011; Gryzman, Prabhakar, Anglin, & Hudson, 2013; Gryzman et al., 2015). These open-ended

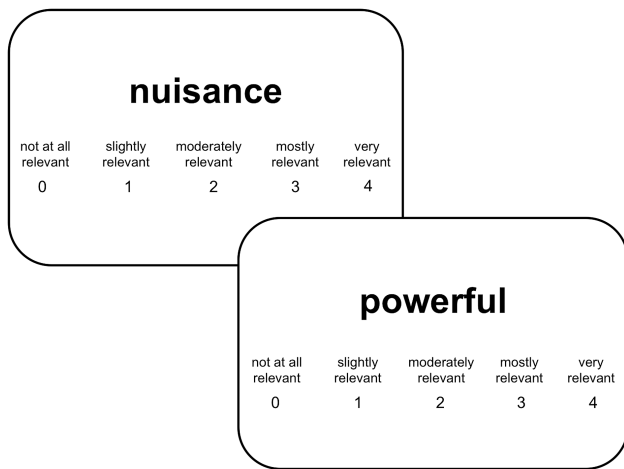


Figure 1. Example trials from the word-rating task.

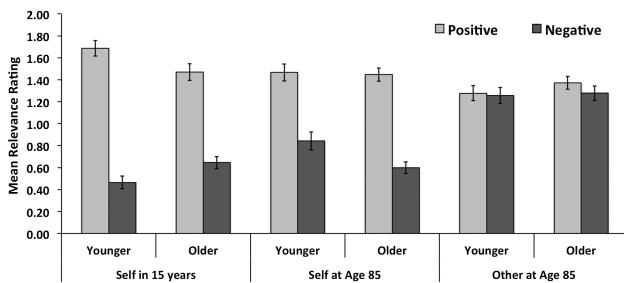


Figure 2. Mean relevance ratings of words as a function of age, condition, and valence. Error bars represent standard errors of the means.

narratives rely primarily on internally-generated thoughts and expectations about the future, which may be heavily influenced by mood and the motivation to maintain a positive well-being. Thus, these narratives are unlikely to include negative attributes or even a mixture of positive and negative features. Our task required participants to forecast to an age that realistically includes both positive and negative events (e.g., leisure, health deterioration). Thus, we provided participants with a list of words that represented a myriad of elements to be expanded upon. By presenting both positive (e.g., beach, dignified, wealthy) and negative (e.g., coffin, nuisance, feeble) words, participants were explicitly asked to consider both the positive and negative possibilities for these hypothetical futures in a way that might not have occurred without externally-generated stimuli.

After the word-rating task, participants rated their mood on a 0–100 scale. Baseline mood was assessed to determine whether the age groups differed on this factor; if so, this might be a potential confounding variable for any subsequently observed age differences. It was also assessed post-task to determine if participants' mood changed after imagining the future, and whether this varied as a function of participant's age and experimental condition. Lastly, participants completed several demographic and

self-report questionnaires, including several other potential confounding variables that could be related to future optimism (e.g., current emotional health, life satisfaction; for a full list, see Table 1).

Results

Participant Characteristics

Levene's test for equality of variances revealed that the variance between age groups was not always equal. In those instances, the reported degrees of freedom, *t* statistic, and *p* value are those in which equal variances were not assumed. Older adults had more years of education than younger adults, $t(529.56) = 4.51, p < .001, d = 0.38$. No age differences were found on measures of physical health (both *ps* > .10), but older adults reported higher levels of current emotional health, $t(567.99) = 4.43, p < .001, d = 0.37$, and emotional health over the past year, $t(558.13) = 6.61, p < .001, d = 0.55$, than younger adults. Older adults also reported higher levels of life satisfaction relative to younger adults, $t(575) = 3.69, p < .001, d = 0.31$. To ensure that the observed age difference could not be entirely explained by potential confounding variables, such as baseline mood, current emotional health, and life satisfaction, we re-ran the primary ANOVA for the word-rating task with these variables as covariates; in each case, the three-way interaction remained significant (all *ps* < .01). The difference between age groups in predicting one's overall health at age 85 was not significant (*p* > .10). As expected, younger adults predicted having significantly more years remaining in life than older adults, $t(435.72) = 31.20, p < .001, d = 2.63$.

With regard to additional self-report measures, older adults reported a more limited future time perspective than younger adults, $t(557.72) = 11.46, p < .001, d = 0.95$. Younger adults identified more with their own age group than older adults did, $t(575) = 2.05, p < .05, d = 0.17$. There was no difference between age groups on the perceived valence of one's own age (*p* > .10), but older adults reported that their age was a more salient part of their self-concept than younger adults did, $t(575) = 2.60, p = .01, d = 0.22$. Lastly, older adults reported more frequent contact with individuals over the age of 80, $t(550.69) = 6.95, p < .001, d = 0.58$, and perceived the quality of this contact as more positive than younger adults did, $t(575) = 6.49, p < .001, d = 0.54$.

Word-Rating Task

To evaluate whether participants' ratings for the words differed depending on age group and experimental condition, we calculated a mean relevance rating for both positive and negative words by averaging the ratings across all words, separately for each participant, within each valence category. We examined the effects of age and experimental condition on optimism for the future by conducting a 2 (Age:

younger, older) \times 3 (Condition: self in 15 years, self at age 85, other at age 85) \times 2 (Valence: positive, negative) mixed ANOVA on these mean word relevance ratings (see Figure 2). Within this analysis, there were main effects of Condition, $F(2, 571) = 14.16, p < .001, \eta_p^2 = .05$, and Valence, $F(1, 571) = 249.39, p < .001, \eta_p^2 = .30$, that were qualified by a significant Condition \times Valence interaction, $F(2, 571) = 55.71, p < .001, \eta_p^2 = .16$, and a significant Age \times Condition \times Valence interaction, $F(2, 571) = 5.91, p < .01, \eta_p^2 = .02$.

To decompose the three-way interaction, we conducted separate 2 (Age) \times 2 (Valence) mixed ANOVAs for each condition. When participants imagined themselves in 15 years, there was a main effect of Valence, $F(1, 186) = 238.69, p < .001, \eta_p^2 = .56$, and a significant Age \times Valence interaction, $F(1, 186) = 9.00, p < .01, \eta_p^2 = .05$. Overall, both age groups rated positive words as more relevant to their own lives in 15 years than negative words (both $ps < .001$); however, this was especially true of younger adults. Follow-up tests indicated that younger adults endorsed more positive words as relevant to their future than older adults, $t(186) = 2.10, p < .05, d = 0.31$, whereas older adults endorsed more negative words than younger adults, $t(186) = 2.28, p < .05, d = 0.33$.

In contrast, when participants were asked to imagine their future at age 85, there was a main effect of Valence, $F(1, 193) = 107.92, p < .001, \eta_p^2 = .36$, and a marginal main effect of Age, $F(1, 193) = 3.80, p = .053, \eta_p^2 = .02$. These main effects reflected the fact that positive words were rated as more relevant than negative words and younger adults had overall higher self-relevance ratings than older adults. Although the Age \times Valence interaction did not reach significance, $F(1, 193) = 2.51, p = .12$, we do note that the age difference in self-relevance ratings primarily occurred for the negative words ($p = .013$) and was statistically absent for the positive words ($p = .84$). To confirm that younger adults did in fact have lower optimism when forecasting themselves at age 85 compared to in 15 years, we ran a 2 (Condition: self in 15 years, self at age 85) \times 2 (Valence: positive, negative) mixed ANOVA. In addition to the main effect of Valence, $F(1, 188) = 194.55, p < .001, \eta_p^2 = .51$, in which positive words were rated as more relevant than negative words, there was a Condition \times Valence interaction, $F(1, 188) = 20.40, p < .001, \eta_p^2 = .10$. Younger adults rated significantly more positive words as relevant to their future in 15 years than their future at age 85, $t(188) = 2.09, p < .05, d = 0.30$. Younger adults also rated more negative words as relevant to their life at age 85 than their life 15 years from now, $t(171.33) = 3.75, p < .001, d = 0.54$.

Finally, when we examined how younger and older adults imagined the average person's future at age 85, there were no significant main effects or interactions (all $ps > .10$). To confirm that both age groups showed a positivity bias when imagining their own future but not others' future at age 85, we conducted a 2 (Age: younger, older) \times 2 (Condition: self at age 85, other at age 85) \times 2 (Valence: positive, negative) mixed ANOVA on mean relevance ratings. Main effects of Condition, $F(1, 385) = 18.07, p < .001,$

$\eta_p^2 = .05$, and Valence, $F(1, 385) = 71.23, p < .001, \eta_p^2 = .16$, were qualified by a Condition \times Valence interaction, $F(1, 385) = 52.24, p < .001, \eta_p^2 = .12$. Both age groups were more negative about others' future at age 85, $t(387) = 7.88, p < .001, d = 0.80$, and more positive about their own future at age 85, $t(387) = 1.98, p < .05, d = 0.20$. The Age \times Condition interaction was also marginally significant, $F(1, 385) = 3.76, p = .053, \eta_p^2 = .01$; older adults in the "other at age 85" condition gave higher overall ratings than older adults in the "self at age 85" condition, $t(177.46) = 5.72, p < .001, d = 0.81$, whereas younger adults' overall ratings did not differ in these two conditions ($p > .10$). No other main effects or interactions were significant (all $ps > .10$).

Next, we tested whether participants' attitude about their own age, beliefs about becoming older, and the frequency and quality of their contact with older adults moderated the observed effects of age on the relevance of positive and negative words in the self in 15 years condition and the relevance of negative words in the self at age 85 condition (see Table 1 for the list of potential moderating variables). To reduce the likelihood of Type 1 errors, we used a Bonferroni-adjusted critical alpha level of .0063 (i.e., a critical alpha of .05 divided by the eight possible interactions for each dependent variable). We conducted a series of moderation analyses using Hayes' (model 1) PROCESS macro for SPSS (Hayes, 2013) for each of the potential moderators listed in Table 1. Within each of these analyses, we used 95% bias-corrected confidence intervals based on 5,000 bootstrapped samples and mean centered the moderator and the interaction term.

Results indicated that anticipated health at age 85, $t(184) = 2.85, p = .0049$, expected number of years remaining in life, $t(182) = 3.47, p = .0007$, and the saliency of one's own age on their self-concept, $t(184) = 3.16, p = .0018$, moderated the effects of age on the relevance of positive words when imagining the future in 15 years. Follow-up simple slopes analyses revealed that age-related differences in positivity for one's future in 15 years only emerged when participants anticipated poor or average health at age 85 (poor: $t = 3.80, p < .001, \eta^2 = .48$; average: $t = 2.51, p = .01, \eta^2 = .22$). Additionally, the age difference only emerged when participants forecasted an average, $t = 2.62, p < .01, \eta^2 = .44$, or high number, $t = 3.67, p < .001, \eta^2 = 1.06$, of years remaining in life. Lastly, age differences were only observed when participants' own age was of average, $t = 2.12, p < .05, \eta^2 = .22$, or high, $t = 3.73, p < .001, \eta^2 = .54$, saliency to their self-concept. None of the variables moderated the effects of age on the relevance of negative words to one's future in 15 years or at age 85 (all $ps > .0063$).

Mood Scores

A univariate ANOVA was conducted on baseline mood scores with age and condition as fixed factors. A main effect of age, $F(1, 571) = 33.37, p < .001, \eta_p^2 = .06$, revealed

that older adults had a higher baseline mood than younger adults. Neither the main effect of condition nor the interaction was significant (both $ps > .10$). Next, we examined if participants' mood was affected by the experiment by conducting a 2 (Age: younger older) \times 3 (Condition: self in 15 years, self at age 85, other at age 85) \times 2 (Mood Assessment Time: baseline, post-task) mixed ANOVA. There was a main effect of Age, $F(1, 571) = 44.02, p < .001, \eta_p^2 = .07$, such that older adults had a more positive mood than younger adults. There was also a main effect of Mood Assessment Time, $F(1, 571) = 109.77, p < .001, \eta_p^2 = .16$, such that participants' mood declined over the course of the experiment. There was also an Age \times Mood Assessment Time interaction, $F(1, 571) = 6.81, p < .01, \eta_p^2 = .01$; younger adults showed a greater decline in mood than older adults did (mean change in mood scores for younger and older adults was 9.07 and 5.46, respectively). It is unlikely that younger adults' greater decline in mood led to the observed age difference in the word-rating task, as an age difference emerged in only one of the three experimental conditions. There was also no evidence that a change in mood significantly mediated or moderated the observed age difference in positive or negative words when participants forecasted their future in 15 years.

Writing Task

Participants' written responses were analyzed using Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Booth, & Francis, 2007). The overall word count did not differ between experimental conditions ($F < 1$). Older adults did include significantly more words in their written responses than younger adults, $F(1, 571) = 19.61, p < .001$; however, the Age \times Condition interaction was not significant ($F < 1$). This program provides two output variables that signify the percentage of positive and negative words. We conducted a 2 (Age: younger, older) \times 3 (Condition: self in 15 years, self at age 85, other at age 85) \times 2 (Valence: positive, negative) mixed ANOVA on these percentages (see Table 2). Within this analysis, there was a main effect of Valence, $F(1, 571) = 684.46, p < .001, \eta_p^2 = .55$; more positive than negative words were used. There was also a main effect of Condition, $F(2, 571) = 6.36, p < .01, \eta_p^2 = .02$. Post-hoc tests revealed that when participants included a greater percentage of emotional words when writing about their own future versus the average person's future at age 85 ($p = .001$; adjusted for multiple comparisons using the Bonferroni correction). No other comparisons between conditions were significant (both $ps > .10$).

A significant Condition \times Valence interaction, $F(2, 571) = 22.71, p < .001, \eta_p^2 = .07$, was also observed. Follow-up tests (all adjusted for multiple comparisons using the Bonferroni correction) showed that participants who wrote about their own future, both 15 years from now and at age 85, included a greater percentage of

Table 2. Means for the Percentage of Words in Participants' Written Responses Representing Positive and Negative Emotion as a Function of Age and Condition

	Positive	Negative
Younger adults		
Self in 15 years	6.16 (3.09)	0.38 (0.80)
Self at age 85	6.12 (3.65)	1.11 (2.00)
Other at age 85	4.05 (2.26)	1.65 (1.90)
Older adults		
Self in 15 years	5.47 (3.21)	0.87 (0.99)
Self at age 85	5.48 (3.35)	1.33 (2.76)
Other at age 85	4.46 (2.64)	1.49 (1.76)

Note: Standard deviations are given in parentheses.

positive words than people who wrote about the average person's future at age 85 (both $ps < .001$). The percentage of positive words between the two self-related conditions (i.e., self in 15 years and self at age 85) was not significant ($p > .10$). With regard to negative words, participants who wrote about their future in 15 years included fewer negative words than participants who wrote about their own future or the average person's future at age 85 (both $ps < .01$). The difference in negative words between writing about one's own future or the average person's future at age 85 was not significant ($p > .10$). The three-way interaction was marginally significant, $F(2, 571) = 2.87, p = .057, \eta_p^2 = .01$. This trend arose because there was a significant Age \times Valence interaction in the "self in 15 years" condition ($p = .014$), but not in the "self at age 85" or "other at age 85" conditions (both $ps > .10$). In the "self in 15 years" condition, older adults included significantly more negative words than younger adults ($p < .001$), whereas there was no difference between age groups for positive words ($p > .10$). No other main effects or interactions were significant (all $ps > .10$).

Discussion

This study investigated whether age differences in future optimism would be eliminated when younger and older adults projected to the exact same age (i.e., age 85), rather than forecasting to different ages and stages of life (i.e., 15 years from the present). As expected, younger adults were more optimistic than older adults when imagining their future in 15 years in both the word-rating task and the writing task. This finding fits nicely with previous studies showing that older adults are less optimistic about their future and their future selves compared to younger adults (Chessell et al., 2014; Kotter-Grühn & Smith, 2011; Ryff, 1991). However, novel to this study, when younger and older adults were explicitly told to forecast to the exact same age and stage of life, the two age groups showed comparable levels of optimism for the future, suggesting that previously reported age differences (e.g., Chessell et al.,

2014; Kotter-Gröhn & Smith, 2011; Ryff, 1991) are likely due to different frames of references used by younger and older adults. Supporting this notion, we found that younger adults were in fact less optimistic about their future at age 85 than their future in 15 years (i.e., when younger adults would be in their late 30s). Younger adults' reduced optimism when forecasting to age 85 could reflect realistic expectations for very old age (e.g., declines in health and mobility) and their assumption that quality of life may also decline (Baltes & Smith, 2003; Heckhausen & Baltes, 1991; Kornadt & Rothermund, 2014). Numerically, younger adults were more negative about their future at age 85 than older adults, which is in line with research demonstrating an age-related shift such that older adults tend to focus more on positive information than younger adults (Reed & Carstensen, 2012); however, the age-by-valence interaction did not reach significance.

We also found that both younger and older adults were more optimistic about their own future than the average person's future in very old age. Specifically, both younger and older adults rated a greater proportion of negative words as relevant to the average person's future than their own future at age 85, and this self-other difference was a large effect size. We also found that participants included a greater number of positive words when writing about their own future versus others' future in very old age. Previous research indicates that people are more optimistic about their own future than an acquaintance's future (Gryzman et al., 2013), and our results extend this line of research to how people view the future in very old age, a life stage associated with more negative life events (Kornadt & Rothermund, 2014). It is unclear whether individuals are overly optimistic about their own future or more pessimistic about others' future in very old age. Future research is needed to identify the most adaptive balance between optimism and realism when imagining the future in very old age.

Both younger and older adults rated a similar proportion of positive and negative words as relevant to average person's future in very old age. In contrast, participants included a greater number of positive than negative words when openly writing about their expectations for the average person's future in very old age. Moreover, the proportion of negative words did not differ between participants' written responses for their own future versus the average person's future in very old age. As discussed earlier, it is possible that when the task requires open-ended written responses, participants are less likely to generate overtly negative statements or even a mixture of positive and negative attributes, due to a variety of motivational factors. For instance, it is plausible that openly writing about the stereotypically negative aspects of aging could make individuals feel as if they are being prejudiced towards older adults. However, when the task requires participants to rate the relevance of single words, implicit negative biases towards older adults (Levy & Banaji, 2002; Nosek et al., 2002) may

be more likely to emerge. Although these possibilities are only speculative in nature, future research should consider whether optimism for the future and willingness to endorse negative age stereotypes varies depending on the format of the experimental task.

We also explored whether participants' attitude about their own age, beliefs about becoming older, and the frequency and quality of their contact with older adults would moderate findings from our primary word-rating task. These analyses revealed that the observed age difference in the relevance of positive words to one's own future in 15 years was moderated by anticipated health at age 85, expected number of years remaining in life, and saliency of one's own age on their self-concept. Future studies should determine precisely how these factors influence age-related differences in future optimism and under what circumstances. Our observation of participants' mood over the course of the experiment is also noteworthy. Consistent with an age-related shift towards a more positive focus (Carstensen, Mikels, & Mather, 2006), older adults' baseline mood was more positive than younger adults. We observed that participants' mood declined throughout the task regardless of age or condition, and younger adults' mood declined more than older adults. One tempting explanation is that imagining the future in very old age may be unpleasant as it prompts negative age stereotypes. However, this explanation is unlikely given that we observed a decline in mood even when both younger and older adults imagined their future 15 years from now. Perhaps a more parsimonious explanation is that the task itself (i.e., rating a series of 120 words presented one at a time on a computer screen) is relatively monotonous, which could have led to declines in mood, especially for younger adults.

One limitation of our study is that participants were recruited from the Internet using Amazon Mechanical Turk. Although research suggests that data collected via Amazon Mechanical Turk is high in quality and nearly as reliable as laboratory data (e.g., Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010), it is possible that using an online sample could have influenced our results. For example, certain factors may motivate individuals to participate in online studies (e.g., unemployment, socioeconomic status), some of which may influence one's optimism for the future. Future research should aim to replicate our findings using more traditional sampling methods (e.g., laboratory settings).

In summary, we found that younger adults were more optimistic than older adults when forecasting the future in 15 years. Several factors appear to moderate this age difference, such as anticipated health at age 85, expected number of years remaining in life, and saliency of one's own age on their self-concept. In contrast, when younger and older adults project to the exact same age (i.e., age 85), both age groups show similar levels of optimism for the future, and expect their future to be more positive than the average person's future at that age. Contrary to the conclusions

drawn from prior research, our results suggest that, when the projected age is the same for younger and older adults, the degree of optimism for the future does not differ between age groups. Age differences found in prior studies (e.g., Chessell et al., 2014; Kotter-Grühn & Smith, 2011; Ryff, 1991) are likely due to the fact that younger and older adults were projecting to different ages and stages of life when forecasting their future. These results emphasize the need for future research to take the participant's frame of reference into consideration when examining how optimism for the future might change across the life span.

Funding

This work was supported by the National Institute on Aging (grant numbers R01AG046464, T32AG000037).

Conflict of Interest

None reported.

References

- Atance, C. M., & O'Neill, D. K. (2001). Episodic future thinking. *TRENDS in Cognitive Sciences*, 5, 533–539. doi:10.1016/S1364-6613(00)01804-0
- Baltes, P. B., & Smith, J. (2003). New frontiers in the future of aging: From successful aging of the young old to the dilemmas of the fourth age. *Gerontology*, 49, 123–135. doi:10.1159/000067946
- Bradley, M. M., & Lang, P. J. (1999). *Affective norms for English words (ANEW): Stimuli, instruction manual and affective ratings*. Technical report C-1, Gainesville, FL: The Center for Research in Psychophysiology, University of Florida.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 6, 3–5. doi:10.1177/1745691610393980
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science (New York, N.Y.)*, 312, 1913–1915. doi:10.1126/science.1127488
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *The American Psychologist*, 54, 165–181. doi:10.1037/0003-066X.54.3.165
- Carstensen, L. L., & Lang, F. R. (1996). *Future Time Perspective Scale*. Unpublished manuscript. Stanford, CA: Stanford University.
- 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* (6th ed., pp. 343–362). San Diego, CA: Academic Press.
- 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
- Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review*, 30, 879–889. doi:10.1016/j.cpr.2010.01.006
- Celejewski, I., & Dion, K. K. (1998). Self-perception and perception of age groups as a function of the perceiver's category membership. *International Journal of Aging & Human Development*, 47, 205–216. doi:10.2190/GL4R-FJ7G-XGEK-MRR6
- Chessell, Z. J., Rathbone, C. J., Souchay, C., Charlesworth, L., & Moulin, C. J. A. (2014). Autobiographical memory, past and future events, and self-images in younger and older adults. *Self and Identity*, 13, 380–397. doi:10.1080/15298868.2013.836132
- Coltheart, M. (1981). The MRC psycholinguistic database. *Quarterly Journal of Experimental Psychology*, 33A, 497–505.
- D'Argembeau, A., Renaud, O., & Van der Linden, M. (2011). Frequency, characteristics and functions of future-oriented thoughts in daily life. *Applied Cognitive Psychology*, 25, 96–103. doi:10.1002/acp.1647
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49, 71–75. doi:10.1207/s15327752jpa4901_13
- Gallo, D. A., Korthauer, L. E., McDonough, I. M., Teshale, S., & Johnson, E. L. (2011). Age-related positivity effects and autobiographical memory detail: Evidence from a past/future source memory task. *Memory (Hove, England)*, 19, 641–652. doi:10.1080/09658211.2011.595723
- Garstka, T. A., Schmitt, M. T., Branscombe, N. R., & Hummert, M. L. (2004). How young and older adults differ in their responses to perceived age discrimination. *Psychology and Aging*, 19, 326–335. doi:10.1037/0882-7974.19.2.326
- Gawronski, K. A., Kim, E. S., Langa, K. M., & Kubzansky, L. D. (2016). Dispositional optimism and incidence of cognitive impairment in older adults. *Psychosomatic Medicine*, 78, 819–828. doi:10.1097/PSY.0000000000000345
- Giltay, E. J., Geleijnse, J. M., Zitman, F. G., Hoekstra, T., & Schouten, E. G. (2004). Dispositional optimism and all-cause and cardiovascular mortality in a prospective cohort of elderly Dutch men and women. *Archives of General Psychiatry*, 61, 1126–1135. doi:10.1001/archpsyc.61.11.1126
- Grysmán, A., Prabhakar, J., Anglin, S. M., & Hudson, J. A. (2013). The time travelling self: Comparing self and other in narratives of past and future events. *Consciousness and Cognition*, 22, 742–755. doi:10.1016/j.concog.2013.04.010
- Grysmán, A., Prabhakar, J., Anglin, S. M., & Hudson, J. A. (2015). Self-enhancement and the life script in future thinking across the lifespan. *Memory (Hove, England)*, 23, 774–785. doi:10.1080/09658211.2014.927505
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: The Guilford Press.
- Heckhausen, J., & Baltes, P. B. (1991). Perceived controllability of expected psychological change across adulthood and old age. *Journal of Gerontology*, 46, P165–P173. doi:10.1093/geronj/46.4.P165
- Kornadt, A. E., & Rothermund, K. (2014). Preparation for old age in different life domains: Dimensions and age differences. *International Journal of Behavioral Development*, 38, 228–238. doi:10.1177/0165025413512065
- Kotter-Grühn, D., & Smith, J. (2011). When time is running out: Changes in positive future perception and their relationships to changes in well-being in old age. *Psychology and Aging*, 26, 381–387. doi:10.1037/a0022223

- Levy, B. R., & Banaji, M. R. (2002). Implicit ageism. In T. D. Nelson (Ed.), *Ageism: Stereotyping and prejudice against older persons* (pp. 49–75). Cambridge, MA: The MIT Press.
- Mather, M., & Carstensen, L. L. (2005). Aging and motivated cognition: The positivity effect in attention and memory. *TRENDS in Cognitive Sciences*, *9*, 496–502. doi:10.1016/j.tics.2005.08.005
- Moran, J. M., Macrae, C. N., Heatherton, T. F., Wyland, C. L., & Kelley, W. M. (2006). Neuroanatomical evidence for distinct cognitive and affective components of self. *Journal of Cognitive Neuroscience*, *18*, 1586–1594. doi:10.1162/jocn.2006.18.9.1586
- Newby-Clark, I. R., & Ross, M. (2003). Conceiving the past and future. *Personality & Social Psychology Bulletin*, *29*, 807–818. doi:10.1177/0146167203029007001
- Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Harvesting implicit group attitudes and beliefs from a demonstration web site. *Group Dynamics: Theory, Research, and Practice*, *6*, 101–115. doi:10.1037/1089-2699.6.1.101
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making*, *5*, 411–419.
- Pennebaker, J. W., Booth, R., & Francis, M. (2007). *Linguistic inquiry and word count: LIWC [Computer software]*. Austin, TX: liwc.net.
- Rasmussen, H. N., Scheier, M. F., & Greenhouse, J. B. (2009). Optimism and physical health: A meta-analytic review. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, *37*, 239–256. doi:10.1007/s12160-009-9111-x
- Rasmussen, H. N., Wrosch, C., Scheier, M. F., & Carver, C. S. (2006). Self-regulation processes and health: The importance of optimism and goal adjustment. *Journal of Personality*, *74*, 1721–1747. doi:10.1111/j.1467-6494.2006.00426.x
- Reed, A. E., & Carstensen, L. L. (2012). The theory behind the age-related positivity effect. *Frontiers in Psychology*, *3*, 339. doi:10.3389/fpsyg.2012.00339
- Renoult, L., Kopp, L., Davidson, P. S., Taler, V., & Atance, C. M. (2016). You'll change more than I will: Adults' predictions about their own and others' future preferences. *Quarterly Journal of Experimental Psychology*, *69*, 299–309. doi:10.1080/17470218.2015.1046463
- Ryff, C. D. (1991). Possible selves in adulthood and old age: A tale of shifting horizons. *Psychology and Aging*, *6*, 286–295. doi:10.1037/0882-7974.6.2.286
- Schacter, D. L., Addis, D. R., & Buckner, R. L. (2008). Episodic simulation of future events: Concepts, data, and applications. *Annals of the New York Academy of Sciences*, *1124*, 39–60. doi:10.1196/annals.1440.001
- Schulz, R., & Fritz, S. (1987). Origins of stereotypes of the elderly: An experimental study of the self-other discrepancy. *Experimental Aging Research*, *13*, 189–195. doi:10.1080/03610738708259324
- Schwartz, L. K., & Simmons, J. P. (2001). Contact quality and attitudes toward the elderly. *Educational Gerontology*, *27*, 127–137. doi:10.1080/03601270151075525
- Sharot, T., Riccardi, A. M., Raio, C. M., & Phelps, E. A. (2007). Neural mechanisms mediating optimism bias. *Nature*, *450*, 102–105. doi:10.1038/nature06280
- Nes, L. S., & Segerstrom, S. C. (2006). Dispositional optimism and coping: A meta-analytic review. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology, Inc.*, *10*, 235–251. doi:10.1207/s15327957pspr1003_3
- Szpunar, K. K., Spreng, R. N., & Schacter, D. L. (2014). A taxonomy of prospection: Introducing an organizational framework for future-oriented cognition. *Proceedings of the National Academy of Sciences of the United States of America*, *111*, 18414–18421. doi:10.1073/pnas.1417144111
- Thomas, W. C. Jr. (1981). The expectation gap and the stereotype of the stereotype: Images of old people. *The Gerontologist*, *21*, 402–407. doi:10.1093/geront/21.4.402
- Weiss, D., & Freund, A. M. (2012). Still young at heart: Negative age-related information motivates distancing from same-aged people. *Psychology and Aging*, *27*, 173–180. doi:10.1037/a0024819