

## Research Article

# Aging Attitudes and Daily Awareness of Age-Related Change Interact to Predict Negative Affect

Shevaun D. Neupert, PhD\* and Jennifer A. Bellingtier, PhD

Department of Psychology, North Carolina State University, Raleigh.

\*Address correspondence to: Shevaun D. Neupert, PhD, Department of Psychology, North Carolina State University, Raleigh, NC 27695. E-mail: [shevaun\\_neupert@ncsu.edu](mailto:shevaun_neupert@ncsu.edu)

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## Abstract

**Background and Objectives:** Possessing more positive views of one's own aging is associated with better self-rated health, reduced reactivity to stressors, and better well-being. We examined two components of aging attitudes: awareness of age-related change (AARC) of loss and gain experiences and attitudes toward own aging (ATOA). We expected that AARC would vary day-to-day and interact with ATOA to predict daily negative affect.

**Research Design and Methods:** One hundred and sixteen participants (61% women, *M* age = 64.71, range 60–90) reported on 743 total days via an online daily diary study. On Day 1, participants reported baseline ATOA and baseline AARC for losses and gains. On Days 2–9, daily stressor exposure, daily AARC losses and gains, and negative affect were reported.

**Results:** Unconditional multilevel models revealed significant within-person fluctuation in daily AARC losses and gains. Controlling for daily stressors, age, and baseline AARC, daily increases in AARC losses were associated with increases in negative affect and a cross-level interaction revealed that this effect was stronger for those with more positive ATOA.

**Discussion and Implications:** AARC gains and losses vary from day-to-day, suggesting that interventions targeting the contextual fluctuations in daily life may be a promising avenue for future research. Specifically, individuals who feel generally positive about their own aging, although less likely to report awareness of daily age-related losses, may be the most vulnerable when they do occur. Efforts to reduce daily AARC losses (e.g., limiting activities due to age, receiving help because others assume age-related deficits) may improve the daily well-being of older adults.

**Keywords:** Attitudes toward own aging, Awareness of age-related change, Daily diary, Well-being

Possessing more positive views of one's own aging (or self-perceptions of aging; [Levy, 2009](#)) is associated with higher levels of life satisfaction ([Brothers, Miche, Wahl, & Diehl, 2015](#)), better self-rated health ([Beyer, Wolff, Warner, Schüz, & Wurm, 2015](#)), and better well-being ([Levy, 2003](#)). A negative attitude toward one's own aging tends to be associated with poorer subjective health, lower life satisfaction, and other indicators of poorer functioning ([Diehl, Wahl, Brothers, & Miche, 2015](#)). In Stereotype Embodiment Theory, [Levy \(2009\)](#) proposed that self-perceptions of aging are the result of internalized age stereotypes. These

self-perceptions of aging act as a lens through which age-related changes are interpreted and their causes attributed ([Sargent-Cox, Anstey, & Luszcz, 2014](#)), thus making the experience of aging subjective ([Miche et al., 2014](#)). Negative aging attitudes can act as a stress–diathesis, such that negative aging attitudes function as a personal vulnerability to react negatively to stressful events ([Bellingtier & Neupert, 2016](#); [Laidlaw, 2010](#)). Stressors that activate the pre-existing vulnerability of negative age self-stereotypes are loss experiences associated with aging and are the result of a person–experience interaction ([Laidlaw, 2010](#)). In the

current study, we examine the person-experience interaction through the interplay of individual differences in attitudes toward own aging (ATOA) and daily fluctuations in awareness of age-related change (AARC).

AARC focuses on concrete and everyday experiences (Brothers et al., 2015) that underlie individuals' evaluations of self-perceptions of aging (or subjective age, Diehl et al., 2015). Specifically, these are "experiences that make a person aware that his or her behavior, level of performance, or ways of experiencing his or her life have changed as a consequence of having grown older (i.e., increased chronological age)" (Diehl & Wahl, 2010, p. 340). This definition relies on the conscious perceptions of changed behavior as well as the direct attribution to increased chronological age, rather than to other changes such as health status (Diehl et al., 2015). A critical feature of this approach, congruent with self-perceptions of aging and age stereotypes, is that losses as well as gains are considered (Diehl et al., 2015). The awareness of age-related losses may impose developmental constraints on a person's behavior and experiences, whereas awareness of age-related gains may highlight developmental opportunities and motivate positive behaviors (Diehl & Wahl, 2010).

Strength and Vulnerability Integration (Charles, 2010) predicts that older adults have both strengths and vulnerabilities that impact their emotional reactions to stressors. The effects of daily experiences may be felt differently across the life span. Older adults may develop better emotion regulation skills over a lifetime of managing stressors and these skills may help them avoid or reframe the meaning of stressful events (Charles, 2010). On the other hand, older adults may be more vulnerable to stressors due to diminished physiological flexibility or fewer social supports (Charles, 2010; Schilling & Diehl, 2014). Positive ATOA may influence the situations older adults find themselves in (i.e., less likely to report a hospitalization; Levy, Slade, Chung, & Gill, 2015) and may serve as a lens through which experiences of aging are understood. For example, older adults with more negative ATOA responded with greater negative affect to daily stressors compared to those with more positive ATOA (Bellington & Neupert, 2016). Those with more positive aging attitudes may be best able to capitalize on the strengths of aging by effectively selecting situations that increase positive affect, (i.e., AARC gains), and effectively regulating their affect (Bellington & Neupert, 2016), but may also be most vulnerable to situations that threaten their positive views (i.e., AARC losses). Those with more negative aging views may experience fewer AARC gains and more AARC losses but be less distressed by any individual AARC loss. Thus, AARC losses and AARC gains represent the experiences that may underlie self-perceptions of aging. Although daily AARC experiences have been captured using a qualitative approach (Miche et al., 2014), no empirical research has yet incorporated AARC into a daily experience sampling study to allow for advanced empirical modeling. Establishing within-person variability in AARC

is a necessary first step in demonstrating that these constructs are state-like rather than merely trait-like.

The present study used daily diary methods to address the interaction of interindividual differences in ATOA with the intraindividual association of AARC and daily negative affect. Befitting Diehl and Wahl's (2010) definition of AARC reflecting experiences, we apply a process approach to capture the changing experiences that can occur to highlight one's awareness of age-related change on a daily basis. Hypothesis 1 reflects the expected dynamic nature of AARC; we expected significant intraindividual fluctuation in AARC losses and AARC gains. Hypothesis 2 tested whether ATOA would be positively associated with AARC gains and negatively associated with AARC losses, following the propositions of Strength and Vulnerability Integration (Charles, 2010). Hypothesis 3 focused on the interplay of individual differences in ATOA and daily AARC losses, tying in the expected person-experience interactions (Laidlaw, 2010) to self-perceptions of aging. We focused on AARC losses as opposed to AARC gains because the magnitude of the relationship between ATOA and AARC losses tends to be stronger than the link between ATOA and AARC gains (Brothers et al., 2015). Further, Meisner's (2012) meta-analysis of positive and negative age stereotype priming found negative stereotypes to exert nearly a three times larger effect on the behavior of older adults than positive stereotypes. Consistent with daily stressor research (e.g., Neupert, Almeida, & Charles, 2007), we operationalized emotional reactivity as the within-person slope between daily AARC and negative affect. Specifically, we expected that emotional reactivity would depend on individual differences in ATOA. Based on Strength and Vulnerability Integration (Charles, 2010), we expected that individuals with generally positive aging attitudes would be more vulnerable/reactive to daily increases in awareness of losses.

## Method

### Participants and Procedure

Participants were from the Mindfulness and Anticipatory Coping Everyday study and were recruited through Amazon's Mechanical Turk. Recruitment involved posting a Human Intelligence Task requesting adults 60 years and older with a link to the survey. Filters restricted participants to those living in the United States. When participants clicked the link to the survey they were redirected to Qualtrics where they provided informed consent and then continued with the Day 1 survey. Upon completion of the Day 1 survey, participants' responses were reviewed to ensure that their stated age and date of birth aligned. Participants with matching age and date of birth indicating age 60 or older, as well as indicating that a doctor had never told them that they had dementia or mild cognitive impairment, were invited to continue with the daily portion of the study.

One hundred and seventy-one people completed Day 1 but 32 were not qualified to move on (not 60+, not in the United States, or identified a cognitive impairment) and 23 were qualified to move on but chose not to. These 23 individuals were not significantly different in ATOA, age, neuroticism, chronic health conditions, life event stressors, or education from those who did move on to Day 2. Those who did continue on to Day 2 were significantly higher in baseline AARC gains. A similar pattern holds when comparing individuals who did at least 3 days compared to those who did only 2 days. Of the initial participants, 116 continued to the daily diary portion of the study. Seventy-one (61%) participants completed all 9 days. The compliance rate was 71.2%, with 743 out of 1044 possible days completed.

Participants were aged 60–90 ( $M = 64.71$ ,  $SD = 4.98$ , 61% women) and most (90%) identified as White. Education ranged from less than a High School degree to a graduate degree, with Bachelor's degree the most common (30%).

Participants completed online surveys over nine consecutive days. The Day 1 survey collected demographic information (e.g., age and SES) and individual differences in aging attitudes and awareness of age-related change. The Day 2–9 surveys contained items assessing daily stressors, affect, daily awareness of age-related change, and other measures not examined in the current study. Participants were compensated \$1 per study day completed.

## Measures

**Aging Attitudes** were assessed on Day 1 with the Attitudes Towards Own Aging (ATOA) subscale of the Philadelphia Geriatric Center Morale Scale (Lawton, 1975). The measure includes five items assessing overall views of the aging process (e.g., "I am as happy now as I was when I was younger"). Items were answered on a 5-point Likert scale from 1 (*does not apply to me*) to 5 (*applies very well*). Scores were averaged and higher scores indicated more positive attitudes towards aging ( $\alpha = .82$ ).

**Awareness of Age-Related Change (AARC; Diehl & Wahl, 2010)** was assessed at baseline on Day 1 and daily on Days 2–9 via a short 20-item version of the AARC Questionnaire (AARC-20; Brothers et al., 2015). The Day 1 measure was included to control for baseline and trait-level differences in AARC. The measure was adapted for daily use on Days 2–9 by adjusting the lead-in to each item (i.e., instead of beginning each prompt with "With my increasing age..." we began each prompt with, "With my awareness of aging today..."). There were two subscales reflecting daily perceptions of age-related gains (e.g., "With my awareness of aging today, I realize that I try to be more myself") and age-related losses (e.g., "With my awareness of aging today, I realize that I am slower in my thinking"). Responses were measured on a 5-point Likert scale and summed for each subscale with higher scores reflecting

greater daily perceptions of age-related gains and losses respectively (Day 1 gains  $\alpha = .85$ ; Day 2 gains  $\alpha = .88$ , Day 1 losses  $\alpha = .90$ ; Day 2 losses  $\alpha = .90$ ).

**Daily Negative Affect** was assessed on Days 2–9 using the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), consisting of two 10-item mood scales. Negative affect was measured by words such as irritable, ashamed, and nervous. Participants were asked to indicate the extent to which they felt these emotions in the past 24 hr. Responses were measured on a 5-point Likert scale, such that higher scores indicated more negative affect. Scores for each item were averaged, and participants received a daily score (Day 2  $\alpha = .90$ ).

**Covariates** *Daily stressors* were included as a covariate because they are associated with increased daily negative affect (Almeida, Wethington, & Kessler, 2002) and interact with ATOA to predict negative affect (Bellinger & Neupert, 2016). Daily stressors were assessed on Days 2–9 with the Daily Inventory of Stressful Events (Almeida et al., 2002) querying yes/no responses to stressors in seven domains (e.g., arguments, home-related stressors, social network stressors). Daily scores were created by summing the number of affirmative responses each day. Age was also used as a covariate to control for differences in affect (Charles, 2010) and ATOA (Miche, Elsässer, Schilling, & Wahl, 2014) between young-old and older-old adults.

## Analyses

Multilevel modeling using SAS Institute (1997) Proc Mixed with the REML estimation method (because we assumed data were missing at random) was implemented to address Hypotheses 1 and 3. MLM adjusts estimates when there are different number of days per person and is frequently used to model intraindividual variability; that is, people's variability around their own average. This technique was especially useful in the current study because we sought to examine interindividual differences (e.g., ATOA) in reactivity (e.g., the within-person relationship between AARC and negative affect), which we modeled using the following formula to test Hypothesis 3:

Level 1:

$$\text{NEGATIVE AFFECT}_{it} = \beta_{0it} + \beta_{1it}(\text{STRESSORS}) + \beta_{2it}(\text{AARC LOSSES}) + r_{it} \quad (1)$$

Level 2:

$$\beta_{0i} = \gamma_{00} + \gamma_{01}(\text{AGE}) + \gamma_{02}(\text{AVERAGE AARC LOSSES}) + \gamma_{03}(\text{DAY 1 AARC LOSSES}) + \gamma_{04}(\text{ATOA}) + u_{0i} \quad (2)$$

$$\beta_{1i} = \gamma_{10} \quad (3)$$

$$\beta_{2i} = \gamma_{20} + \gamma_{21}(\text{ATOA}) \quad (4)$$

In Equation 1, the intercept ( $\beta_{0it}$ ) is defined as the expected level of negative affect for person  $i$  on days when no stressors (i.e., STRESSOR = 0) and no AARC losses (AARC LOSSES = 0) occurred. The  $\beta_{1it}$  slope is the expected change in negative affect associated with days when stressors increase and the  $\beta_{2it}$  slope is the expected change in negative affect associated with days when AARC losses increase. The error term ( $\epsilon_{it}$ ) represents a unique effect associated with person  $i$  (i.e., fluctuation around the mean). Equation 2 includes age, average AARC losses (which served to person-mean center the daily AARC variable and focus on state-like deviations of losses from one's own average), and Day 1 AARC losses (to adjust for trait-level differences between people) as covariates and tests for ATOA differences in the average level of negative affect, with the intercept ( $\gamma_{00}$ ) representing the average level of negative affect when all predictors are at 0. Equation 3 yields  $\gamma_{10}$  representing the average relationship between daily stressors and negative affect. Equation 4 provides the average relationship between daily AARC losses and negative affect ( $\gamma_{20}$ ; reactivity) and tests whether there is a cross-level interaction of ATOA (between-person)  $\times$  AARC (within-person) ( $\gamma_{21}$ ; ATOA differences in reactivity). Interindividual deviations from the mean level are represented by  $u_{0i}$ .

Fully unconditional multilevel models (Raudenbush & Bryk, 2002) were used to test the dynamic nature of AARC losses and gains expected in Hypothesis 1. These models contained no predictors and yielded estimates of within-person ( $\sigma^2$ ) and between-person ( $\tau_{00}$ ) variability. The estimates were used to obtain the intraclass correlation coefficient ( $\rho = \tau_{00}/[\tau_{00} + \sigma^2]$ ), which represents the amount of between-person variance in the dependent variable. Significant  $z$  statistics for the variability estimates indicate a significant amount of variance from that respective level of analysis.

## Results

Descriptive statistics for all study variables can be found in Table 1. Results from fully unconditional MLMs indicated that, consistent with expectations, there was a significant amount of within-person variance for AARC losses (8% of the variance was within-person;  $\sigma^2 = 5.34$ ,  $z = 16.19$ ,  $p < .0001$ ) and AARC gains (9% of the variance was within-person;  $\sigma^2 = 6.02$ ,  $z = 16.19$ ,  $p < .0001$ ).

Hypothesis 2 addressed the relationship between ATOA and AARC. In line with expectations, between-person Pearson correlations revealed that people with more positive views of their own aging reported more AARC gains at baseline,  $r(104) = .48$ ,  $p < .0001$  as well as more AARC gains across the study period,  $r(104) = .36$ ,  $p < .001$ . Also consistent with expectations, those with more positive views of their own aging reported fewer AARC losses at baseline,  $r(104) = -.71$ ,  $p < .0001$  and across the study period,  $r(104) = -.66$ ,  $p < .0001$ .

Results from the model to test Hypothesis 3 can be found in Table 2. People with more positive attitudes toward their own aging reported less negative affect ( $\gamma_{04}$ ) than people with less positive attitudes toward their own aging. Importantly, the within-person relationship between daily AARC losses and negative affect was moderated by ATOA ( $\gamma_{21}$ ); as can be seen in Figure 1, those with more positive ATOA were more reactive (i.e., exhibited a steeper within-person slope) to increases in daily AARC losses compared to those with less positive ATOA.

**Table 1.** Descriptive Statistics for Study Variables

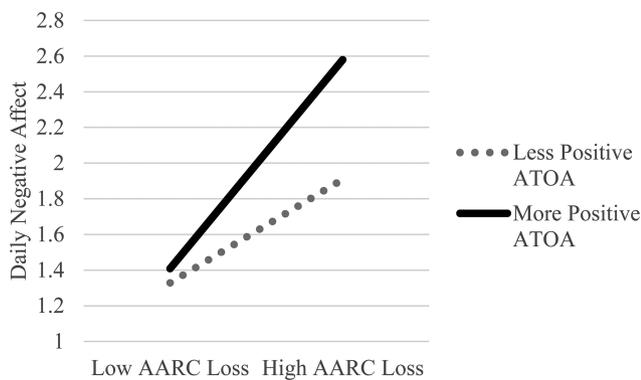
	<i>M</i>	<i>SD</i>	Range
Age	64.71	4.98	60–90
Day 1 AARC losses	22.49	8.29	10–39
Day 1 AARC gains	37.69	7.10	19–50
Average AARC losses	20.41	7.87	10–42
Average AARC gains	37.41	8.38	10–50
Daily AARC losses	19.86	7.89	10–42
Daily AARC gains	37.80	8.21	10–50
Daily stressors	0.49	0.81	0–5
ATOA	3.38	0.95	1–5
Negative affect	1.35	0.56	1–4

*Note:* Between-person scores: Age, Day 1 AARC Losses, Day 1 AARC Gains, Average AARC Losses (between-person average based on daily assessments), Average AARC Gains (between-person average based on daily assessments), ATOA. Within-person scores: Daily AARC Losses, Daily AARC Gains, Daily Stressors, Negative Affect. AARC = awareness of age-related change; ATOA = attitudes toward own aging.

**Table 2.** Unstandardized Estimates (and *SE*) from a Multilevel Model Predicting Daily Negative Affect

Fixed effects	
Negative affect, $\beta_0$	
Intercept, $\gamma_{00}$	1.80**(0.68)
Age, $\gamma_{01}$	–0.01(0.01)
Average AARC losses, $\gamma_{02}$	0.02(0.01)
Day 1 AARC losses, $\gamma_{03}$	–0.00(0.01)
ATOA, $\gamma_{04}$	–0.22*(0.10)
Daily stressors, $\beta_1$	
Intercept, $\gamma_{10}$	0.09***(0.02)
Daily AARC losses, $\beta_2$	
Intercept, $\gamma_{20}$	–0.02(0.01)
ATOA, $\gamma_{21}$	0.02***(0.004)
Random effects	
Negative affect ( $\tau_{00}$ )	0.17***(0.03)
Within-Person Fluctuation ( $\sigma^2$ )	0.08***(0.004)
R <sup>2</sup> between-person	35%
R <sup>2</sup> within-person	11%

*Note:* AARC = awareness of age-related change; ATOA = attitudes toward own aging. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . Estimates of effect size were calculated based on the pseudo-R<sup>2</sup> method outlined by Raudenbush and Bryk (2002).



**Figure 1.** Cross-level interaction of daily AARC losses and baseline ATOA predicting daily negative affect. Predicted points were plotted using low ( $M - 1SD$ ) and high ( $M + 1SD$ ) values of each variable. AARC = awareness of age-related change; ATOA = attitudes toward own aging.

## Discussion

The goals of the current study were to examine the dynamic nature of AARC and explore the person–environment interaction of individual differences in aging attitudes and daily experiences of AARC losses on daily negative affect. These results extend previous research that treated AARC as an individual difference characteristic (e.g., Brothers et al., 2015; Diehl & Wahl, 2010) or examined change in AARC over longer periods of time (Dutt, Gabrian, & Wahl, 2016).

Results from the unconditional multilevel models support the first hypothesis that there would be significant intraindividual variability in daily AARC. Consistent with the theoretical description of AARC (Brothers et al., 2015; Diehl & Wahl, 2010), the experiences that underlie individuals' self-perceptions of aging do appear to change on an everyday basis. This suggests that the experiences tied to changes in daily AARC do not need to be severe or infrequent; instead, they can be seemingly minor, common experiences (e.g., realizing that one is slower in thinking today than usual). It is important to note that there were also significant individual differences in AARC, which in previous studies have been associated with psychological well-being (Brothers, Gabrian, Wahl, & Diehl, 2016), functional health, and satisfaction with life (Brothers et al., 2015).

Consistent with Strength and Vulnerability Integration (Charles, 2010) and the second hypothesis, people with more positive views of their own aging reported more gains and fewer losses with respect to their awareness of age-related change compared to people with less positive views of their own aging. Those with positive aging attitudes may be best able to capitalize on the strengths of aging by effectively selecting situations that increase positive affect (i.e., AARC gains) and effectively regulating their affect (Bellinger & Neupert, 2016). Examining the specific mechanisms under which these processes operate could be a fruitful avenue for future research.

Also in line with Strength and Vulnerability Integration (Charles, 2010) and the third hypothesis, those with more

positive ATOA were more reactive to increases in daily AARC losses compared to those with less positive ATOA, suggesting vulnerability to situations that threaten positive views (i.e., AARC losses). Because we person-mean centered daily AARC losses, our results suggest that even when controlling for individual differences in AARC, deviations in losses from one's own typical average are important for well-being and interact with individual differences in ATOA. It could be that individuals with more positive ATOA have a higher threshold for reporting AARC losses. Perhaps the loss needs to be perceived as more serious for them to report it than individuals with less positive ATOA who may be generally inclined to see losses in everyday life. Thus, the stronger link between AARC loss and daily negative affect in those with more positive ATOA could reflect more severe AARC losses. This appraisal of AARC losses, similar to appraisals of stressors (Lazarus, 1999) and the lens through which age-related changes are interpreted (Sargent-Cox et al., 2014), will be important for future research.

There are several implications of these findings for service-delivery and practice. AARC gains and losses vary from day-to-day, suggesting that interventions targeting the contextual fluctuations in daily life may be promising for future research (Wahl, Iwarsson, & Oswald, 2012). Specifically, individuals who feel generally positive about their own aging may be the most vulnerable to daily fluctuations in loss-based experiences of their awareness of aging. For example, when these individuals feel they must limit their daily activities or others assume they need assistance due to their age, it takes a toll. Efforts to help older adults remain active (e.g., Aging<sup>PLUS</sup>; Brothers & Diehl, 2016) or that reduce societal ageist beliefs could help reduce the daily experience of AARC losses and boost well-being.

Results of the current study should be considered in light of some limitations. The sample was mostly White and younger old with a mean age of 65, although we did have a wide age range (60–90). Including age as a covariate did not alter the results but future studies with a more diverse sample in terms of racial and ethnic backgrounds would provide an opportunity to more clearly examine the role of chronological age and race as moderators. We also note that the Positive and Negative Affect Schedule (Watson et al., 1988) tends to focus on high arousal states and may not generalize to all negative affect states. We were able to find significant within-person variance in the daily AARC measures with 8 consecutive days of measurement, but future studies with more consecutive days which could include an important event that would create a big shift in AARC may be able to increase the within-person variance estimates. If AARC is truly more variable than we have identified in the current study, it may be a good target for interventions because it does change on a rather rapid basis.

Limitations notwithstanding, this is the first investigation to establish the daily dynamic nature of AARC and focus on the person–environment interaction of ATOA and AARC from a daily perspective. Our results suggest

that interventions targeting daily fluctuations in loss-based domains of AARC may be especially helpful for those who already possess a generally positive view of their own aging.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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