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Growing Old and Being Old: Emotional Well-Being Across Adulthood

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Abstract

The current study examines change in reports of daily, weekly, and monthly psychological distress over 20 years, and of negative and positive affect over 10 years, using data from the Midlife in the United States (MIDUS) study. The study includes three waves of data collection on adults ranging from 22 to 95 years-old. Cross-sectional findings reveal that older age is related to lower levels of psychological distress and negative affect and to higher levels of positive affect across each successive age group. Yet, longitudinal findings vary across younger, middle-aged, and older adults. Psychological distress decreases over time among younger adults (although only until age 33 for weekly reports), remains stable in midlife, and is stable (monthly) or slightly increases (daily and weekly) among older adults. For negative affect, levels decrease over time for younger and middle-aged adults, and only increase for the oldest adults for daily and monthly affect. Positive affect is stable over time among younger adults, but decreases in midlife starting in the mid-fifties. In conclusion, overall patterns of findings suggest that being old (assessed cross-sectionally) is related to higher levels of emotional well-being. Growing old (assessed longitudinally) is related to improvements in emotional well-being across younger and early middle adulthood, which mirrors cross-sectional findings. There is relative stability in later midlife, however, and continued stability or slight declines across older age.

Keywords

Psychological Distress; Positive Affect; Negative Affect; Life-span; Aging

Older adults generally experience relatively high levels of emotional well-being. Several large cross-sectional and longitudinal studies reveal that older age is related to higher levels

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of positive affect and lower levels of negative affect (see Charles & Carstensen, 2010; Stone et al., 2010; Mroczek & Kolarz, 1998). In one striking example including nearly half a million participants ranging in age from their late teens to their mid-80s, successively older adults reported gradually lower levels of daily stress, worry, and anger, and higher ratings of happiness when asked about the emotions they had experienced over the past day (Stone et al., 2010). Other studies find similar patterns across adulthood. Older age is related to less frequent negative affect and more frequent positive affect when people report their emotional experiences across the day (Carstensen et al., 2011), during the last two weeks (Charles et al., 2001), and across the prior month (Mroczek & Kolarz, 1998). Even during the COVID-19 pandemic, when the physical threat of the disease was greatest for older adults, older age was related to lower levels of psychological distress (Carstensen et al., 2020; Young et al., 2021; Twenge & Joiner, 2020). These age differences often replicate across gender and ethnicity, and after adjusting for health status and education (e.g., Charles et al., 2001; Kunzmann et al., 2000; Morczek & Kolarz, 1998).

Most studies conducted on emotional well-being trajectories across the life course were conducted in the last part of the 20th century. The current study tests whether these patterns replicate into the current century by examining how emotional well-being assessed across three temporal windows (the past day, week, and month) varies by age and changes over time within different age groups across 20 years (for psychological distress) and 10 years (for negative and positive affect). Our predictions are guided by two theories: Socioemotional Selectivity (SST) and Strength and Vulnerability Integration (SAVI)

Explaining Changes in Emotional Well-Being with Age

Socioemotional selectivity theory (SST) describes age-related changes in motivation that underlie age-related increases in emotional well-being across the life span (Carstensen, 2021). SST posits that a person's awareness of how much time is left in their life (i.e., time perspective) is related to their social motivations. As people perceive a narrowing of their temporal horizons, they increasingly prioritize social goals related to meaning and social satisfaction. As a result, older age is related to a tendency to deploy greater cognitive resources for positive over negative information (i.e., the positivity effect), which is predicted to contribute to positive emotional states. Older adults appraise even negative situations more positively than do younger adults and attend to and remember more positive information compared to negative information (for a review, see Reed & Carstensen, 2012). This motivation may partially explain why psychological distress declines with age (Mroczek & Kolarz, 1998) and why longitudinal studies examining rates of anxiety and depressive symptoms show age-related declines across three age groups (20–24-year-olds, 40–44-year-olds, and 60–64-year-olds; Jorm et al., 2005).

When life circumstances constrain older adults from using these strategies, however, Strength and Vulnerability Integration (SAVI) posits that age-related increases in well-being will attenuate or will no longer be present (Charles, 2010; Charles & Piazza, 2007). SAVI incorporates SST by explaining how the tendency to disengage from stressful experiences—or avoid them completely—is a strength of aging. By avoiding stressful situations, people avoid physical reactivity to these events. SAVI further posits that age-related changes

in health make the body more vulnerable to stress reactivity, so reducing physiological reactivity is particularly important for the long-term health of older adults. Yet, losses are more likely to occur in late life (Heckhausen et al., 1989), sometimes making stressful situations impossible to avoid. When avoidance is impossible and people experience high levels of arousal, age differences in well-being will attenuate if not disappear. Furthermore, certain losses, such as health problems that interfere with daily life, are more common in later adulthood, thus explaining why trajectories of well-being often decline toward the end of the lifespan.

Affect After Age 65

Age-related decreases in negative affect and stability (or increases) in positive affect are fairly consistent until studies focus on participants 65 years and older. Research examining only older adults (i.e., those over age 65), yields mixed findings, with some studies showing continued age-related declines in negative affect (Schöllgen et al., 2012), others demonstrating an attenuated decline (Charles et al., 2001), and still others indicating a leveling off of emotional well-being (Carstensen et al., 2011) or an upturn of negative affect over time (Davey et al., 2004; van't Veer-Tazelaar, 2008). Although rates of distress rarely equal those observed among younger adults, most of these studies find stable if not slight, age-related increases in negative affect when examining only people aged 65 and older. For example, a cross-sectional study comparing older adults (i.e., those 65–75) to their even older peers (those starting the study at age 76 and older) shows age-related increases in negative affect (Nakagawa et al., 2020). Another longitudinal study indicates decreases in negative affect from midlife to approximately 70 years of age, at which time negative affect increases slightly (Griffin et al., 2006).

Positive affect, in contrast, often remains stable or slightly decreases among the oldest-old. For example, one study found that over the course of 22 years, people who were at least 62 years old at the study's onset increased in positive affect during the first eight years, but then decreased in positive affect across the remaining 14-year period (Gana et al., 2015). In a longitudinal study that followed middle-aged and older Japanese adults across 14 years, positive affect increased across midlife, but then declined across older age (Nakagawa et al., 2020).

The Current Study

The current study examines age differences and change in two types of negative distress (psychological distress over 20 years and negative affect across 10 years), and in positive affect (across 10 years) and across three temporal windows (asking participants about their emotional experiences across the day, week, and month). In 1995 and approximately 10 and 20 years later, people were asked about psychological distress they experienced daily, weekly, and monthly. Psychological distress was measured with questions assessing anxiety and depressive symptoms (Kessler et al., 2002), whereas negative affect was assessed by a broader range of negative emotional experiences that included these questions as well as others (e.g., anger, loneliness). At the second and third time point, participants were also asked about positive and negative affect.

Most longitudinal studies of affect usually model overall linear and quadratic trends across the entire age range. In the current study, we model the rate of intra-individual change (i.e., slope) in affect within successively older age bands, and compare these slopes to detect how age at baseline is related to the rate of change in positive and negative affect across different age bands. We predict that for people who began the study as younger and middle-aged adults, psychological distress and negative affect decreases, and positive affect remains stable or decreases over time. We further predict that for people beginning the study after age 65, age-related benefits in well-being attenuate or even reverse in direction. We base this prediction on the assumption that after age 65, people are more likely to experience situations such as bereavement, poor health, and other unavoidable losses that elicit high levels of distress. To test one of these assumptions, we examine the presence of functional limitations to see if functional limitations contributes to age-related patterns of well-being. We tested this prediction in two prior studies (Piazza et al., 2007; Piazza et al., 2015) and found that age-related increases in emotional well-being did not replicate among samples with poorer physical health. However, these studies tested the hypothesis cross-sectionally, whereas the current study examines this question both cross-sectionally and longitudinally.

We further explored whether age differences were smaller for reports of more proximal (e.g., daily as opposed to monthly) emotional experiences. Our rationale is based on SAVI's prediction that age differences grow smaller the closer people are to a noxious stimulus. Older adults perceive, appraise, and remember fewer of the negative aspects of life, a phenomenon referred to as the positivity effect (Carstensen & Mikels, 2005). Because of the positivity effect, questions that ask participants to reflect on longer periods of time may result in more positive appraisal. In contrast, questions about affect over shorter intervals (such as asking how their emotions are that day) may be more tied to the emotion-eliciting stimuli as opposed to chronically activated goals. One study, for example, found that age differences in negative affect across shorter recall periods (i.e., emotions that day) were smaller than differences across longer recall periods (i.e., that prior month; Charles et al., 2016). Another study, however, found that these effects only occurred soon after the stressor: age was unrelated to reports of negative affect immediately after a stressor, but were soon evident after 10 minutes (Scott et al., 2017). This age-related pattern did not occur across longer intervals (e.g., when comparing 2.5 hours versus 5 hours after a stressor). Given these mixed findings, we explored whether age-related advantages are more pronounced when asking about the emotional experiences people had over the prior month than when asked about emotions over the prior 24 hours.

Finally, all of our models adjusted for gender, education, functional health and race. The theories guiding our predictions regarding why age-related improvements may occur in younger and middle-adulthood (time perceived left in life; socioemotional selectivity theory), and why they may not in very late life (experiencing more unavoidable situations later in life; SAVI) are hypothesized to act similarly across men and women, and people of different education levels and race. Yet, researchers have found that levels of affect and age differences vary by gender and educational differences (e.g., Mroczek & Kolarz, 1998). Differences in health status also often vary by gender, educational level and ethnicity. For these reasons, we included gender, educational level, health, and ethnicity in all

analyses, and we further explored whether age-related patterns in affect vary by these sociodemographic factors.

Method

Participants and Procedure

Participants were from the National Study of Daily Experiences (NSDE), a subproject of the Midlife in the United States (MIDUS) study (https://www.icpsr.umich.edu/web/ICPSR/series/203). As part of the MIDUS study, all participants completed a larger MIDUS Survey on their overall health and well-being, where they reported levels of psychological distress and positive and negative affect over the *past 30 days*. This larger survey was repeated at approximately 10-year intervals, resulting in three waves of longitudinal data over a 20-year period (MIDUS 1: ~1995; MIDUS 2: ~2004: MIDUS 3: ~2013). From the original wave, 82% of participants completed wave 2, and 72% of those completing wave 2 remained in the study to complete wave 3.

A subset of participants from the first wave, randomly invited from the larger MIDUS Survey project, agreed to participate in the NSDE project and completed end-of-day telephone interviews for eight consecutive days that assessed levels of psychological distress and affect over the *past 24 hours*. On the eighth day of daily telephone interviews, participants reported their levels of psychological distress and affect over the *past 7 days* (for a detailed description of data collection, see Almeida, 2005; Almeida et al., 2009). The NSDE data collection consisted of three waves of daily assessments repeated at approximately 10-year intervals, providing longitudinal daily diary data across 20 years of adulthood (NSDE 1: ~1996; NSDE 2: ~2005; NSDE 3: ~2017). Daily diary data was collected on a total of 33,900 days out of 37,576 possible days (completion rate = 90%). At wave 2, the NSDE subsample was replenished by adding participants who completed the original MIDUS survey but did not participate in wave 1 of the NSDE data collection. From the original wave of NSDE data collection, 53% completed wave 2 (N = 793), and 52% of those completing wave 2 continued to complete wave 3 (N = 1,048). In total, 1,429 participants completed two or more waves.

The current research made use of all available data from respondents who participated in any of the three NSDE waves. Figure 1 depicts the timing that each affective measure was collected, and Table 1 presents the number of participants, waves, and daily assessments completed across the three retrospective periods.

Measures: 24-hour, 7-day, and 30-day Retrospection

Psychological Distress—During each wave of the MIDUS Survey and NSDE data collections, participants were asked to indicate how frequently they felt each of six emotions (*fidgety*, *nervous*, *worthless*, *so sad that nothing could cheer you up*, *everything was an effort*, and *hopeless*; Mroczek & Kolarz, 1998) on a scale from 0 (*none of the time*) to 4 (*all of the time*). The same items were used to capture the three retrospective periods (daily, weekly, and monthly), but were altered to ask about emotions felt in the past 24 hours,

7 days, or 30 days, respectively. Daily, weekly, and monthly psychological distress scores were computed by averaging across the items from the respective recall period.

Negative Affect—A broader negative affect measure was included in waves 2 and 3 of both the NSDE project and the MIDUS Survey project. This measure consisted of 14 items, which included the original 6 items from the psychological distress measure and 8 additional negative emotions (e.g., *lonely*, *afraid*, *irritable*, *ashamed*, *upset*). Participants reported how frequently they felt each emotion in the past 24 hours (for end of day assessment), in the past 7 days (for end of week assessment), or in the past 30 days (for MIDUS Survey assessment). Daily, weekly, and monthly negative affect scores were computed by averaging across the items from the respective recall periods.

Positive Affect—Positive affect was assessed during waves 2 and 3 of both the NSDE and MIDUS Survey data collections. Participants were presented with a list of 13 positive emotions (e.g., *cheerful*, *in good spirits*, *calm and peaceful*, *enthusiastic*) and asked to indicate how frequently they felt each emotion in the past 24 hours (for end of day assessment), in the past 7 days (for end of week assessment), or in the past 30 days (for MIDUS Survey assessment). Responses ranged from 0 (*none of the time*) to 4 (*all of the time*). Positive affect scores were computed by averaging across the items.

Functional Health—To capture levels of functional health, the Instrumental Activities of Daily Living scale (IADLs) was measured during the initial MIDUS Survey data collection. Items reflect an individual's ability to engage in everyday activities, including lifting or carrying groceries; climbing several flights of stairs; bending, kneeling, or stooping; walking more than a mile; walking several blocks; engaging in vigorous activity; and engaging in moderate activity. Participants report how much difficulty they have carrying out each of these activities on a scale from 1 (*not at all*) to 4 (*a lot*), with higher scores indicating greater functional limitations.

Covariates—Participant age at baseline, sex, education, and race were included as covariates to adjust for sample heterogeneity. Age at baseline was grouped into five-year bins (<30; 31–35; 36–40; 41–45; 46–50; 51–55; 56–60; 61–65; 66–70; >70) and was centered at the youngest age in all statistical models. Gender was coded as a binary variable (sex) with males as the reference category. Education and race were both coded as dichotomous variables (0=*high school or less*, 1=*some college or more*, and *0=white, 1=not white*, respectively).

Descriptive statistics at each wave are presented in Table 1. Measurement invariance analyses were carried out for each of the outcome measures (i.e., psychological distress, negative affect, and positive affect). Scaler invariance across time was established for the outcomes using the criteria of differences in the comparative fit index (CFI) and root mean-square error of approximation (RMSEA) <.01 and <.015, respectively, across more constrained models (Chen, 2007; Cheung & Rensvold, 2002; Putnick & Bornstein, 2016)[1]. Further, previous research has demonstrated these affect measures to be equivalent across age groups (Charles, Mogle, Leger, & Almeida, 2019)

Transparency and Openness

Data are publicly available and can be found at the following website: (https://www.icpsr.umich.edu/web/ICPSR/series/203). All analyses were completed using Mplus v8.8 (Muthén & Muthén, 2017), and both scripts and output are available upon request. This study's design and its analysis were not pre-registered on any official website, although plans for these specific hypotheses using these data were articulated in the NIH grant: P01 AG020166. These data have been publicly accessible for over 20 years, with hundreds of studies including measures of psychological distress, positive and negative affect from both the MIDUS survey and the daily diary project (see the following website for a list of publications: www.midus.wisc.edu/findings/index.php). One study specifically examined age differences in monthly psychological distress and a slightly different measure of monthly positive affect from the first wave of the MIDUS study (Mrozcek & Kolarz, 1998), but no study has examined longitudinal trends across the three waves of data presented here. The study was approved by the Institutional Review Board of the Pennsylvania State University (PRAMS00042558).

Data Analytic Strategy

Multilevel modeling analyses were used to examine both longitudinal age changes and cross-sectional age differences in emotional experiences for each retrospective period (i.e., 24-hour, 7-day, 30-day recall). An interaction term was included between longitudinal changes and age at baseline to examine whether younger adults changed differently over time relative to middle-aged or older adults. While our data does not permit us to fully disentangle the age-period-cohort (APC) effects (Fosse & Winship, 2019; Murphy & Yang, 2018), including longitudinal age changes, cross-sectional age differences, and the interaction between the two does allow for a disentangling of the age-cohort effects, where we can address the distinction between growing old and being old.

Furthermore, functional health limitations were included in all models as both a main effect on initial levels of emotional experiences, as well as a moderator of longitudinal age changes and cross-sectional age differences. A three-way interaction between age change, age differences, and functional health was included to examine whether age differences in the longitudinal rates of change depended on functional health status at baseline. Finally, to explore whether our covariates were also moderating age-related patterns, we examined interactions for each of our covariates (gender, education, ethnicity).

For the 24-hour recall models, daily measurement occasions were nested within measurement waves and measurement waves were nested within people, resulting in three levels of analysis. Changes in daily emotional well-being were estimated with the following equation:

$$\text{Level 1:} \quad \text{EWB}_{ijk} = \pi_{0ij} + e_{ijk} \tag{1a}$$

[1]Due to the large sample size in the current study, criteria for invariance testing were based on differences in the practical fit indices, CFI and RMSEA, instead of relying on chi-square difference tests, which have been consistently shown to be overly sensitive in large samples (Putnick & Bornstein, 2016; Widaman, Ferrer, & Conger, 2010).

$$\text{Level 2:} \quad \pi_{0ij} = \beta_{00i} + \beta_{01i}(Wave_{ij}) + r_{0ij} \tag{1b}$$

$$\text{Level 3:} \quad \beta_{00i} = \gamma_{000} + \gamma_{001}(Age.BL_i) + \gamma_{002}(IADL_i) + \gamma_{003}(Age.BL * IADL_i) + \gamma_{004}(Sex_i) + \gamma_{005}(College_i) + \gamma_{006}(Race_i) + u_{00i} \tag{1c}$$

$$\beta_{01i} = \gamma_{010} + \gamma_{011}(Age.BL_i) + \gamma_{012}(IADL_i) + \gamma_{013}(Age.BL * IADL_i) + u_{01i} \tag{1d}$$

where EWB_{ijk} is the emotional well-being score (i.e., psychological distress, positive or negative affect) measured on day k during wave j for person i; π_{0ij} is the average daily emotional well-being estimate for person i at wave j, and e_{ijk} represents the within-wave residual. At Level 2, the within-wave emotional well-being estimate (π_{0ij}) was regressed on $Wave_{ij}$ (coded 0, 1, or 2) to provide an estimate of macro-longitudinal change in daily emotional well-being across waves for each individual (β_{01i}; between-wave, Level 2). β_{00i} represents the average daily EWB estimate for person i at baseline (i.e., when $Wave_{ij} = 0$). At Level 3, Age at baseline ($Age.BL_i$), $IADL_i$, Sex_i, $College_i$, and $Race_i$ were included as between-person covariates. γ_{003} reflects the interaction between Age at baseline and $IADL_i$, which models whether cross-sectional age differences differed based on functional health status at baseline.

Age at baseline and $IADL_i$ were also included as between-person moderators of changes in emotion (i.e., γ_{011} and γ_{012}, respectively). γ_{013} reflects the three-way interaction between Age at baseline, $IADL_i$, and longitudinal changes in emotion. Therefore, γ_{001} provides the fixed estimate of cross-sectional age differences in daily emotional experiences, γ_{010} provides the fixed estimate of longitudinal age differences, and γ_{011} provides the fixed estimate of age differences in longitudinal age changes. u_{00i} and u_{01i} represent the random effects.

The 7-day and 30-day recall models consisted of a single affect value at each wave, which was nested within people, resulting in two levels of analysis. Changes in emotional well-being were estimated with the following equation:

$$\text{Level 1:} \quad EWB_{ij} = \beta_{0i} + \beta_{1i}(Wave_{ij}) + e_{ij} \tag{2a}$$

$$\text{Level 2:} \quad \beta_{0i} = \gamma_{00} + \gamma_{01}(Age.BL_i) + + \gamma_{02}(IADL_i) + \gamma_{03}(Age.BL * IADL_i) + \gamma_{04}(Sex_i) + \gamma_{05}(College_i) + \gamma_{06}(Race_i) + u_{0i} \tag{2b}$$

$$\beta_{1i} = \gamma_{10} + \gamma_{11}(Age.BL_i) + \gamma_{12}(IADL_i) + \gamma_{13}(Age.BL * IADL_i) + u_{1i} \tag{2c}$$

Emotional well-being for person i at wave j (EWB_{ij}) was regressed on $Wave_{ij}$ (coded 0, 1, or 2) to provide an estimate of change in emotional well-being across waves, γ_{10} (between-person, Level 2). Age at baseline ($Age.BL$), $IADL_i$, Sex, $College$, and $Race$ were included as between-person (Level 2) covariates. γ_{03} reflects the interaction between Age at baseline and $IADL_i$, which models whether cross-sectional age differences differed based on functional health status at baseline.

Age at baseline and $IADL_i$ were also included as between-person moderators of longitudinal changes in emotional well-being (i.e., γ_{11} and γ_{12}, respectively). γ_{013} reflects the three-way interaction between Age at baseline, $IADL_i$, and longitudinal changes in emotion. All models were estimated in Mplus v8.8 (Muthén & Muthén, 2017) using full information maximum likelihood with robust standard errors (MLR).

Monte Carlo simulations of the two- and three-level models were carried out in Mplus to estimate power to detect longitudinal emotional outcomes, as well as 2- and 3-way moderators of longitudinal changes with between person-level variables (i.e., age and IADL). Simulation results revealed sufficient power (>.80) to detect small to moderate effects (i.e., accounting for <10% of total variability).

Results

Psychological Distress

Analyses revealed both cross-sectional age differences and longitudinal age changes in the experience of psychological distress that were consistent across retrospective recall time windows (see Table 2). Cross-sectional analyses indicated that for each of the three retrospective recall windows, older age at baseline was related to lower levels of psychological distress.

Longitudinally, individuals reported significant declines in daily (24-hour recall), weekly (7-day recall), and monthly (30-day recall) psychological distress across the 20-year follow-up. Importantly, these results were conditioned by age, such that age at baseline moderated longitudinal changes in psychological distress for all three retrospective periods. Figure 2 (top panels) displays the nature of this interaction. The Johnson-Neyman technique (Johnson & Neyman, 1936; Rast, Rush, Piccinin, & Hofer, 2014) was used to further probe the significance of the longitudinal changes across varying ages throughout adulthood. Figure 2A (bottom panel) shows that younger adults, who were younger than 45 years at baseline, reported significant declines in daily psychological distress over the 20 years of follow-up. Middle-aged adults (between the ages of 45 and 58 years at baseline), reported stable levels of psychological distress, as indicated by a non-significant slope, and older adults (over the age of 58 at baseline) showed significant longitudinal increases in daily levels of psychological distress.

Despite similar overall patterns, slightly different regions of significance emerged for the 7-day and 30-day retrospective reporting of psychological distress (Figure 2B and C, bottom panel). Younger adults displayed longitudinal declines in weekly reports of psychological distress, but these statistically significant declines only occurred up to the age of 33 years. Middle-aged adults displayed stable longitudinal trajectories, while adults over the age of 57 at baseline significantly increased in their reports of weekly psychological distress. For monthly psychological distress, younger adults displayed significant longitudinal declines until the baseline age of 47. Beyond this age, no significant longitudinal changes were detected, and though older adults were estimated to have slight increases in their psychological distress, this increase was not statistically significant, as indicated by the 95% confidence bands overlapping zero.

Negative Affect

Examining negative emotional experiences using the broader negative affect measure revealed significant cross-sectional age differences and longitudinal changes. Table 3 presents the results from the multilevel models across the three retrospective recall windows. Consistently across retrospective recall windows, older adults at baseline reported lower levels of negative affect relative to younger adults.

Similarly, significant longitudinal declines in negative affect were reported across the 10-year follow-up. Once again, however, age at baseline moderated longitudinal changes for reports of daily and monthly (but not weekly) negative affect. Figure 3 displays similar patterns for both the 24-hour and 30-day retrospective periods. Younger adults decline most steeply in their negative affect over the 10-year follow-up, though middle-aged adults also show significant longitudinal declines. Individuals between the ages of 59 to 80 years at baseline for the 24-hour retrospective period, and between 55 to 77 years at baseline for the 30-day retrospective period (see Figures 2A and 2C, bottom panel) do not significantly change over time. Beyond these ages, individuals display significant longitudinal increases in daily and monthly levels of negative affect. Results from the 7-day retrospective period, however, indicate consistent declines in reports of weekly negative affect until age 79, where the rate of decline lessens to non-significance (Figure 3B).

Positive Affect

Table 4 presents the multilevel modeling results examining age differences and changes in the emotional experience of positive affect. A significant cross-sectional age effect in positive affect for all three retrospective time windows revealed that older adults at baseline reported higher levels of positive affect relative to younger adults. No significant longitudinal age changes in positive affect were detected when participants were centered at the youngest age, but age at baseline again moderated longitudinal changes. This interaction effect was significant for the 24-hour, 7-day, and 30-day retrospective recall windows.

The patterns of the age differences in longitudinal changes are consistent across the three retrospective periods. As displayed in Figure 4 (top panels), younger adults are relatively stable in their reports of positive affect over the 10-year follow-up, whereas middle-aged and older adults decline in positive affect over time, despite reporting higher levels initially at baseline. The Johnson-Neyman plots (Figure 4, bottom panels) confirm that declines in positive affect are statistically significant starting in middle adulthood (ages 56, 55, and 51 for the 24-hour, 7-day, and 30-day periods, respectively).

Functional Health

Consistently across emotion outcomes and retrospective recall periods, functional health was an important predictor. In all models, individuals who had more functional limitations at baseline also had higher levels of psychological distress and negative affect, and lower levels of positive affect (see Tables 2, 3, and 4, respectively). Functional health also significantly moderated both longitudinal changes and cross-sectional age differences in psychological distress and negative affect.

Furthermore, in the models of psychological distress and negative affect, functional health also moderated the effect of cross-sectional age differences on longitudinal changes. In this three-way interaction, individuals with more functional limitations at baseline showed a more extreme cross-sectional age by wave interaction. Figure 5 illustrates the nature of the three-way interaction by displaying the longitudinal and cross-sectional age patterns across people who reported higher than average (1 SD above the mean value) functional limitations at baseline.

Effects of Covariates

Sex, education, and race were included in all models to account for differences in initial levels of emotional experiences due to sample heterogeneity. The effects of these covariates varied across the three emotional experience variables and retrospective recall periods. Though some significant associations emerged, the patterns were not consistent. For example, individuals who completed some college reported significantly lower levels of daily and monthly psychological distress. However, education was not associated with weekly psychological distress, nor was it associated with any of the negative affect recall periods, and college educated individuals reported significantly less daily and weekly positive affect. Similar inconsistent findings emerged for both sex and race.

Additional sensitivity analyses were conducted to examine whether any of the covariates (i.e., sex, education, and race) moderated the longitudinal changes or cross-sectional age differences. Results of these additional analyses consistently revealed that sex, education, and race did not moderate the age-related effects on emotional well-being (i.e., 25 out of 27 additional effects examined through these sensitivity analyses were non-significant). There were two exceptions, where sex moderated longitudinal changes in psychological distress and negative affect for the 30-day retrospective recall period. In both instances, females exhibited steeper declines in psychological distress and negative affect than males. Given the post hoc nature of these analyses, and the largely consistent null findings across the other temporal recall periods, the results of these sex interactions should be interpreted with caution.

Discussion

The current study assessed emotional experiences (psychological distress, negative and positive affect) over time and across different age groups in a large sample including adults ranging from 22 to 95 years old. Cross-sectional analyses of participants at each wave of data collection, across all emotional experiences and recall windows, revealed that older age was associated with higher levels of well-being. At each time point, older age was associated with lower levels of psychological distress and negative affect, and higher levels of positive affect. Among people in their twenties and thirties, longitudinal findings across waves support hypotheses of age-related increases in well-being. For people in midlife, psychological distress remained stable over time. For people starting the study at older ages, findings are more variable.

Being Old: Cross-Sectional Findings

Cross-sectional findings are consistent with previous studies that reveal an age-related advantage for emotional well-being. Across all waves of data collection, the oldest adults reported the highest levels of positive affect and the lowest levels of negative affect and psychological distress. These results replicate patterns across many cross-sectional studies, where the highest rates of distress and the lowest levels of positive affect are among younger adults (e.g., Carstensen et al., 2011; Stone et al., 2010). Prior studies have examined age differences among groups sampled in the early 1970s (Charles et al., 2010), the late 1990s (e.g. Carstensen et al., 2000), and the beginning of this century (Stone et al., 2010). Findings from the current study, where the first wave was collected in 1995 and the last in 2016, replicate previous findings and show that this age-related pattern is robust over time and is not related to a particular period or driven by a single cohort.

Growing Old: Longitudinal Findings

The cross-sectional pattern at each wave is similar to the longitudinal change over time among the younger adults. People who started the study as young adults (i.e., in their twenties and thirties in 1995/1996) exhibited declines in their reported distress and negative affect. Longitudinal declines for negative affect and stability in positive affect replicates a pattern observed in a prior study that observed change across 23 years from 1970–1993 (Charles et al., 2001). This developmental pattern of affect is consistent with socioemotional selectivity, a theory that describes how adults increasingly prioritize emotional meaning and experiences that fulfill emotion-related goals, which in turn shifts how they view and remember their experiences (see review by Reed et al., 2014). Changes in social partner frequency and emotional closeness predicted by SST are observed starting when people are in their early 30s (Carstensen, 1992). Thus, the changes we observed in psychological distress and negative affect are consistent with changes that occur relatively young in adulthood. This age-related pattern is similar to developmental patterns in personality traits with strong affective components. One large meta-analysis, for example, found that emotional stability increased across young adulthood, from age 20 to 40 (Roberts et al., 2006). The stability of positive affect is also consistent with the stability in vitality – a component of the personality trait extraversion that includes positive affect – across young adulthood (Roberts et al., 2006).

For people in midlife – those who started the study in their forties and fifties – rates of psychological distress were stable over time, negative affect declined in a pattern similar to younger adults, and positive affect declined among those who started the study in their late fifties. For people who began the study as older adults, findings generally indicate either stability or overall declines in well-being. With the exception of declines in weekly reports of negative affect over time, reports of negative affect remained stable, psychological distress remained stable for monthly reports but increased for weekly and daily reports, and positive affect declined across the two measurement waves. Some previous studies have found stable levels--if not slight declines--in well-being beginning around age 60 (Carstensen et al., 2011; Charles et al., 2001). In another study of a sample of people 65 years and older, sadness increased over time (Davey et al., 2004). Declines in positive affect also replicate prior findings showing slight decreases in positive affect among people

age 65 and older (Charles et al., 2001) and longitudinal trends in personality. The vitality component of extraversion, which includes positive affect, decreases over time among older adults (Roberts et al., 2006).

The different pattern for psychological distress and negative affect may reflect the specific affect measured. Psychological distress only included questions about sadness and anxiety, whereas negative affect included these emotional experiences, as well as questions about anger, frustration, irritation, and feeling restless/fidgety, and jittery. According to the lifespan theory of discrete emotions (Kunzmann et al., 2014), younger adults, during period of growth and expansive horizons, need to tenaciously pursue their goals, and anger reflects their goal striving. As people age, however, they encounter a greater number of losses, and sadness may facilitate disengagement from no longer tenable goals. In the current study, even though all the questions in the psychological distress measure were included in the negative affect measure, psychological distress had a greater proportion of depressive symptoms. The current findings are consistent with the lifespan theory of discrete emotions and suggest that the type of emotions assessed influences the pattern of age differences we find in psychological studies.

These findings are also consistent with constraints late in life that are described by the theoretical model of Strength and Vulnerability Integration (Charles, 2010), which states that although age is related to increases in emotional well-being overall, downturns in well-being in later life occur as a result of the increased prevalence of adverse life circumstances. When faced with situations that cannot be avoided or ameliorated by emotion regulation strategies, individuals will show an upturn in rates of distress. These experiences often occur near the end of life, when physical health problems create functional limitations, pain, or cognitive impairment that impede emotion regulation strategies that had once been effective for reducing exposures to problems in the past but can no longer remove these new obstacles.

We investigated one of these circumstances – functional limitations – and found that the effect of functional limitations resulted in more pronounced age-related patterns in later life for daily and weekly psychological distress and negative affect. Even the least healthy younger adults, however, also exhibited declines in distress and negative affect over time, suggesting that younger adults also benefit from age-related changes. It is unclear at this time what age-related mechanisms are facilitating well-being in younger adults and working differently among older adults. Perhaps older adults have limitations that are indicative of more severe illness, placing them close to death and the terminal drop in well-being (Schilling et al., 2018). Another possibility is that we are capturing younger adults closer to the onset of functional disabilities when we surveyed them at the first wave, and decreases in distress may reflect adjustment periods. Studies that capture the timing of health-related changes and that have more time points will be able to examine these questions.

Time Intervals

We explored whether the temporal recall window would increase age-related effects, such that age-related advantages for affect would be most apparent for monthly reports compared to questions asking about emotions more proximal to the emotion-eliciting events. We

observed this only for psychological distress, where longitudinal increases occurred for the shorter intervals (24-hour and weekly intervals) but not monthly intervals. A prior study did find greater age differences with longer temporal intervals (Charles et al., 2016), but this study also adjusted for external factors in daily life known to elicit positive and negative emotions (i.e., average number of weekly stressors and positive uplifts) and used a cross-sectional sample. In an experience-sampling study, age differences were not apparent at the time people reported a stressor, but emerged quickly afterwards; the study did not, however, find this age pattern when comparing across time frames farther removed from any emotion-eliciting stimulus (Scott et al., 2017). Perhaps one reason why we did not observe a similar pattern is that all three of our questions about affect were assessed retrospectively (over the last day, week or month), which required people to reflect and reconstruct their emotional experiences as opposed to report their immediate reactions to an emotion-eliciting event. For a more accurate test of SAVI, future research should examine emotional experiences that occur simultaneously or soon after the emotion-eliciting event.

Possible Period Effects

We measured psychological distress across three time points, which allowed us to examine age-related changes across time periods. Positive and negative affect, however, were assessed at two time points only, which raises concerns that a one-time period effect may be influencing the findings. For example, during the first wave of data collection (1995–1997), the U.S. was experiencing an era of relative prosperity and had less involvement in military engagements than it did in the next two waves of data collection. In 1995, the federal government experienced a surplus, but would would go into deficit in 2001 throughout the study period. These historical factors may have influenced the downward trajectory of positive affect for people in the study, but it would not explain why only those in their 50s and older would be affected, and only for positive affect. More time points, however, will continue to clarify age-related trajectories of positive affect and the potential influences of period effects.

Limitations

The study has several strengths, including the assessment of emotional experiencing using three different temporal windows (daily, weekly, monthly) across three waves of data collection for psychological distress, and two waves of data collection for positive and negative affect. Moreover, the large samples included a wide adult age range. These strengths, however, need to be weighed in relation to its weaknesses. For example, the study included almost all (over 90%) white Americans, with higher than average education and income levels. The extent to which these findings generalize to racially and ethnically diverse Americans, or to people who have attained lower levels of education and income, is unknown. In addition, positive and negative affect were assessed at only two of the time points. Finally, information about affect is limited to the specific type of emotion questions and the response options included in the survey. Emotions vary in valence and arousal, and include a myriad of different types of emotions and emotional experiences. In addition, people were asked how often they experienced these emotions, and not the intensity of these experiences. Although frequency often correlates with intensity, we did not examine both aspects in the current study.

Conclusion

For over 50 years, researchers have studied how emotional experiences vary by age and change over time. Theories describe why emotional well-being improves over time and why emotional well-being sometimes decreases in very old age. The current findings affirm that 20 years across this century largely mirrors previous findings from the past century. Being old is related to advantages in well-being: older adults consistently report higher levels of positive affect and lower levels of negative affect and distress than younger adults. When examining the effects of growing old, the overall patterns of findings indicate that well-being improves over time as people age throughout their twenties, thirties, and into their forties. For people aging through their forties and fifties, well-being is more mixed but largely remains stable. Beyond the fifties, stability and slight declines in well-being are not unusual. Our findings thus reflect the idea that being old and growing old have different implications for emotional well-being across the life-span.

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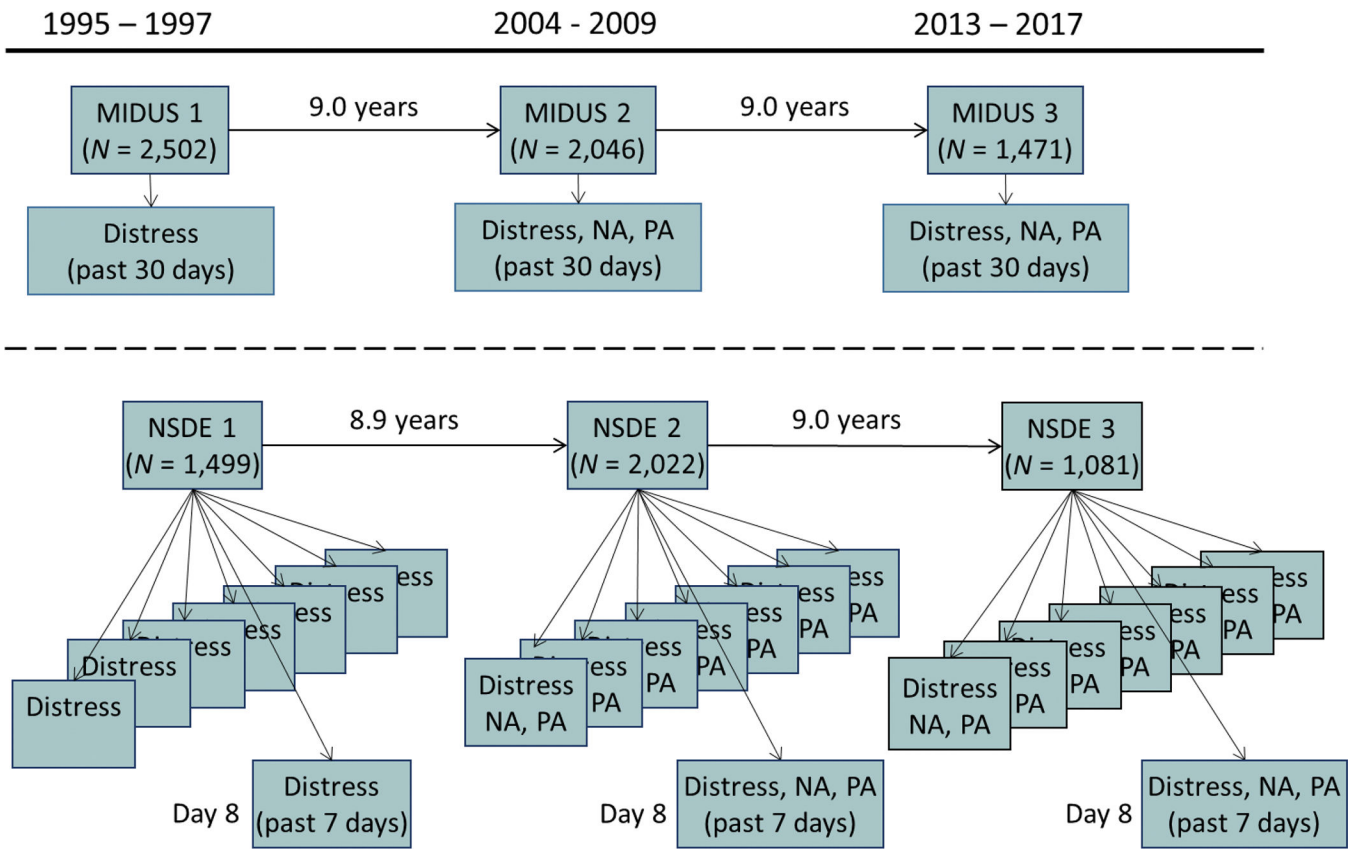

Figure 1. MIDUS / NSDE Study Design

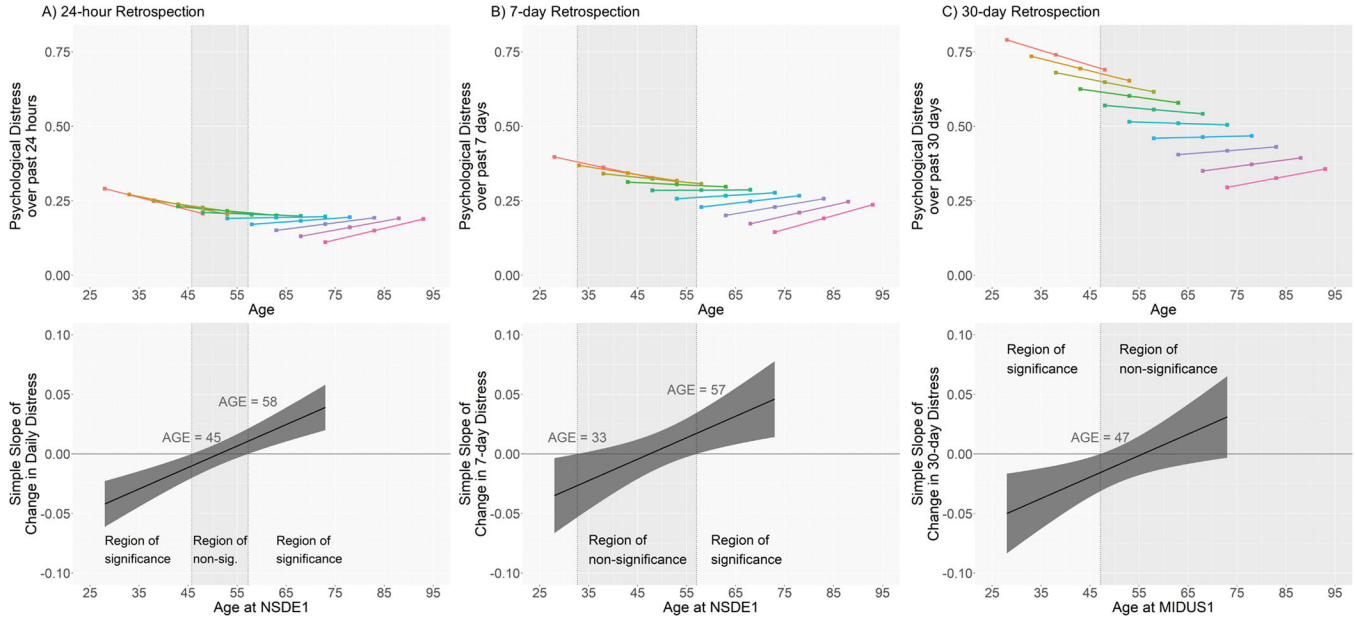

Figure 2. Top Panels: Longitudinal Age Changes and Cross-Sectional Age Differences in Psychological Distress Across Adulthood. Bottom Panels: Johnson-Neyman Plots to Identify Regions of Significance.

Note: The simple slope of change in psychological distress is shown across varying Age at baseline (thick black line). The gray bands represent the 95% confidence interval that can be used to infer statistical significance. When the horizontal zero line is included in the confidence bands, the simple slope is not statistically significant at that age. The vertical hatched line denotes the boundary age where longitudinal change in psychological distress is no longer statistically significant.

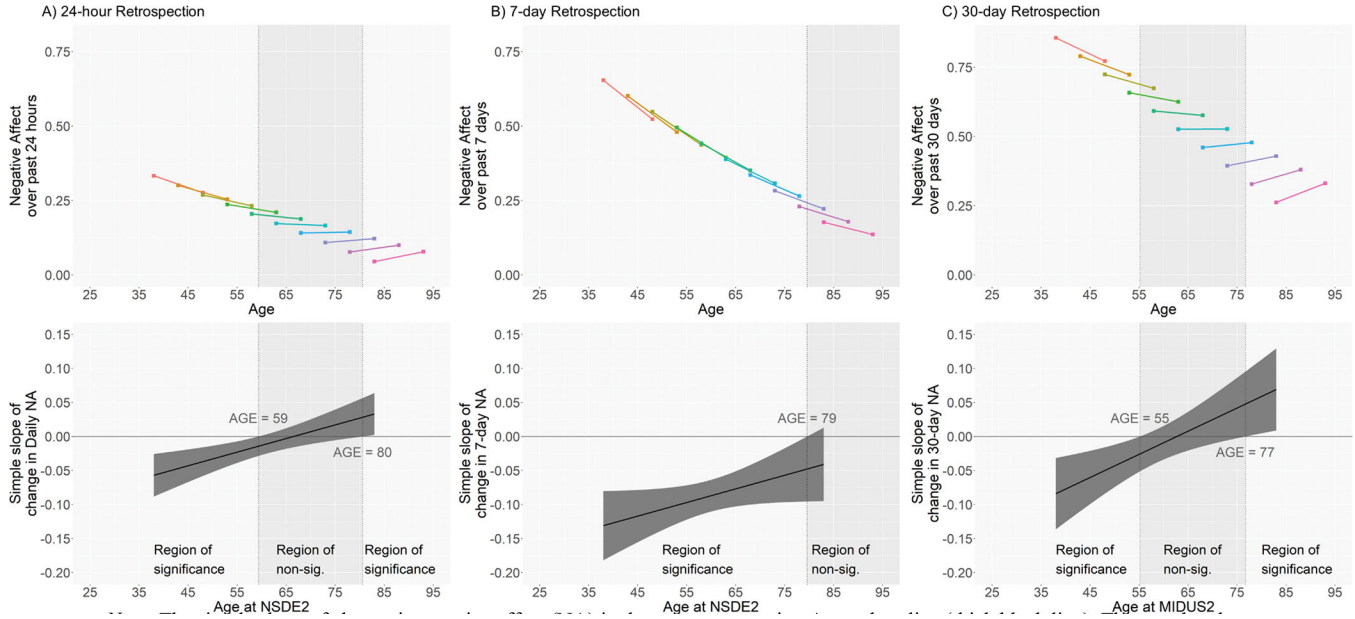

Figure 3. Top Panels: Longitudinal Age Changes and Cross-Sectional Age Differences in Negative Affect Across Adulthood. Bottom Panels: Johnson-Neyman Plots to Identify Regions of Significance

Note: The simple slope of change in negative affect (NA) is shown across varying Age at baseline (thick black line). The gray bands represent the 95% confidence interval that can be used to infer statistical significance. When the horizontal zero line is included in the confidence bands, the simple slope is not statistically significant at that age. The vertical hatched line denotes the boundary age where longitudinal change in negative affect is no longer statistically significant.

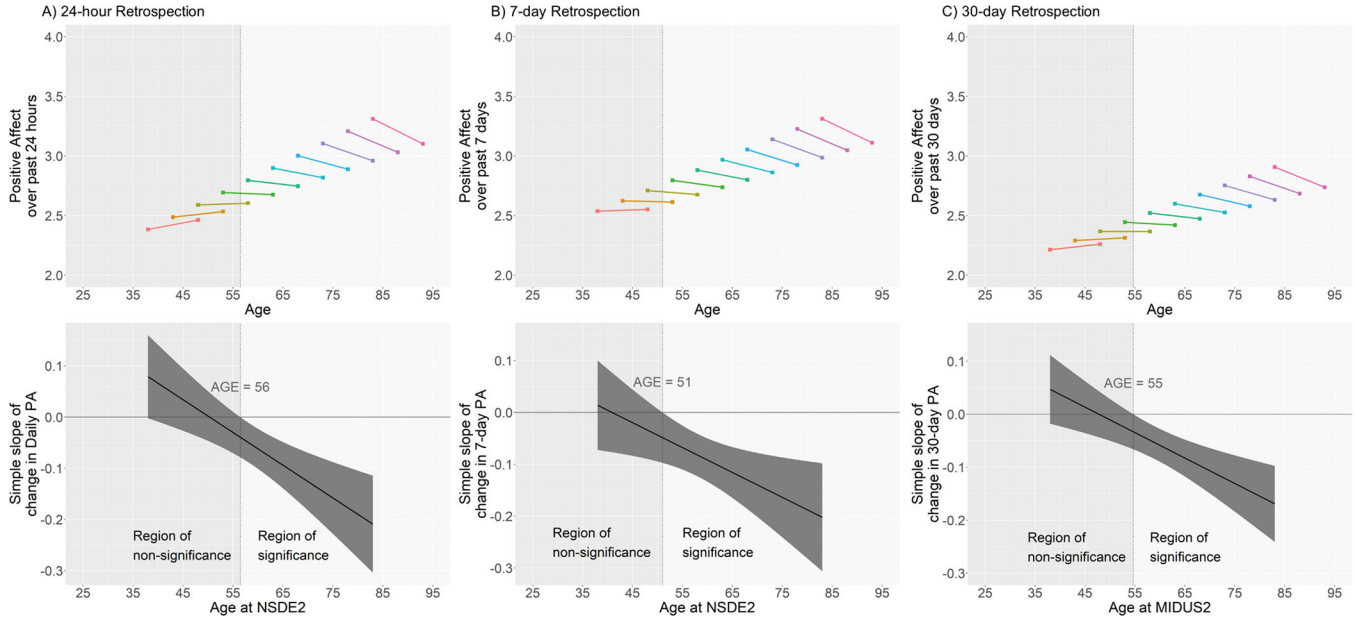

Figure 4. Top Panels: Longitudinal Age Changes and Cross-Sectional Age Differences in Positive Affect Across Adulthood. Bottom Panels: Johnson-Neyman Plots to Identify Regions of Significance

Note: The simple slope of change in positive affect (PA) is shown across varying Age at baseline (thick black line). The gray bands represent the 95% confidence interval that can be used to infer statistical significance. When the horizontal zero line is included in the confidence bands, the simple slope is not statistically significant at that age. The vertical hatched line denotes the boundary age where longitudinal change in positive affect is no longer statistically significant.

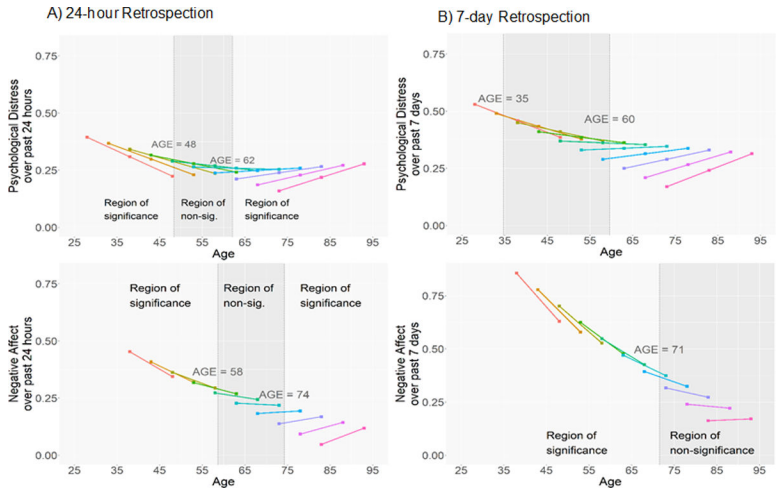

Figure 5. Longitudinal and Cross-Sectional Age Patterns in Psychological Distress and Negative Affect Among People Who Reported Higher Than Average (1 SD Above the Mean Value) Functional Limitations at Baseline

Note. The vertical hatched line denotes the boundary value of baseline age where longitudinal change in psychological distress (top panels) and NA (bottom panels) is no longer statistically significant.

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Table 1

Means, Standard Deviations, and Range among Study Variables Across Waves.

	Wave 1				Wave 2				Wave 3				Total #		
Variable	***M***	***SD***	**Range**	**ω**	***M***	***SD***	**Range**	**ω**	***M***	***SD***	**Range**	**ω**	**N**	**Waves**	**Days**
Psychological Distress[a]															
24-hr retrospection	0.18	0.29	0–3.39	.81	0.20	0.31	0–3.08	.82	0.17	0.25	0–2.92	.82	2,857	4,657	33,900
7-day retrospection	0.27	0.37	0–3.00	.70	0.33	0.43	0–3.50	.73	0.27	0.36	0–2.83	.70	2,632	4,165	—
30-day retrospection	0.53	0.60	0–4	.86	0.51	0.57	0–4	.85	0.47	0.58	0–4	.85	2,529	5,998	—
Negative Affect[b]															
24-hr retrospection	—	—	—	—	0.21	0.28	0–2.55	.94	0.18	0.24	0–2.86	.92	2,170	3,176	23,545
7-day retrospection	—	—	—	—	0.39	0.41	0–3.07	.88	0.32	0.34	0–2.57	.87	2,002	2,875	—
30-day retrospection	—	—	—	—	0.58	0.53	0–3.64	.92	0.55	0.53	0–4	.92	2,076	3,522	—
Positive Affect[b]															
24-hr retrospection	—	—	—	—	2.72	0.71	0–4	.97	2.68	0.69	0.21–4	.97	2,170	3,176	23,548
7-day retrospection	—	—	—	—	2.77	0.70	0–4	.95	2.67	0.68	0.08–4	.94	2,003	2,875	—
30-day retrospection	—	—	—	—	2.56	0.68	0–4	.94	2.54	0.70	0–4	.95	2,079	3,524	—
Covariates															
Age	48.20	12.84	22–77	—	58.61	12.12	35–86	—	67.67	10.34	47–95	—			
IADL	1.52	0.73	1–4	—	1.77	0.87	1–4	—	1.97	0.94	1–4	—			
Sex[c]	.53	0.50	0–1	—	.57	0.49	0–1	—	.57	0.49	0–1	—			
College[d]	.65	0.48	0–1	—	.69	0.46	0–1	—	.75	0.43	0–1	—			
Race[e]	.10	0.29	0–1	—	.15	0.36	0–1	—	.14	0.34	0–1	—			

Note. IADL = Instrumental Activities of Daily Living.

[a]Assessed at all three waves.

[b]Assessed only at wave 2 and 3.

[c]Proportion of female participants.

[d]Proportion of participants with some college.

[e]Proportion of non-white participants.

ω = omega reliability estimate.

Table 2

Multilevel Modeling Analyses of the Longitudinal Changes in Psychological Distress Across 20 years

Variable	24-hr Retrospection			7-day Retrospection			30-day Retrospection		
	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI
Fixed Effects									
Intercept	0.291 (.018)	<.001	[0.256, 0.327]	0.397 (.027)	<.001	[0.343, 0.450]	0.790 (.031)	<.001	[0.729, 0.851]
Wave	−0.042 (.010)	<.001	[−0.061, −0.022]	−0.035 (.016)	.028	[−0.067, −0.004]	−0.050 (.017)	.004	[−0.083, −0.016]
Sex	0.005 (.009)	.558	[−0.013, 0.024]	0.047 (.014)	.001	[0.020, 0.074]	0.053 (.019)	.005	[0.016, 0.090]
College	−0.039 (.011)	.001	[−0.061, −0.016]	−0.017 (.017)	.334	[−0.050, 0.017]	−0.110 (.023)	<.001	[−0.154, −0.066]
Race	−0.008 (.017)	.626	[−0.041, 0.024]	−0.028 (.027)	.294	[0.013, 0.115]	0.020 (.041)	.624	[−0.060, 0.100]
Age.BL	−0.020 (.002)	<.001	[−0.025, −0.015]	−0.028 (.004)	<.001	[−0.036, −0.020]	−0.055 (.004)	<.001	[−0.064, −0.046]
Wave*Age.BL	0.009 (.002)	<.001	[0.005, 0.012]	0.009 (.003)	.007	[0.002, 0.015]	0.009 (.003)	.009	[0.002, 0.016]
IADL	0.141 (.026)	<.001	[0.090, 0.193]	0.183 (.038)	<.001	[0.108, 0.258]	0.314 (.042)	<.001	[0.232, 0.396]
Wave*IADL	−0.059 (.018)	.001	[−0.095, −0.024]	−0.051 (.029)	.080	[−0.107, 0.006]	−0.071 (.031)	.024	[−0.133, −0.009]
Age.BL*IADL	−0.009 (.004)	.034	[−0.017, −0.001]	−0.016 (.006)	.007	[−0.027, −0.004]	−0.017 (.008)	.020	[−0.032, −0.003]
Wave*Age.BL*IADL	0.010 (.004)	.008	[0.003, 0.016]	0.010 (.005)	.057	[0.000, 0.020]	0.011 (.007)	.123	[−0.003, 0.024]
Random effects									
Within-wave residual	0.058 (.002)			—			—		
Between-wave									
Intercept	0.023 (.003)			0.079 (.006)			0.148 (.008)		
Between-person									
Intercept	0.034 (.006)			0.061 (.007)			0.148 (.011)		
Wave	0.000 (.003)			0.001 (.005)			0.012 (.005)		

Note. CI = confidence interval. Sex (0=male; 1=female). College (0=high school or less; 1=some college or more). Race (0=white; 1=non-white). Age.BL = Age at baseline. IADL = Instrumental activities of daily living. Estimates of fixed effects are reported as unstandardized regression coefficients. Estimates of random effects are reported as variances.

Table 3

Multilevel Modeling Analyses of the Longitudinal Changes in Negative Affect Across 10 years

Variable	24-hr Retrospection			7-day Retrospection			30-day Retrospection		
	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI
Fixed Effects									
Intercept	0.333 (.029)	<.001	[0.277, 0.389]	0.654 (.049)	<.001	[0.559, 0.750]	0.856 (.033)	<.001	[0.791, 0.921]
Wave	−0.057 (.016)	<.001	[−0.089, −0.026]	−0.131 (.026)	<.001	[−0.182, −0.080]	−0.084 (.027)	.002	[−0.136, −0.031]
Sex	0.011 (.010)	.286	[−0.009, 0.031]	0.055 (.017)	.001	[0.023, 0.088]	0.025 (.020)	.206	[−0.014, 0.0633]
College	0.010 (.012)	.402	[−0.013, 0.032]	0.032 (.019)	.093	[−0.005, 0.070]	−0.042 (.023)	.074	[−0.087, 0.004]
Race	−0.017 (.017)	.326	[−0.051, 0.017]	−0.051 (.031)	.096	[−0.111, 0.009]	0.085 (.047)	.068	[−0.006, 0.177]
Age.BL	−0.032 (.005)	<.001	[−0.041, −0.022]	−0.053 (.008)	<.001	[−0.069, −0.036]	−0.066 (.005)	<.001	[−0.075, −0.056]
Wave*Age.BL	0.010 (.003)	.002	[0.003, 0.016]	0.010 (.005)	.074	[−0.001, 0.020]	0.017 (.006)	.003	[0.006, 0.028]
IADL	0.139 (.039)	<.001	[0.063, 0.215]	0.232 (.062)	<.001	[0.110, 0.354]	0.265 (.035)	<.001	[0.196, 0.334]
Wave*IADL	−0.059 (.021)	.005	[−0.101, −0.018]	−0.109 (.034)	.001	[−0.176, −0.042]	−0.046 (.034)	.177	[−0.113, 0.021]
Age.BL*IADL	−0.016 (.007)	.018	[−0.028, −0.003]	−0.028 (.011)	.009	[−0.048, −0.007]	−0.012 (.006)	.039	[−0.024, −0.001]
Wave*Age.BL*IADL	0.012 (.004)	.003	[0.004, 0.020]	0.019 (.007)	.003	[0.006, 0.032]	0.004 (.007)	.565	[−0.010, 0.018]
Random effects									
Within-wave residual	0.042 (.002)			—			—		
Between-wave									
Intercept	0.014 (.002)			0.060 (.006)			0.095 (.011)		
Between-person									
Intercept	0.030 (.006)			0.063 (.009)			0.167 (.013)		
Wave	0.000 (.002)			0.000 (.005)			0.020 (.018)		

Note. CI = confidence interval. Sex (0=male; 1=female). College (0=high school or less; 1=some college or more). Race (0=white; 1=non-white). Age.BL = Age at baseline. IADL = Instrumental activities of daily living. Estimates of fixed effects are reported as unstandardized regression coefficients. Estimates of random effects are reported as variances.

Table 4

Multilevel Modeling Analyses of the Longitudinal Changes in Positive Affect Across 10 years

Variable	24-hr Retrospection			7-day Retrospection			30-day Retrospection		
	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI	Estimate (*SE*)	*p*-value	95% CI
Fixed Effects									
Intercept	2.384 (.069)	<.001	[2.249, 2.519]	2.538 (.072)	<.001	[2.396, 2.679]	2.214 (.041)	<.001	[2.134, 2.294]
Wave	0.079 (.041)	.058	[−0.003, 0.160]	0.014 (.044)	.755	[−0.072, 0.100]	0.047 (.033)	.155	[−0.018, 0.112]
Sex	0.048 (.031)	.121	[−0.013, 0.109]	0.032 (.032)	.313	[−0.030, 0.094]	0.049 (.027)	.068	[−0.004, 0.102]
College	−0.095 (.035)	.007	[−0.164, −0.026]	−0.102 (.036)	.004	[−0.172, −0.032]	0.003 (.031)	.933	[−0.057, 0.062]
Race	0.042 (.064)	.511	[−0.084, 0.168]	0.075 (.069)	.274	[−0.059, 0.210]	0.063 (.055)	.251	[−0.045, 0.171]
Age.BL	0.103 (.012)	<.001	[0.079, 0.127]	0.086 (.013)	<.001	[0.061, 0.112]	0.077 (.006)	<.001	[0.065, 0.089]
Wave*Age.BL	−0.032 (.009)	<.001	[−0.049, −0.014]	−0.024 (.010)	.014	[−0.043, −0.005]	−0.024 (.007)	<.001	[−0.038, −0.011]
IADL	−0.257 (.084)	.002	[−0.421, −0.092]	−0.308 (.087)	<.001	[−0.479, −0.136]	−0.341 (.038)	<.001	[−0.415, −0.268]
Wave*IADL	0.073 (.057)	.197	[−0.038, 0.184]	0.111 (.058)	.057	[−0.003, 0.225]	0.080 (.043)	.062	[−0.004, 0.163]
Age.BL*IADL	0.015 (.015)	.311	[−0.014, 0.044]	0.026 (.017)	.117	[−0.007, 0.059]	0.017 (.007)	.018	[0.003, 0.030]
Wave*Age.BL*IADL	−0.016 (.011)	.135	[−0.037, 0.005]	−0.021 (.013)	.087	[−0.046, 0.003]	−0.008 (.009)	.371	[−0.025, 0.009]
Random effects									
Within-wave residual	0.142 (.004)			—			—		
Between-wave									
Intercept	0.126 (.011)			0.158 (.012)			0.138 (.014)		
Between-person									
Intercept	0.288 (.020)			0.259 (.023)			0.265 (.014)		
Wave	0.006 (.008)			0.007 (.008)			0.064 (.020)		

Note. CI = confidence interval. Sex (0=male; 1=female). College (0=high school or less; 1=some college or more). Race (0=white; 1=non-white). Age.BL = Age at baseline. IADL = Instrumental activities of daily living. Estimates of fixed effects are reported as unstandardized regression coefficients. Estimates of random effects are reported as variances.