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Can Self-Regulation Explain Age Differences in Daily, Weekly, and Monthly Reports of Psychological Distress?

David M. Almeida, Daniel K. Mroczek, and Michelle Neiss

There is growing evidence that psychological distress rarely increases over the course of the adult life span (Malatesta & Kalnok, 1984; Smith & Baltes, 1993). In fact, a number of studies have reported a general decrease in distress across the adult years (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Charles, Reynolds, & Gatz, 2001; Costa, McCae, & Zonderman, 1987; Diener, Sandvik, & Larsen, 1985; Rossi & Rossi, 1990; Vaux & Meddin, 1987). Such results seem surprising in the face of the stressful experiences that often accompany advancing age, such as declining physical health and deaths of peers and spouse (Baltes & Baltes, 1990).

This commentary reviews previous research that uses concepts of self-regulation to explain such age differences. In addition we extend this line of inquiry by presenting a series of analyses that assess self-reports of negative affect across monthly, weekly, and daily time frames. Because the daily and weekly reports of psychological distress occurred over the same period of time, these analyses offer a unique opportunity to assess the extent to which frequency of psychological distress reported on a daily basis is recalled at the end of the week. Finally, the analyses explored the differences in how people of various ages recall emotions. We examined the extent to which the most distressing day in a given week predicted the recall of distress over the same week. Final analyses tested whether this relationship was greater for younger adults than for older adults.

DEVELOPMENTAL CHANGES IN SELF-REGULATION

Explanations for lower levels of psychological distress among older adults often focus on age differences in the ability to control or regulate emotions. In a study of emotion-specific autonomic nervous system activity, older

adults exhibited lower levels of somatic activity when reliving a remembered emotion than did younger adults (Levenson, Carstensen, Friesen, & Ekman, 1991). Furthermore, skills in emotional regulation, or attempts to control emotions, do seem to increase over the life span. Labouvie-Vief (1997) proposes that emotion becomes better integrated with cognitive processes as people age. One dimension of this integration is affective complexity, evidenced by the ability to integrate both positive and negative emotions. A benefit of increased integration is greater understanding of one's own emotions, a possible mechanism for greater effectiveness in regulating affect (Labouvie-Vief, DeVoe, & Bulka, 1989).

Socioemotional selectivity theory also provides insight into change in emotional experiences over the life span by focusing on how the primacy of emotional goals changes as we age (Carstensen, 1991; Carstensen, Isaacowitz, & Turk-Charles, 1999). Socioemotional selectivity theory suggests that as people approach the end of the life span, they view time as limited. Awareness of time constraints alters emotional experience by leading people to give greater weight to emotional goals rather than to knowledge-related goals. In addition to increased salience of emotion, awareness of endings may also bring about more mixed reactions. To the extent that older adults face endings, they may experience both positive and negative feelings, or a sense of poignancy (Carstensen et al., 2000). Self-reports of emotional regulation support the proposition that regulatory skills increase with age. Across culturally and ethnically diverse samples, older adults report greater emotional control than do younger adults (Gross et al., 1997). Greater skills in regulating emotion suggest that quality of life for older adults may be more positive even in the face of losses.

Much of the empirical evidence supporting decreases in psychological distress across adulthood comes from studies that rely on longer-term retrospective accounts of affect recalled over one month or more (Costa et al., 1987; Charles et al., 2001; Rossi & Rossi, 1990; Vaux & Meddin, 1987). For example, Mroczek and Kolarz's (1998) analysis of the National Survey of Midlife in the Unites States (MIDUS) showed that older adults experienced more frequent positive affect and less frequent psychological distress than their younger counterparts. These findings were based on respondents' recall of positive and negative affect over the previous 30 days. In a more recent study of daily emotional experiences, Carstensen, Pasupathi, Mayr, and Nesselroade (2000) found age-related declines in frequency of negative affect. The present paper extends this work by

examining age differences in distress using daily, weekly, and monthly reports of psychological distress from a subsample of MIDUS respondents. A focus on differing time intervals of recalled emotions allows for the comparison of age differences in psychological distress using molar time referents (i.e., monthly) and more micro time referents (i.e., daily and weekly).

AGE DIFFERENCES IN CONCURRENT VERSUS RETROSPECTIVE REPORTS OF EMOTIONS

The length of the recall period may play an important role in people's reports of their emotional experiences. Winkielman, Knauper, and Schwarz (1998) found that questions with a shorter recall period (1 day) were interpreted by respondents as referring to less extreme and therefore less memorable events, whereas questions with a longer recall period (1 year) were interpreted as referring to rare and more memorable events. These interpretations are reflected in empirical findings of actual reported emotions across differing recall periods. Weekly retrospective accounts of positive and negative affect tend to be higher than daily reports (Thomas & Diener, 1990) and daily reports tend to be higher than momentary ratings (Parkinson, Briner, Reynolds, & Totterdell, 1995). A general pattern seems to indicate that longer reference periods are prone to a systematic bias for recall of more intense emotional experiences. We will extend this research by examining whether similar bias occurs when recalling frequency of negative emotions across a wide age span.

Another potential problem with longer-term retrospective reports of emotions is the assumption of temporal integration where individuals average their affective experiences equally over a given interval. Kahneman (1999) proposes an alternative process of recollection, the peak-end hypothesis. Based on this hypothesis, retrospective evaluations will be best predicted by the average of the peak affective experience during a given episode and the affective experience at the end of the episode. In a series of studies, Kahneman and colleagues found support for this hypothesis by comparing individuals' ongoing reports of emotions during actual events with recollections of emotions at the end of the experience (Fredrickson & Kahneman, 1993; Redelmeier & Kahnamen, 1996; Varey & Kahneman, 1992). For example, in a study of patients' discomfort during a colonoscopy, retrospective evaluations were best predicted by the average of the

highest discomfort during the procedure with the level of discomfort at the end of the procedure (Redelmeier & Kahnamen, 1996). Although most evidence for peak-end recollection processes come from studies of intensity of emotion over specific episodes (e.g., colonoscopy), the present study will assess peak-end recollection of frequency of emotion across a specific interval (i.e., week). Accordingly, the peak experience (most frequent distress day of the study week) and the end experience (frequency of distress on the last day of the week) should be more memorable and therefore have a greater effect on retrospective reports.

There may be age differences in temporal integration and peak-end-recollection processes. Differences in emotional regulation may play a role in how younger and older adults recall emotions. Investigating the salience of affect in potential social interactions, Carstensen and Fredrickson (1998) found that older adults placed more importance on the affective dimension of possible social partners than younger adults. This increased salience of affect has been found to impact older adults' recall of material. Furthermore, Carstensen and Turk-Charles (1994) found that older adults recalled proportionately more emotional material than neutral material. The proportion of emotional material recalled increased linearly with age, suggesting emotional material was more salient for older adults. Greater attention to affect may enable older adults to better recall all of their emotional experiences than younger adults. If this is the case, age-related declines in psychological distress may not be reflecting actual differences in experienced emotions. Rather, age declines in distress may be due to age differences in how younger and older adults recall emotional experiences. During recall, older adults may temporally integrate their emotional experiences while younger adults use peak-end processing.

RESEARCH QUESTIONS FROM A DAILY DIARY STUDY

The remainder of this commentary will focus on a series of analyses that show how age differences in self-regulation processes are manifested in how individuals recall naturally occurring emotions. By comparing daily, weekly, and monthly reports on psychological distress, we have the ability to test several research questions. First, do age differences in psychological distress generalize across different recall periods? The second question centers on age differences in discrepancy of daily and weekly recall. Because emotions are more pertinent to older adults, do they recall

affective experiences more consistently? The third set of questions pertains to age differences in the peak-end hypothesis of retrospective evaluations. Greater affective complexity may allow older adults to better process their emotional experience, perhaps by being able to temporally integrate both mundane and more salient emotions. When younger adults recall their emotions, they may be more likely to rely on extreme negative emotional experiences than on more mundane emotional experiences. Thus, we predicted that the relationship between weekly recall of distress and the most distressful day (i.e., peak day) would be higher for young adults. A competing hypothesis was that older adults would show less accuracy in their recall of emotions. Due to age-related declines in memory, older adults may rely on more recent emotions (end day) than do younger adults. When recalling psychological distress across a week, for example, older adults may be more likely to base their report on the current day's experience.

THE NATIONAL STUDY OF DAILY EXPERIENCES

We attempt to answer these questions by analyzing data from the National Study of Daily Experiences (NSDE). Respondents were 1,031 adults (562 women, 469 men), all of whom had previously participated in the Midlife in the United States Survey (MIDUS), a nationally representative telephone-mail survey of 3,032 people 25–74 years of age, carried out in 1995–1996 under the auspices of the John D. and Catherine T. MacArthur Foundation Network on Successful Midlife (for descriptions of the MIDUS project, see Keyes & Ryff, 1998; Lachman & Weaver, 1998; Mroczek & Kolarz, 1998). Respondents in the NSDE were randomly selected from the MIDUS sample and received $20 for their participation in the project. Of the 1,242 MIDUS respondents who we attempted to contact, 1,031 agreed to participate, yielding a response rate of 83%. Over the course of eight consecutive evenings, respondents completed short telephone interviews about their daily experiences. On the final evening of interviewing, respondents also answered several questions about their previous week. Data collection spanned an entire year (March 1996–March 1997) and consisted of 40 separate "flights" of interviews, with each flight representing the 8-day sequence of interviews from approximately 38 respondents. The initiation of interview flights was staggered across the days of the week to control for the possible confounding between day of study and day of week. Respondents completed an average of seven of the eight

interviews, resulting in a total of 7,221 daily interviews. The present analyses used the 571 respondents (244 men, 327 women) who completed all eight interviews. To assess distress across one week, we dropped the first interview day. Thus our analyses involved 3,997 days (571 respondents over seven days). For many of the analyses that follow, we used the *week* as the unit of aggregation by calculating the mean of the distress score across the seven days.

The MIDUS and NSDE samples had very similar distributions for age, marital status, and parenting status. The NSDE had slightly more females, fewer minority respondents, and better-educated respondents than the MIDUS sample. Respondents for the present study were 47 years old on average. Seventy-seven percent of the women and 85% of the men were married at the time of the study. Forty-seven percent of the households reported having at least one child in the household. The average family income was between $50,000–$55,000. Younger adults (25–39 years of age) had less household income, while older adults (56–74 years of age) were less likely to have children in the household.

Our analyses used five measures of psychological distress that differed in interval of recall and level of aggregation. Each distress measure used the same inventory of six emotions from the Non-Specific Psychological Distress Scale (Mroczek & Kolarz, 1998). This scale was developed from several well-known instruments: The Affect Balance Scale (Bradburn, 1969), the University of Michigan's Composite International Diagnostic Interview (Kessler et al., 1994), the Manifest Anxiety Scale (Taylor, 1953), and the Center for Epidemiological Studies Depression Scale (Radloff, 1977). The scale consists of six emotions across a range of intensity, including sad, hopeless, anxious, restless, depressed, and worthless. Respondents indicated how much of the time they experienced each emotion on a 4-point scale from *none of the time* to *all of the time*. For each of the following measures of distress across these items, sum scores were calculated.

Daily distress was assessed during the daily telephone interviews in which respondents indicated how often they felt each of the emotions "during the past 24 hours." On each day, sum scores across the six items were computed (Cronbach's alpha = .89). A *Weekly Aggregate Distress* measure was created by computing the mean frequency of distress across the seven diary days. *Peak Day Distress* was measured by selecting the highest of the seven daily distress scores (Cronbach's alpha = .91). *End Day Distress* was daily distress score on the last day of the interview (Cronbach's alpha = .84). *Weekly Distress Recall* was assessed at the conclusion of the final day of interviewing when respondents were asked how often they felt each of the six emotions "during the past week" (Cronbach's alpha = .85). *Monthly Distress Recall* was measured approximately eight months prior to the daily interviews during the initial baseline MIDUS data collection via questionnaire items asking respondents to indicate how often they felt each of the six emotions "during the past thirty days" (Cronbach's alpha = .87).

RESULTS

Descriptive Results

The first set of analyses provides some descriptive information on the psychological distress measures. Table 3.1 shows the average level of distress for each of the measures for the total sample and separately by gender. Although gender is not a main focus of the present investigation, we describe gender differences in this first set of analyses and use gender as a covariate in subsequent analyses. Several studies have shown that women report higher levels of psychological distress than men (for review, see Nolen-Hoeksema, 1987) including daily distress (Almeida & Kessler, 1998). Mean differences in the measures of psychological distress and gender were examined through a 2 × 4 (Gender × Type of Measure) mixed model MANOVA with type of measure as the within-person factor and gender as a between-person factor. This analysis revealed a main effect for gender and type of measure. Women reported significantly higher levels of distress across all four measures. Only the weekly aggregate of distress yielded similar levels of distress across both men and women. A significant Gender × Type of Measure interaction indicated that the gender difference was greatest for the monthly recall measure.

These analyses also showed significant mean differences in psychological distress by recall period (F (3, 568) = 11.0, $p < .01$). A series of subsequent paired t-tests revealed that measures with longer recall intervals yielded higher mean levels of psychological distress. Respondents' monthly recall distress scores were higher than their weekly recall scores (t (570) = 14.2, $p < .01$) and their weekly aggregated scores (t (570) = 21.1,

TABLE 3.1 Description of Psychological Distress Variables by Gender and Reference Period

Psychological Distress	Total Sample	Men	Women	Gender
Variable	Mean (SD)	Mean (SD)	Mean (SD)	*F*
Weekly Aggregate	1.17_a (.26)	1.15_a (.22)	1.19_a (.29)	4.05*
Weekly Recall	1.28_b (.37)	1.25_b (.32)	1.31_b (.40)	6.27**
Monthly Recall	1.55_c (.62)	1.47_c (.52)	1.62_c (.68)	13.05**
Peak Day	1.47_d (.53)	1.42_d (.48)	1.51_d (.51)	6.25**

Notes: $N = 571$. Means with different subscripts in the same column differ at $p < .01$. Responses range from 1 "none of the time" to 4 "all of the time." $^{*}p < .05$. $^{**}p < .01$.

$p < .01$). In fact, the monthly estimate of distress was greater than the peak daily distress score ($t\,(570) = 4.1, p < .01$). There was also a significant difference between the weekly recall and weekly aggregate of distress scores ($t\,(570) = 17.2, p < .01$). Respondents, on average, reported greater levels of distress when asked to recall over the entire week as compared to the aggregate of daily reports of distress across that same week. The discrepancy between the aggregate and the recall measures suggested that respondents tended to report more frequent distress when they recalled their emotions over longer time intervals.[1]

1. It is important to mention the particularly low mean for weekly aggregate, suggesting that individuals reported very little psychological distress across the study days. There are several possible reasons for these low scores including: (a) few respondents actually reported any distress across the study week; (b) few days which were days of reported distress; (c) only a few items endorsed on the distress scale; or (d) some combination of these factors. A detailed evaluation of the distribution of distress scores across respondents, study days, and distress items revealed that 82% of participants experienced at least some distress (i.e., a distress score above 1 on the aggregate measure) across the study week. Across the study days, respondents reported some distress on 48% of the study days. Furthermore, respondents endorsed one distress item (i.e., experienced this emotion more than never) on 18% of the days, two distress items on 14% of the days, and three or more distress items on 16% of the days. The most frequently endorsed item was anxious (21% of study days) and least endorsed item was worthless (4% of study days) Thus it appears that the low weekly aggregate reflects a combination of the number of days of distress reported and the number of distress items endorsed.

Age Differences in Recalling Distress

The next series of analyses assessed the first research question, whether age differences existed in this pattern of recall of distress. Hierarchical multiple regressions were computed using each of the distress measures as criterion variables. On the first step, Gender as well as linear and quadratic functions of Age were entered. On the second step, interactions of Gender and the Age functions were entered. Figure 3.4 plots mean age differences for each of the distress measures. Standardized regression coefficients for the linear Age term are shown in parentheses.

The quadratic functions of Age and the Age × Gender interactions were not significantly associated with any of the psychological distress measures. For the monthly and weekly recall measures, age was negatively related to level of distress. Older respondents reported less frequent distress than their younger counterparts. However, age was not related to level of psychological distress for the weekly aggregate, peak day, or end day distress scores. Furthermore, age slopes for weekly aggregate distress and peak day distress were significantly less than the age slopes for weekly recall distress ($t = 2.8$ (568), $p < .05$; $t = 2.2$ (568), $p < .05$) and monthly recall distress ($t = 4.5$ (568), $p < .05$; $t = 3.8$ (568), $p < .05$). This pattern of results, with age differences present only in weekly and monthly recall, suggested that length of recall interval played a role in age differences in psychological distress. A subsequent analysis assessed age differences in day-to-day variation in psychological distress. Using each of the seven daily psychological distress scores, a within-person standard deviation

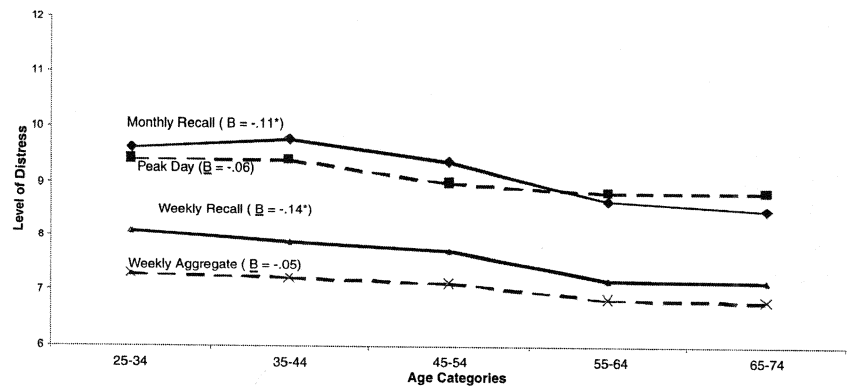

FIGURE 3.4 Age differences in psychological distress.

was calculated for each respondent. The mean within-person standard deviation was 1.11. Age, Gender, and the Age × Gender interaction were not associated with within-person variation.

We further explored the pattern of age differences by examining the discrepancy between the weekly aggregate and weekly recall distress scores. As noted earlier, weekly recall scores were, on average, greater than the weekly aggregate scores collected during the same week. In the next set of analyses we wanted to see if this discrepancy was associated with age. To this end, difference scores were calculated between the weekly aggregate and recall scores. Positive difference scores were interpreted as an overestimate in the recall of distress and negative difference scores were interpreted as an underestimate. These difference scores were then used as the criterion variable in a multiple regression with linear and quadratic functions of age and gender as predictors. Age, gender, and their interaction were significant. Figure 3.5 illustrates the results of this analysis. Men's and women's standardized regression coefficients for the linear age term are shown in parentheses. Older individuals' weekly recall of psychological distress was closer to their aggregated daily scores of distress. The Age × Gender interaction indicated that this was especially the case for men in the sample. The discrepancy between the weekly aggregate score and the weekly recall of distress for older men was close to zero.[2]

The next set of analyses tested the final research question, whether there were age differences in the peak-end hypothesis for recalling emotions. One explanation for age differences in recall discrepancy is that older adults may be more likely to average their emotions equally across the days of the week (temporal integration), while younger adults may be more likely to give more weight to those days when they experience more frequent

2. Findings for the age differences could be biased due to floor effects in the weekly aggregate variable especially if older adults are more likely to have no days of distress. This does not appear to be the case. First, we recomputed the regressions for the weekly aggregate and peak day measures using only those respondents who reported having some distress across the study week (i.e., a weekly aggregate score above 1). The age slopes for weekly aggregate ($\beta = -.08, p > .05$) and peak day ($\beta = -.05, p > .05$) were almost identical to the slopes estimated on the entire sample. Second, we recomputed the regression testing age difference in the discrepancy between weekly aggregate and weekly recall again using only those respondents whom reported having some distress across the study week. The pattern of results did not differ from the results for the entire sample. The age slope for men was ($\beta = -.27, p < .01$) and the age slope for women was ($\beta = -.13, p < .05$).

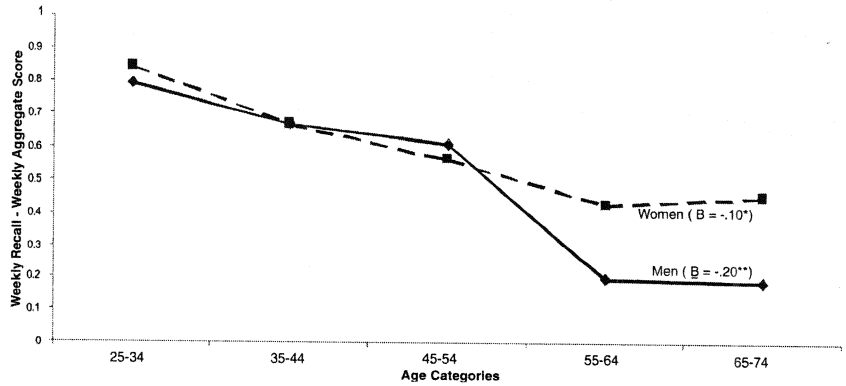

FIGURE 3.5 Age differences in the discrepancy between weekly aggregate of psychological distress and weekly recall of psychological distress.

distress (peak day). For example, an older and a younger respondent may both report particularly distressing Mondays, but report emotionally calm days for the remainder of the week. Because the older adult is more sensitized to, and a better regulator of, his or her emotions, he or she is likely to average the distressing Monday and the calm days equally. The younger adult, not yet having acquired these skills, might be more attuned to the distressing Monday and therefore give this day more weight when he or she recalls his or her emotions over the entire week. To address this hypothesis, we tested whether age moderated the associations of the peak day distress (i.e., the most distressing day in the week) with the weekly recall of distress. In addition, older adults might be more likely than their younger counterparts to rely on the most current assessment of distress (end day) because of declines in memory functioning. Thus we assessed whether peak day distress was more predictive of weekly recall of distress for younger adults, and whether end day distress was more predictive of weekly recall for older adults. Table 3.2 shows the results of a hierarchical multiple regression using linear function of age, gender, peak day distress, end day distress, and interactions between age and the two daily distress scores as predictors.

On the first step of the analysis, Gender and Age significantly predicted weekly recall of distress. On the second step, both Peak Day Distress and End Day Distress predicted weekly recall of distress, accounting for an additional 58% of the variance beyond the effects of gender and age. On the third step, the Age × Peak Day Distress interaction significantly predicted weekly recall of distress. On this step, the age effect decreased to

TABLE 3.2 Hierarchical Multiple Regression of Age, Peak Day Distress, Final Day Distress Predicting Weekly Recall of Psychological Distress

	Step 1	Step 2	Step 3
Predictors	***B*** (SE) β	***b*** (SE) β	***b*** (SE) β
Age	−.024 (.006) −.15*	−.015 (.004) −.07*	.020 (.012) .09
Gender	.300 (.155) .06*	.047 (.106) .01	0.50 (.098) .01
Peak Day Distress	.365	(.017) .59*	.487 (.069) .73*
End Day Distress	.339	(.027) .27*	.423 (.100) .39*
Age × Peak Day Distress			−.004 (.001) −.25*
Age × End Day Distress			.002 (.002) .09
R^2	.03*	.61*	.65*
Change in R2		.58*	.04*

Notes: $N = 571$. * $p < .01$.

non-significance, suggesting that age differences in weekly recall of distress are mediated by the interaction between age and peak distress day. Figure 3.6 shows the nature of this interaction. We plotted regression lines representing the prediction of weekly recall of distress from peak daily distress for younger (25–39 years of age), middle aged (40–55 years of age), and older adults (56–74 years of age). Standardized regression coefficients for the peak daily distress terms are shown in parentheses. As hypothesized, peak daily distress was a stronger predictor of weekly recall of distress for younger adults than for older adults.

One explanation for these findings is that younger adults place more weight on peak days because they are more likely to experience particularly distressing days. The logic is that more days with more severe distress are more memorable. Recalculating the peak-end analysis two ways tested this possibility. First, we omitted respondents who did not report any weekly aggregate distress. Second, we omitted respondents who scored lower than the mean on the Peak Day Distress variable. The pattern of results for both of these subsamples was identical to the original sample. In both of these supplementary analyses, the significant Age × Peak Day Distress interactions ($\beta = -.25, p < .01$ and $\beta = -.24, p < .01$) indicated

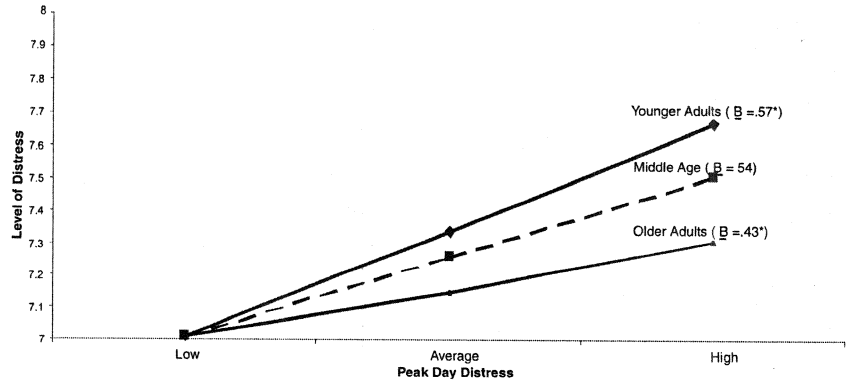

FIGURE 3.6 Weekly recall of psychological distress as a function of peak day distress for younger, middle aged, and older adults.

that peak daily distress was a stronger predictor of weekly recall of distress for younger adults than for older adults.

Another possible explanation for these findings is that older adults may have more difficulty recalling the most distressing day in their week because of declines in memory processing (Smith, 1996). In other words, younger adults place more weight on particularly distressing experiences when recalling emotions because they remember them better than older adults do. Our final analysis tested potential age differences in the ability to recall psychological distress over our 7-day study period. In a multiple regression, daily distress scores from the first study day and the final study day were used to predict the weekly recall of distress. If age-related decline in memory was a factor in the weekly recall of distress, we would expect a negative age by first-day distress score interaction and a positive age by last-day distress score interaction. For example, the relationship between first day distress and weekly recall of distress should be less for older adults. Although the main effects for the first and last day distress scores were significant ($\beta = .41, p < .01$; $\beta = .47, p < .01$, respectively), the interactions of age by daily distress scores were not significant. Thus it appears older adults did not differ from their younger counterparts in their ability to recall earlier distressing experiences.

DISCUSSION

Using daily, weekly, and monthly reports of psychological distress from a national sample of adults, these analyses examined several issues related

to age differences in how adults recall negative emotions. Respondents tended to recall more frequent distress when reporting over longer time frames compared to shorter time frames. When asked to report their level of distress over the entire week, respondents recalled greater frequency compared to the aggregate of their daily reports of distress across that same week. Thomas and Diener (1990) found a similar pattern of results, and attributed such discrepancy to recall bias that occurs in measures that use longer time intervals. Such bias may be due to differences in peak-end recollection processes. Extreme emotional experiences (i.e., peak experience) are more likely to occur over longer intervals. For example, the feeling of distress is more likely to occur over a given week than on a given day. To the extent that individuals place more weight on peak emotions during recollection, we would expect to find higher scores for longer intervals.

An alternative explanation is that lower scores are due to respondents finding it more plausible to give a "none of the time" response for shorter recall periods than for longer recall periods. The percentage of respondents who reported experiencing no monthly, weekly, and daily distress was 22%, 26%, and 18% respectively. Chi square tests revealed no significant differences across these three measures. However, the distribution of the daily scores across the study days revealed that respondents reported never experiencing distress on 52% of the study days. Although we did show evidence for peak-end processes, we cannot rule out the possibility that recall differences may be partially due to respondent interpretations of questions across differing recall periods.

Age Differences in Monthly, Weekly, and Daily Psychological Distress

Compared to older adults, younger adults recalled experiencing greater levels of distress over monthly and weekly time frames. These findings are consistent with previous work on age differences in affect (e.g., Mroczek & Kolarz, 1998). However, we found no age differences in distress for shorter time frames. Younger and older adults did not differ in their daily reports of psychological distress aggregated across the week or in their peak distress score during that week. These results differ from Carstensen et al. (2000) findings on momentary assessments of affect. At least three reasons can account for this discrepancy. First, this study

used a more restricted age range than the Carstensen sample. If we had a younger sample, our pattern might be more similar. Second, our method of assessment relied on self reports at the end of a day, not momentary assessments across the day. Third, there may have been floor effects present in our study. Although the majority of our respondents reported at least some distress across the study week, the mean of the weekly aggregate variable suggests that the level of distress experienced was very low. It is important to mention, however, that subsequent analyses attempting to control for low level did not alter the pattern of results.

Our pattern of results suggests that frequency of emotional experience does not differ at the daily level; rather, age differences are apparent in recall of emotional experience over weekly and monthly intervals. Previously reported age differences in reports of distress may be partially due to differences in how younger and older adults recall emotions. Older adults may be better able to recall their emotion because they pay more attention to their emotional experiences (Carstensen et al., 1999). Alternatively, older adults may be less able than their younger counterparts to recall their emotional experiences because of declines in memory processing (West & Craik, 1999). The subsequent analysis more fully examined age-related differences in recall.

Age Differences in Recalling Psychological Distress

Our findings indicate that older adults' weekly recall is more consistent with their daily reports of distress. Although respondents overall showed a general tendency to recall more frequent psychological distress over the week compared to the aggregate of daily distress reports, this discrepancy decreased with age. This pattern supported the hypothesis that older adults would more accurately recall their emotions. Interestingly, more consistent recall by older adults does not follow the general pattern of age-related declines in memory usually found in cognitive studies (e.g., West & Craik, 1999). However, older adults' greater consistency in recalling emotion does add to a base of literature suggesting that emotions become better integrated with cognitive processes throughout adulthood (Labouvie-Vief & DeVoe, 1991; Labouvie-Vief et al., 1989). Consistent with laboratory studies investigating recollection of emotions (Carstensen & Turk-Charles, 1994), our study suggests that older adults may be better than younger adults at recalling their own emotions in real-life settings as well.

We also found that men reported lower levels of psychological distress on each of the measures than did women. This gender difference in psychological distress is similar to other studies of negative mood (Almeida & Kessler, 1998; Nolen-Hoeksema, Larson, & Grayson, 1999). However, it is important to point out that a negative age effect was present for women as well. This suggests that, regardless of gender, older and younger adults recall their emotions in a different manner.

Younger Adults are More Likely to Recall Particularly Distressing Days

For both older and younger adults, the peak day distress is a significant predictor of weekly reports of psychological distress. However, younger adults' weekly recall of psychological distress is more influenced by the peak day distress than older adults' recall of distress. This is consistent with our hypothesis that younger adults would rely more on salient negative experiences when evaluating their overall distress over the past week.

Why might peak day distress more substantially affect recall of psychological distress among younger adults as compared to older adults? Labouvie-Vief and DeVoe (1991) suggest that older adults perhaps have a clearer understanding of their own affective experience and are better able to integrate both positive and negative aspects of their emotional experiences. In a recent study of momentary assessments of emotions, Carstensen et al. (2000) found age to be positively associated with more differentiated emotional experiences. In their study, differentiation was exhibited through endorsement of more specific emotions and the co-occurrence of positive and negative emotions at a given time frame. If older adults are in fact more likely to experience positive emotions even when experiencing feelings of psychological distress, they may have a more balanced perspective, so that a particularly distressful day does not exert such a strong influence on their assessment of affect over longer time frames. This greater cognitive complexity might facilitate greater temporal integration across all emotional experiences within a given interval. An alternative explanation could be age differences in the quality of distress on a peak day. Our analysis found no age difference in within-person variation of distress scores across the study days or in the mean level of peak day distress. However, there may be other age-related differences such as activity, volatility, and lifestyle that make peak day distress more

memorable or distinctive for younger adults. Unfortunately we were unable to consider these possible explanations.

Conclusions

Findings from these analyses should be interpreted in light of this study's limitations. First, it is constrained by the fact that it is cross-sectional. As with all studies examining *age differences,* we are unable to rule out cohort effects. For example, older individuals in this sample may have underreported distress in the weekly and monthly recall measures because they have been exposed to more severe life events such as challenges of economic survival and war (Kling, Seltzer, & Ryff, 1997). This may have altered their assessment of what they considered distressing. Further, because of the cross-sectional design, we cannot make any interpretations regarding age changes. Future research should attempt to track the trajectories of various measures of psychological distress across the adult life course.

It is important to note the age restriction in our sample. Some recent evidence suggests that an increase in psychological distress can be found among the oldest old (Carstensen et al., 2000). Adults of very old age might report higher levels of psychological distress, a pattern different than that seen among our respondents. Nevertheless, a unique aspect of this study is our ability to demonstrate how age differences in psychological distress display different patterns over various time frames.

Finally, another limitation of these analyses revolves around our assessment of negative emotions. The response format across the three time intervals used the same vague quantifiers (e.g., "some of the time"), thus mean differences across the measures should not be directly interpreted as differences in objective frequency of psychological distress. In addition, we did not obtain accompanying measures of positive emotions. The role of positive emotions may be key to understanding the greater weight younger adults seem to place on distressing days. We can speculate that for younger adults, a particularly distressing day may subjectively seem more important as it is less likely to also involve positive emotions. Our understanding of how age moderates discrepancies in recall of distress could be informed by research examining the role of both positive and negative emotions. In addition, younger adults may give more weight to distressful days because they are less able to regulate or control their negative emotions. Perhaps

older adults, with greater skills in emotional regulation, feel more control over their negative emotions and are therefore not as adversely affected by distressful experiences.

These limitations not withstanding, this commentary offers unique insight into our understanding of age differences in emotional self-regulation. Previous research on adult age differences in psychological distress has largely relied on either single reports of affect recalled over long periods (e.g., Mroczek & Kolarz, 1998), or several reports of affect over only shorter time frames (e.g., Carstensen et al., 2000). The study of how people recall emotions has benefited from daily studies that compare reports of affect collected over differing time frames (Thomas & Diener, 1990; Winkielman, Knauper, & Schwarz, 1998). The present study expands on previous research by using daily telephone interviews from an U.S. national sample of adults across a broad age range. Such a design allowed for a comparison of distress, as it is recalled day to day across a week, with recollection of distress across that same week. Although younger adults reported higher levels of distress over longer time frames, younger and older respondents did not differ in their levels of distress as reported in daily interviews. Interestingly, when we compared weekly aggregate to weekly recall measures of distress, older adults were more consistent in their recall of psychological distress. Subsequent analyses showed that this finding was not due to adults merely forgetting their distressing experiences. Thus it appears that older adults are actually better at remembering their emotions than younger adults. Due to experience in adapting to daily stress, older adults may have greater self-awareness and self-knowledge which lessens bias when remembering distress. Future research should investigate the processes that shape the ways people remember their emotional experience.

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Social Norms, Rules of Thumb, and Retirement: Evidence for Rationality in Retirement Planning

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Workers who anticipate reaching old age must make three choices about their retirement. They must decide at what age they will retire, the percentage of their wages to set aside so they can live comfortably when earnings cease, and the allocation of their retirement savings across different kinds of investments, such as stocks, bonds, bank and insurance accounts, and real estate. The three decisions are interrelated. Workers who do not expect to retire until shortly before they die do not need to save much for retirement. Those who anticipate retiring in their early 50s should plan to save a sizeable fraction of their pay. People who invest in risky assets, like biotechnology stocks and swamp real estate, may obtain terrific rewards for accepting great risk. If they are lucky they can use some of the rewards to retire young and live sumptuously. Less fortunate investors may be left with too little savings to retire.

Over the past couple of decades economists have devoted increasing efforts to understand retirement decisions. Labor economists focus on the timing of retirement and on retirees' work patterns after they leave career jobs. Microeconomists have examined workers' preretirement saving and postretirement consumption behavior. Finance economists have theorized about workers' choices regarding the allocation of retirement saving across risky and less risky investments.