Positive and Negative Affect in Very Old Age

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The current study examined two issues involving the relationship between age and affect in very old age using data from men and women (aged 70 to 100+ years, M = 85 years) in the Berlin Aging Study (BASE). The first issue was whether unique effects of age on positive and negative affect remained after we controlled for other variables that would be expected to relate to affect in late life. We found no unique effects of age after we controlled for demographic, personality, and health and cognitive functioning variables. Personality and general intelligence emerged as the strongest predictors of positive and negative affect. Second, we evaluated patterns within meaningful subgroups: young old versus oldest old and men versus women. Subgroup differences in predictor patterns were minimal. Although we accounted for much of the age-related variance in positive and negative affect, a significant amount of variance in the affect of older adults remained unexplained.

Recently, psychologists studying the relationship between age and affect have found evidence for a “paradox of well-being” at least for the middle aged and young old: Despite the presence of individual difference variables (such as poor health) that disproportionately affect older people and thus should lead to worse well-being in older adults, mean-level age differences in well-being are null or positive (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Mroczek & Kolarz, 1998). This apparent paradox highlights the ways in which age and individual differences may be intertwined in the study of well-being. Two empirical questions emerge when one attempts to further disentangle the complicated relationship between age and affect.

First is the question of so-called unique age affects: Do differences in mean levels of affect between individuals of different ages exist when other possible sources of variance are controlled for, including those individual difference variables known to predict affect more generally? Perhaps more important, is there anything left to predict, by age or any other variables, after age-related variables are entered into a model predicting well-being? Age is a carrier for other variables and is itself not a causal factor in psychological processes (P. B. Baltes, Reese, & Nesselroade, 1977; Wohlwill, 1973). A typical research strategy of life span developmentalists is to try to explicate age-related variance. Mroczek and Kolarz (1998), for example, found unique age effects on affect even when they controlled for a long list of age-related predictors. According to life span developmental theory, this finding indicates that the study may not have captured the complete set of age-related predictors in their assessment.

Second, are there meaningful subgroups in which the profile of affect predictors differs? For example, predictors of affect in old age may differ by gender, or may vary in the young old and oldest old. Together, analyses of these two questions can help clarify how affect is and is not different in adults of different ages and can help us understand both the apparent paradox as well as its limitations.

A recent study on the relationship of age and affect in adults aged 25–74 years considered each of the three above approaches in its analyses (Mroczek & Kolarz, 1998). First, the authors considered whether there was unexplained age-related variance in positive and negative affect in the large, representative sample from the MacArthur Study of midlife Development (MIDMAC) after they controlled for other possible predictors of affect in middle-aged individuals (i.e., demographics, personality, and contextual factors particular to midlife, such as occupational stress). Unique age effects did emerge after controls such that older individuals, in general, reported higher levels of positive affect and lower levels of negative affect. However, the authors wondered whether these effects might differ by gender, and investigated whether the pattern of predictors and the unique age effects would hold true for both men and women. Finally, the authors examined the interaction of age and each positive predictor of affect in the full sample. These analyses together suggested differential patterns of age–affect relationships based on gender, personality, and demographics, as age interacted with marital status and extraversion in predicting affect in males only (Mroczek & Kolarz, 1998).

Although such in-depth analyses may only be possible in large data sets such as that of MIDMAC, a consideration of both age and age-relevant individual difference-type life contexts appears fundamental to understanding the unfolding of affect in adulthood and old age. More important, these contexts may differ substantially by age, even between the range of individuals studied in MIDMAC (those aged 25–74 years) and their older peers. Advanced old age, for example, is a time of life unlike middle age and even early old age (P. B. Baltes, 1997; P. B. Baltes & Smith, 2003; Smith, 2001a; Suzman, Manton, & Willis, 1992). Unlike earlier in adulthood, when most individuals experience good health, and levels of disability and medical comorbidity are rather low, rates of morbidity and functional impairment are impressively high overall among those adults aged 80 and older (Steinhausen-Thiessen & Borchelt, 1999; Suzman et al., 1992). Similarly, after age 75, few cognitive abilities appear spared from age-related decline (Lindenberger & P. B. Baltes, 1997; Schaie, 1996). These age-related changes may in turn influence the predictors of individual differences in affective experience. So, although some traditional predictors (e.g., personality traits) may predict affect in very old age as they do in earlier adulthood, other affect predictors are likely unique to different
times of life. We expect additional factors such as physical health, functional capacity, and cognitive functioning, for example, to be particularly important predictors of individual differences among the oldest old.

Below, we review evidence on predictors of affect other than age in adults of different ages. Then, we consider previous studies on age differences in affect, and we turn our attention to what other than age should predict affect in late life, with particular attention to differences between the young old and the oldest old. Finally, we present our approach to studying affect in the context of the Berlin Aging Study’s (BASE) unique sample of older individuals.

**Affect and Its Predictors in Adulthood**

Personality may be the most consistent predictor of individual differences in affect among adults regardless of age (Costa & McCrae, 1980). Mroczek and Kolarz (1998), for example, found that neuroticism and extraversion added more than any other predictor, including age, to their model predicting positive and negative affect in a large sample of middle-aged adults. A recent meta-analysis of the relationship between personality and well-being found strong, consistent associations, particularly linking neuroticism with negative affect, and extraversion and agreeableness with positive affect (DeNeve & Cooper, 1998). Personality may influence affect directly through affective set-points (Lykken, 1999) or indirectly by impacting an individual’s environmental preferences and behavioral patterns. Interestingly, Costa, McCrae, and colleagues (McCrae et al., 1999; Yang, McCrae, & Costa, 1998) have reported cross-cultural data indicating small yet significant decreases in both extraversion and neuroticism between younger and older adults. These age differences, although small in magnitude, may have implications for the contribution of personality factors to individual differences in affect late in life.

It is important to note, however, that personality does not exclusively predict affect, even among middle-aged adults. In the MIDMAC data, occupational and relative stress, health, and age all predicted affect after personality was controlled for (Mroczek & Kolarz, 1998). Other studies have found relationships with parents and children to be important determinants of well-being among middle-aged individuals (Ryff, Lee, Essex, & Schmutte, 1994; Welsh & Stewart, 1995). Work and family are the most salient life domains to the middle-aged individual (Lachman, 2001), so it is not surprising that variations in those domains should affect individual differences in well-being above and beyond personality in that age group.

**Affect in Old Age**

Although early cross-sectional studies on affect found few differences between older adults and younger adults (Lawton, Kleban, Rajagopal, & Dean, 1992; Malatesta & Kalnok, 1984), more recent studies have presented a more positive view of the affective life of older individuals. Charles, Reynolds, and Gatz (2001) found that participants followed over 23 years from their mid-60s to their mid-80s showed a small decrease in positive affect (see also Stacey & Gatz, 1991). Negative affect declined until age 60. Carstensen and colleagues (2000) found that older adults were more likely to remain in positive emotional states and to continue not experiencing negative emotional states over time than were younger adults. However, no age differences were found in this sample of 18–94 year olds in the rated intensity of positive or negative affect or in the shear frequency of positive affect. Older adults reported less frequent overall negative affect than did younger adults, but only up to age 60.

When age differences have been found in these studies, they have been small in magnitude compared with the substantial individual variation in positive and negative affect in any age group. Furthermore, few studies have looked for age or individual differences in affect among the oldest old. The unique nature of very old age, starting around age 85, has even led some theorists to call for the recognition of a fourth age (e.g., P. B. Baltes, 1997; P. B. Baltes & Smith, 2003; Smith, 2001a). The population of the oldest old consists of people who have outlived average life expectancy and the majority of their birth cohort, and who have to deal with high levels of medical comorbidity (Suzman et al., 1992).

**Predictors of Affect in Old Age**

Older adults are less likely to work and more likely to suffer from health problems than are their middle-aged counterparts. Thus, the set of life context variables that may predict variance in affect in older adults should be different than those of middle-aged individuals, and attempts to explicate age effects in older individuals would need to first specify the impact of these age-salient variables. For example, although occupational stress would therefore not be an appropriate contextual variable for older individuals, physical health status or functional abilities (e.g., strength, mobility, limitations in activities of daily living [ADLs]) might be appropriate (see, for example, Birren, Lubben, Rowe, & Deutchman, 1991; Kunzmann, Little & Smith, 2000; Lawton, 1991; Smith, 2001b).

Furthermore, the life contexts of the oldest old appear to differ substantially from those of their young old counterparts. Although the young old may be similar to their middle-aged counterparts in relatively high levels of health, the lives of the very old are likely to feature multiple comorbid health conditions (Manton & Soldo, 1992). A recent study of Swedish older adults aged 90 and older, for example, found only 19% of participants with no severe chronic diseases (von Strauss, Fratiglioni, Viitanen, Forsell, & Winblad, 2000). Similarly, the American oldest-old population has much higher levels of disability than does the young-old population (Stump, Clark, Johnson, & Wolinsky, 1997). Links between chronic health conditions, functional disability, and depression have been well established (see Williamson, Shaffer, & Parmelee, 2000).

Beyond health and functional status, cognitive abilities also show age-related decline in the oldest old (e.g., Lindenberger & P. B. Baltes, 1997; Sliwinski & Buschke, 1999). Although surprisingly little research has looked at the relationship between individual differences in cognitive functioning and affective profiles in older adults (see, however, Arbuckle, Gold, & Andres, 1986; Wetherell, Reynolds, Gatz, & Pedersen, 2002), everyday functioning has been linked with satisfaction in old age (Diehl, 1998; Lawton, 1991; Willis, 1996), and some evidence has found a link between cognitive decline and depression in the early stages of dementia (Schmand, Jonker, Geerlings, & Lindeboom, 1997; Zank & Leiptold, 2001).

Social networks are not unimportant to the lives of the very old. In fact, they may be even more important to those in worse health, because of the impact social support has on physical health, because of the impact social support has on physical health, because of the impact social support has on physical health, because of the impact social support has on physical health, because of the impact social support has on physical health, because of the impact social support has on physical health, because of the impact social support has on physical health.
health and health behaviors (Seeman, 2001). A recent meta-
analysis of 286 studies on predictors of subjective well-being
in older individuals found quality of social relationships to
be a strong predictor of subjective well-being in older adults
(Pinquart & Sorensen, 2000). Interestingly, whereas quality was
in general a stronger predictor of well-being than was quantity
of social relationships, differences emerged for friendships and
adult family relationships. Frequency of contact was more im-
portant for friendships than for adult family relationships, but
quality of contact was more important for adult family relation-
ships (Pinquart & Sorensen, 2000). Although some recent work
has suggested that personality may be more important than social
support in the prediction of well-being in the oldest old (Landau
& Litwin, 2001), it seems clear that social support—both quality
and quantity—does play some role in late-life well-being.
Chipperfield and Havens (2001) reported that stability of mari-
tal status in old age was differentially related to changes in life
satisfaction: Men were more negatively affected by widowhood,
whereas marital stability actually related to declines in satisfac-
tion for women. These findings also suggest the need to eval-
uate affect predictors by gender, particularly given previous
findings showing differential patterns by gender (e.g., Mroczek
& Kolarz, 1998).

Hypotheses and Analytic Strategy
On the basis of Charles and colleagues’ (2001) and
Carstensen and colleagues’ (2000) findings in particular (both
of which included at least some individuals over the age of 80),
we hypothesized negative age differences for positive affect and
no age differences for negative affect in our sample
(average age 85 years). To test these hypotheses, we conducted
stepwise hierarchical regressions in which demographic vari-
ables such as education and marital status are entered in the first
step, personality is entered second, followed by the age-salient
context variables (health comorbidity, functional abilities, cogni-
tive functioning, quality and quantity of social support), and
finally the age term in the fourth step.

However, we also expected different patterns of predictors
between the young old and oldest old when analyses were re-run
separately in those age groups. In particular, because of the
greater role of health-related comorbidity and disability, we
hypothesized that age-salient contextual variables such as these
would eliminate the unique age effect in the oldest-old sample,
but that the effect would remain in the young-old sample. In
other words, we expected the results in the young old to basically
replicate the findings of Mroczek and Kolarz (1998) in terms of
unique age effects on affect, whereas the oldest old would show
strong effects of health and cognition, but no unique age effects.
We tested this by conducting the full-model regression from the
previous analyses (Step 3 in the stepwise regression described
above, including all predictors except age) separately for posi-
tive and negative affect in the young old and the oldest old. We
also ran the analyses separately for men and women, although
we did not make differential hypotheses by gender.

METHODS

Participants
The present article uses cross-sectional data from the focal
BASE sample \((N = 516)\). Because details regarding the study
sample, design, selectivity, and multidisciplinary assessment
battery are published elsewhere (P. B. Baltes & Mayer, 1999,
also Baltes & Smith, 1997; Smith et al., 2002), we provide
only a summary. Addresses for potential participants in an age
by sex stratified design were drawn from the city registry.
Participants included in the present analyses \((N = 516)\) had
completed a multidisciplinary assessment battery involving a
total of 14 individual sessions over a period of 3 to 5 months.
This cross-sectional sample included six age/cohort groups
(aged 70–74 years, born 1922–1915; aged 75–79 years, born
1917–1910; aged 80–84 years, born 1913–1905; aged 85–89
years, born 1908–1900; aged 90–94 years, born 1902–1896,
and aged 95–105 years, born 1897–1883). There were equal
numbers of men and women in each group \((n = 43)\) and the
mean age of both sexes did not differ \((M = 84.7\) years;
Women: \(M = 85.1\) years). Data were collected from
1990 to 1993. Apart from some clinical medical assessments,
all testing was carried out in the participant’s place of
residence (e.g., private home, nursing home, hospital) by
trained research assistants and physicians. Seventy-eight per-
cent of the participants resided in their own homes; 14%
resided in institutions (e.g., homes for seniors, nursing homes,
hospitals).

Measures

Sociodemographic characteristics.—In addition to age
(years) and gender \((men = 1; women = 2)\), other sociodemo-
graphic variables in the analyses were current marital status
(not married = 0; married = 1) and years of education. At the
time of the cross-sectional study \((1990–1993)\), 30% of the
BASE sample were married, 55% widowed, 7% divorced, and
8% had never married. Representative for these cohorts in
Germany, 65% of the sample had primary level education, 28%
secondary level, and 8% tertiary level \((M = 10.8\) years).

Affect.—Raw total scores for Positive Affect and Negative
Affect were calculated using a translated version of the widely-
used Positive and Negative Affect Schedule (PANAS, Watson,
Clark, & Tellegen, 1988). In BASE, participants rated on a 5-
point scale how often they had experienced 20 emotions over
the previous year: 10 of the emotion words were positive (e.g.,
enthusiastic, excited, proud), and 10 were negative (e.g.,
distressed, afraid, upset). Cronbach’s alphas were high for
the 10 positive items \((\alpha = .78)\) and for the 10 negative items
\((\alpha = .81)\).

Personality.—Personality dispositions were represented by
two factors: Neuroticism (derived from responses to six items
assessing the facets anxiety, depression, vulnerability, and
hostility), and Extraversion (derived from responses to six
items assessing the facets gregariousness, positive emotionality,
assertiveness, and activity). Items to assess these dimensions
were selected from the NEO Inventory (Costa & McCrae,
1985): Cronbach’s alpha for the six neuroticism items was .75,
and Cronbach’s alpha for the six extraversion items was .66.
Participants were asked to indicate how well items described
them using a 5-point scale. Each item was read aloud by an
interviewer, and the individual’s response was recorded.
Health comorbidity.—On the basis of a full clinical medical examination, BASE physicians determined medical diagnoses for each participant according to the ICD-9 (Steinhaag-Thiessen & Borchelt, 1999). Here we use as an index of comorbidity a count of number of moderate to severe physical illnesses ($M = 3.69$).

Functional ability/disability.—We used two different measures of functional ability and disability. The first was a simple count of those ADLs (Mahoney & Barthel, 1965) and instrumental ADLs (items from Lawton & Brody, 1969) on which the individual did not show a limitation or need for assistance; therefore, a higher score on this measure indicates better functional ability and less disability. Scores on this scale could range from 0 to 12.

We also used a measure of physical mobility, because ability to move around may be a major constraint on functional health. This mobility measure (described in more detail in Steinhagen-Thiessen & Borchelt, 1999) was a composite of four clinical tests (balance, walking on a spot, bending over, and turning around 360 degrees in as few steps as possible) and a subjective report of the distance that could be walked without difficulty.

Social relationships and support.—We included two measures of social relationships and support: One was more objective, and one was more subjective. The more objective measure was the size of the self-reported social network, as indicated by each participant in Antonucci’s (1986) Hierarchical Mapping Task of the personal network of close partners. This measure of network size is a sum of the number of individuals mentioned as being very close, close, and less close.

We assessed satisfaction with social networks by using a 5-point self-report scale for (a) satisfaction with family life and (b) satisfaction with friendships. Mean score in the entire sample was 3.95 for family and 3.83 for friends. In the current study, we used a composite of the 2 scales.

Intellectual functioning.—As reported by Lindenberger and P. B. Baltes (1997), the various measures of intellectual functioning collected in the BASE battery could be reasonably summarized using a general intelligence factor (g). Therefore, we used this measure in the current study, expressed as T-scores ($M = 50, T = 10$).

RESULTS

Zero-order correlations between all study variables are shown in Table 1 (see Appendix, Note). In contrast to the correlations reported by Mroczek and Kolarz (1998) for a younger sample but in line with Charles and colleagues’ results (2001), we found a significant negative correlation between positive affect and age in our sample, and no relationship between age and negative affect (see also Smith, 2001b; Smith, Fleeson, Geiselmamn, Settersten, & Kunzmann, 1999; Smith & P. B. Baltes, 1993).

Predictors of Affect

We tested for unique linear age effects on positive and negative affect after we controlled for demographic, personal-
with women reporting higher levels of negative affect. When we conducted regressions on positive affect separately for men and women, only extraversion as a significant predictor for men ($\beta = .33$, $p < .01$, $R^2 = .252$). For women, extraversion ($\beta = .44$, $p < .01$) and intelligence ($\beta = .21$, $p < .01$), as well as functional ability/disability ($\beta = .17$, $p < .05$) predicted positive affect (model $R^2 = .365$). Tests of differences between betas did not reach two-tailed significance levels.

Men who were not married ($\beta = .11$, $p < .05$), less extraverted ($\beta = -.11$, $p < .05$), more neurotic ($\beta = .66$, $p < .01$) and more intelligent ($\beta = .23$, $p < .01$) reported higher levels of negative affect ($R^2 = .494$). For women, only neuroticism ($\beta = .63$, $p < .01$) and general intelligence ($\beta = .18$, $p < .05$) predicted more negative affect ($R^2 = .430$). Again, tests for differences between regression betas were not significant.

After controls for age-related constructs, no significant age variance was left unexplained for either men or women.

**DISCUSSION**

In this study, we attempted to contribute to the understanding of affect in the very old by considering the relationship of age to positive and negative affect in a sample of individuals aged 70 to 100 years once other age-related possible predictors had been controlled. Although we specifically investigated unique age effects, this is really a proxy for any variables that are left to be explained after controlling for many other possible age-related predictors. In this study, all of our predictors except for neuroticism covary with age. We attempted to include predictors that accurately reflect the life contexts of older individuals, such as physical comorbidity as well as mobility.

Table 1. Intercorrelations Between Variables Included in the Study

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Table 2. Hierarchical Regression on Positive Affect

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</tr>
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<td>ADL and IADL</td>
<td></td>
<td>.04</td>
<td>.03</td>
<td>.15</td>
</tr>
<tr>
<td>Grip strength</td>
<td></td>
<td>.04</td>
<td>.03</td>
<td>.01</td>
</tr>
<tr>
<td>General intelligence (g)</td>
<td></td>
<td>.04</td>
<td>.03</td>
<td>.41</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>.04</td>
<td>.03</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note: The full column represents standardized betas for the full model. ADL = activity of daily living; IADL = instrumental activity of daily living; g = general intelligence factor.

*p < .05; **p < .01.
in addition to more standard and general predictors of affect, such as personality and gender. We found that personality and cognitive functioning predicted positive and negative affect, with age contributing no unique variance after the entry of the other predictors.

We then conducted analyses to determine whether predictors of positive and negative affect in old age differ by meaningful subgroup. We were particularly interested in differences between the young old and the oldest old, given recent findings suggesting that the two groups are distinct (P. B. Baltes & Smith, 2003; Smith, 2001a; Suzman et al., 1992). Although the predictors from the full-sample analyses replicate in both age groups for negative affect, an interesting difference emerges for positive affect. Although extraversion, general intelligence, and social network size (not significant in the full-sample analyses) all predict positive affect in the young old, only extraversion predicts positive affect in the oldest old. However, the regression betas for social network size and general intelligence are not significantly different, suggesting that the differential prediction pattern should be viewed with caution.

Finally, we conducted the analyses separately by gender. Although additional predictors emerge in these analyses, such as functional abilities for women and positive affect, and marital status for men and negative affect, these analyses primarily serve to reiterate the strong relationships between personality and cognitive functioning, and the affect outcome measures.

### Personality: The Strongest Predictor of Affect

What is at first most striking about these findings is the strong, consistent relationship between personality and affect; Extraversion predicts positive affect, and neuroticism predicts negative

---

### Table 3. Hierarchical Regression on Negative Affect

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Step 1</th>
<th></th>
<th>Step 2</th>
<th></th>
<th>Step 3</th>
<th></th>
<th>Step 4</th>
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<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>SE</td>
<td>$B$</td>
<td>SE</td>
<td>$B$</td>
<td>SE</td>
<td>$B$</td>
<td>SE</td>
</tr>
<tr>
<td>Education</td>
<td>-.11</td>
<td>.19</td>
<td>.23</td>
<td>.15</td>
<td>-.06</td>
<td>.15</td>
<td>-.05</td>
<td>.15</td>
</tr>
<tr>
<td>Marital status</td>
<td>1.1</td>
<td>1.1</td>
<td>2.09*</td>
<td>.84</td>
<td>1.35</td>
<td>.85</td>
<td>1.29</td>
<td>.86</td>
</tr>
<tr>
<td>Gender</td>
<td>3.84**</td>
<td>1.0</td>
<td>1.75*</td>
<td>.78</td>
<td>1.23</td>
<td>.94</td>
<td>1.04</td>
<td>1.01</td>
</tr>
<tr>
<td>Extraversion</td>
<td>-.04</td>
<td>.03</td>
<td>-.06</td>
<td>.03</td>
<td>-.06</td>
<td>.03</td>
<td>-.06</td>
<td>.06</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>.64**</td>
<td>.03</td>
<td>.65**</td>
<td>.03</td>
<td>.65**</td>
<td>.03</td>
<td>.65**</td>
<td>.03</td>
</tr>
<tr>
<td>Social network size</td>
<td>.03</td>
<td>.05</td>
<td>.02</td>
<td>.05</td>
<td>.02</td>
<td>.05</td>
<td>.02</td>
<td>.05</td>
</tr>
<tr>
<td>Satisfaction with network</td>
<td>-.59</td>
<td>.47</td>
<td>-.58</td>
<td>.47</td>
<td>-.58</td>
<td>.47</td>
<td>-.58</td>
<td>.47</td>
</tr>
<tr>
<td>No. diagnosed illnesses</td>
<td>.27</td>
<td>.15</td>
<td>.27</td>
<td>.15</td>
<td>.27</td>
<td>.15</td>
<td>.27</td>
<td>.15</td>
</tr>
<tr>
<td>Mobility</td>
<td>.75*</td>
<td>.38</td>
<td>.72</td>
<td>.38</td>
<td>.72</td>
<td>.38</td>
<td>.72</td>
<td>.38</td>
</tr>
<tr>
<td>ADL and IADL</td>
<td>-.37*</td>
<td>.20</td>
<td>-.39</td>
<td>.20</td>
<td>-.39</td>
<td>.20</td>
<td>-.39</td>
<td>.20</td>
</tr>
<tr>
<td>Grip strength</td>
<td>-.02</td>
<td>.05</td>
<td>-.03</td>
<td>.06</td>
<td>-.03</td>
<td>.06</td>
<td>-.03</td>
<td>.06</td>
</tr>
<tr>
<td>General intelligence (g)</td>
<td>.20**</td>
<td>.04</td>
<td>.19**</td>
<td>.04</td>
<td>.19**</td>
<td>.04</td>
<td>.19**</td>
<td>.04</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>-.03</td>
<td>.05</td>
<td>-.03</td>
<td>.05</td>
<td>-.03</td>
<td>.05</td>
</tr>
</tbody>
</table>

$R^2$ .032 .427 .464 .465
$\Delta R^2$ .032 .395 .037 .000
$F$ for $\Delta R^2$ 5.7 176.1 4.97 0.28
$df$ 3,512 5,510 12,503 13,503
$p < .001 .001 .001 ns$

Notes: The final column represents standardized betas for the full model. ADL = activity of daily living; IADL = instrumental activity of daily living; g = general intelligence factor.

*p < .05; **p < .01.

### Table 4. Comparison of the Young Old (N = 258) and Oldest Old (N = 258) in the Berlin Aging Study: Means and Standard Deviations

<table>
<thead>
<tr>
<th>Construct</th>
<th>Young Old</th>
<th>Oldest Old</th>
<th>Significant Age and Cohort Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>77.5 (4.3)</td>
<td>92.4 (4.5)</td>
<td>$F(1,515) = 1478.1, p &lt; .001$</td>
</tr>
<tr>
<td>Positive affect</td>
<td>3.3 (.53)</td>
<td>3.0 (.62)</td>
<td>$F(1,515) = 26.5, p &lt; .001$</td>
</tr>
<tr>
<td>Negative affect</td>
<td>2.3 (.54)</td>
<td>2.2 (.66)</td>
<td>ns</td>
</tr>
<tr>
<td>% women</td>
<td>50</td>
<td>50</td>
<td>ns</td>
</tr>
<tr>
<td>% married</td>
<td>39</td>
<td>20.5</td>
<td>$\chi^2(1, N = 516) = 21.2, p &lt; .001$</td>
</tr>
<tr>
<td>Education (years)</td>
<td>11.2 (2.4)</td>
<td>10.4 (2.2)</td>
<td>$F(1,515) = 115.8, p &lt; .001$</td>
</tr>
<tr>
<td>Extraversion</td>
<td>3.5 (.55)</td>
<td>3.2 (.6)</td>
<td>$F(1,515) = 25.2, p &lt; .001$</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>2.3 (.75)</td>
<td>2.4 (.8)</td>
<td>ns</td>
</tr>
<tr>
<td>No. diagnosed illnesses</td>
<td>3.2 (2.1)</td>
<td>4.2 (2.3)</td>
<td>$F(1,515) = 30.7, p &lt; .001$</td>
</tr>
<tr>
<td>ADL and IADL nonlimitations (max: 12)</td>
<td>10.9 (1.7)</td>
<td>8.4 (2.7)</td>
<td>$F(1,515) = 168.1, p &lt; .001$</td>
</tr>
<tr>
<td>Maximum grip strength (kg)</td>
<td>4.7 (1.01)</td>
<td>3.7 (1.3)</td>
<td>$F(1,515) = 129.5, p &lt; .001$</td>
</tr>
<tr>
<td>Mobility (max: 6)</td>
<td>4.99 (7.6)</td>
<td>45 (6.2)</td>
<td>$F(1,515) = 155.2, p &lt; .001$</td>
</tr>
<tr>
<td>General intelligence (g)</td>
<td>55 (8.8)</td>
<td>44 (8.5)</td>
<td>$F(1,515) = 172.7, p &lt; .001$</td>
</tr>
<tr>
<td>No. in social network</td>
<td>11.9 (7.9)</td>
<td>7.6 (5.4)</td>
<td>$F(1,515) = 50.3, p &lt; .001$</td>
</tr>
<tr>
<td>Network satisfaction</td>
<td>3.9 (1.6)</td>
<td>3.7 (1.8)</td>
<td>$F(1,515) = 5.1, p &lt; .05$</td>
</tr>
</tbody>
</table>

Notes: Scores for positive affect, negative affect, extraversion and neuroticism are for a 5-point scale (5 = high). When the original scale is noninformative (cognition), means are reported as T-scores ($M = 50, SD = 10$). Mobility is coded on a 6-point scale (max = 6: can walk 5 km without difficulty). ADL = activity of daily living; IADL = instrumental activity of daily living; g = general intelligence factor.
affect, in both the young old and the oldest old samples. Not only is this consistent with one of the earliest findings on predictors of affect in adulthood (Costa & McCrae, 1980), it is also highly consistent with more recent findings suggesting that personality is more important than social relationships in predicting subjective well-being in the oldest old (Landau & Litwin, 2001). Indeed, social network variables predict well-being in only one case in the current analyses: total size of social network related to positive affect in the young old.

More important, personality factors are also much stronger predictors of positive and negative affect than is health. Although previous studies have found health and subjective well-being to be strongly linked in older adults (Kunzmann et al., 2000; Smith, 2001b), we find that the inclusion of personality variables eliminates any effect of health in the prediction of well-being. The only exception is that functional abilities predict positive affect in females. These findings strongly support Costa & McCrae’s (1980) argument that personality is a strong predictor of well-being at any age. Additionally, they are consistent with Mroczek & Kolarz’s (1998) results in a sample of adults aged 25–74 years, in which personality was the single strongest predictor of affect as well. However, in the MIDMAC sample, other sociodemographic variables also predicted affect, although not as strongly as personality.

The personality findings provide a solid rationale for investigating positive and negative affect separately, rather than investigating predictors of a single well-being measure such as life satisfaction or depressive symptoms. Although controversies still exist on the structure of affect, many in the field consider positive and negative affect to be independent constructs (Watson & Clark, 1997). Indeed, research with older individuals has found that positive and negative affect are independent (Kercher, 1992), and have both different age-related trajectories (Carstensen et al., 2000; Charles et al., 2001; Mroczek & Kolarz, 1998) as well as differential relationships with other variables (Isaacowitz & Seligman, 2002). Consistent with Costa and McCrae’s (1980) early predictions that extraversion would predict positive affect and neuroticism would predict negative affect, we find exactly these relationships in the current study. In only one case is there overlap: both neuroticism and extraversion predict negative affect in men. Had we not evaluated positive and negative affect separately, we may have missed these strong, distinct relationships between personality and affect in our sample of very old adults.

One concern with these findings showing a strong link between personality measured with items from NEO, and affect measured by the PANAS, is that there may be some conceptual overlap between the items on the two measures. This is of particular concern because we asked participants to report positive and negative affect over the previous year, which is akin to a trait-like rating (Watson et al., 1988). One recent study attempted to disentangle the two constructs by evaluating their relationship to success on the job market among individuals graduating from college (Burger & Caldwell, 2000). They found that trait positive affect predicted behavior after controlling for extraversion, but not vice versa. Interestingly, another study found that premorbid personality predicted the emotions of older individuals suffering from dementia, though that study used different measures of personality and affect (Magai, Cohen, Culver, Gomberg, & Malatesta, 1997). Clearly, how personality and affect relate to each other more specifically in older adults is a needed area of future research.

### Intelligence and Affect

Perhaps a more surprising finding, and one that is less predictable from past research, is that, more so than any demographic or contextual variables, a general intelligence factor predicts both positive and negative affect. Higher levels of cognitive functioning predict both more positive affect and more negative affect, after demographic, health, and personality variables are controlled for. At the zero-order level, intelligence was significantly correlated with positive affect, but not with negative affect.

Interestingly, intellectual functioning predicts mortality more strongly in the young old than the oldest old in BASE (Maier & Smith, 1999). It is difficult, however, to try to understand these strong, distinct effects of cognitive fitness on well-being in both the young-old and oldest-old participants because of the paucity of other data on the links between cognition and affect. The notable exception is data linking early stages of dementia with declines in well-being (Schmand et al., 1997; Zank & Leipold, 2001).
Table 6. Regression Coefficients by Age Group for Negative Affect

<table>
<thead>
<tr>
<th>Variable</th>
<th>Young Old (N = 258) B</th>
<th>SE</th>
<th>B</th>
<th>Young Old (N = 258) B</th>
<th>SE</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>-0.23</td>
<td>0.20</td>
<td>-0.06</td>
<td>0.17</td>
<td>0.26</td>
<td>0.03</td>
</tr>
<tr>
<td>Marital status</td>
<td>1.39</td>
<td>1.06</td>
<td>0.08</td>
<td>1.59</td>
<td>1.43</td>
<td>0.06</td>
</tr>
<tr>
<td>Gender</td>
<td>1.76</td>
<td>1.45</td>
<td>0.10</td>
<td>1.00</td>
<td>1.49</td>
<td>0.05</td>
</tr>
<tr>
<td>Extraversion</td>
<td>-0.05</td>
<td>0.05</td>
<td>-0.05</td>
<td>-0.09</td>
<td>0.05</td>
<td>-0.08</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>0.60</td>
<td>0.05</td>
<td>0.65**</td>
<td>0.69</td>
<td>0.05</td>
<td>0.65**</td>
</tr>
<tr>
<td>Social network size</td>
<td>0.01</td>
<td>0.06</td>
<td>0.01</td>
<td>0.09</td>
<td>0.11</td>
<td>0.04</td>
</tr>
<tr>
<td>Satisfaction with network</td>
<td>-0.99</td>
<td>0.73</td>
<td>-0.07</td>
<td>-0.42</td>
<td>0.67</td>
<td>-0.03</td>
</tr>
<tr>
<td>No. diagnosed illnesses</td>
<td>0.08</td>
<td>0.22</td>
<td>0.02</td>
<td>0.42</td>
<td>0.24</td>
<td>0.09</td>
</tr>
<tr>
<td>Mobility</td>
<td>0.33</td>
<td>0.52</td>
<td>0.04</td>
<td>0.70</td>
<td>0.59</td>
<td>0.08</td>
</tr>
<tr>
<td>ADL and IADL</td>
<td>-0.07</td>
<td>0.08</td>
<td>-0.05</td>
<td>-0.08</td>
<td>0.07</td>
<td>-0.08</td>
</tr>
<tr>
<td>Grip strength</td>
<td>0.00</td>
<td>0.08</td>
<td>0.04</td>
<td>-0.04</td>
<td>0.12</td>
<td>-0.02</td>
</tr>
<tr>
<td>General intelligence (g)</td>
<td>0.17</td>
<td>0.06</td>
<td>0.17**</td>
<td>0.20</td>
<td>0.08</td>
<td>0.16**</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td>0.471</td>
<td></td>
<td></td>
<td>0.467</td>
</tr>
</tbody>
</table>

Note: ADL = activity of daily living; IADL = instrumental activity of daily living.
*p < .05; **p < .01.

Rowe & Kahn’s (1997; 1998) model of successful aging provides one way of understanding the important role of general intellectual functioning in the well-being of older individuals. According to their model, maintaining high levels of cognitive functioning is a critical part of the structure of successful aging. But how is it possible that it relates to both higher levels of positive and negative affect, as we find in the current study? One possibility is that better cognitive functioning allows individuals to stay more engaged with life; such engagement may then bring with it both greater enjoyment from life, but also the risk for greater involvement in disappointments (e.g., sadness about loss of friends, self-awareness of age-related changes taking place). It is important to keep in mind, however, that mean levels of negative affect are particularly low in this study.

Interestingly, one of the only differences between the young old and oldest old is that intelligence predicts negative affect in both age groups, but does not predict positive affect in the oldest old. However, the regression betas do not differ significantly between the two age groups, so it seems best to not overinterpret this finding. Overall, predictors of affect in the young old and oldest old are more similar than different.

Conclusions and Future Directions

It is perhaps surprising given recent findings on age and well-being (e.g., Mroczek & Kolarz, 1998) that we do not find any unique effects of age on positive or negative affect after we controlled for a host of other predictors. Another way of looking at this finding would be that we have successfully captured the actual age-related predictors of affect in very old age, and thus have left no variance to be explained by age. This argument would be consistent with the assertion that age is primarily an empty variable, carrying the effects of other more substantive variables (P. B. Baltes, Reese, & Nesselroade, 1977; Wohlwill, 1973). Although health may be the most often considered variable that age may carry, health status does not predict well-being in the current study. Instead, personality, consisting of loosely age-related variables, and intellectual functioning, a strongly age-related construct, emerge as the strongest predictors of affect in the very old.

Two lines of future research are suggested by these findings, and by the obvious limitations of the study. First, even though all age-related variance seems to have been accounted for in our analyses, a large proportion of variance in affect is still left unexplained. Thus, there is clearly room for exploration of non-age-related factors that may predict affect in very old age. Second, these cross-sectional results lead to obvious questions for longitudinal work: In particular, what effect does change in the predictor variables actually have on affect? Is it merely the case that those individuals with lower mean levels of general intelligence have more positive and negative affect, or do actual declines in intellectual functioning over time lead to changes in affect? The current study provides a glimpse into how age may and may not relate to affect in very late life.

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References


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**Appendix**

**Note**

Because of the high intercorrelations among several of our predictor variables, we were concerned about potential multicollinearity in our hierarchical regression models. To investigate whether multicollinearity might be substantially influencing our regression findings, we evaluated variance inflation factors (VIFs) for the predictors and found most to be below 2 and none above 3. These were well below the traditional cut-off of 10 for substantial multicollinearity (Belsley, Kuh, & Welsh, 1980). Nonetheless, we did re-run the hierarchical regressions after standardizing all predictor variables; this did not alter the results of the regression.