# The Complexity of Emotions in Later Life

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**The complexity of positive and negative emotions was examined in a sample of 40 adults between the ages of 60 and 85 years. Participants' emotional experiences were assessed by use of a 30-day assessment protocol. Results suggest that different vulnerability and resilience factors are implicated in the intraindividual experience of positive and negative emotions. Individual differences in perceived stress and neuroticism were associated with less differentiation and fewer co-occurrences of positive and negative emotional experiences. In contrast, dispositional resilience predicted greater differentiation and more co-occurrences of affective states. Findings are interpreted within the framework of life-span theories of emotions.**

COMPARED with the declines in cognitive and physiological functioning observed in later life, emotional functioning shows a remarkable degree of resiliency, with positive emotions lingering longer and negative emotions making briefer intrusions as adults age (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). In comparison with younger adults, older individuals report fewer negative affective experiences (Charles, Reynolds, & Gatz, 2001), exhibit greater emotional control (Carstensen & Charles, 1998), and show greater investment in attention and memory for emotionally positive information (Charles, Mather, & Carstensen, 2003; Mather & Carstensen, 2003). Mounting evidence suggests that improved emotion regulation is associated with greater emotional complexity in later life (e.g., Carstensen et al., 2000; Labouvie-Vief & Medler, 2002). The importance of emotional complexity, moreover, is congruent with a number of life-span theories (e.g., Baltes & Staudinger, 2000; Carstensen et al., 2000; Labouvie-Vief & Medler, 2002) and cognitive-developmental models (Linville, 1987; Mayer & Salovey, 1997; Saarni, 1999), which suggest that representations of emotional experience that include both positive and negative emotions may be a hallmark of optimal psychological functioning.

Although prior research suggests that old age is associated with increased emotional complexity, relatively little attention has been given to the identification of individual difference variables that contribute to emotion differentiation in later life. (It is important to note that our concept of emotional complexity specifically refers to individual differences in the covariation among affective states. Thus, it should be distinguished from research that assesses affective states as distinct entities, such as that by Chipperfield, Perry, & Weiner, 2003, because complexity in the latter sense may include significant co-occurrences of positive and negative emotions present in the former.) It remains unclear what the psychological factors are that promote or impair the intraindividual experience of positive and negative emotions. The present study was designed to provide information bearing on this lacuna of evidence. In keeping with past research, we begin by selectively reviewing the literature on emotional complexity. We then review evidence of individual difference variables that contribute to the intraindividual variability in emotional experience. We suggest that different vulnerability and resilience factors are implicated in the intraindividual experience of positive and negative emotions.

## Emotional Complexity

*Emotional complexity* refers to the capacity to distinguish between pleasant and unpleasant feeling states. Individual differences in emotional complexity reflect how pleasant and unpleasant emotions are understood in relation to one another. Research on emotion and health suggests that emotional complexity is manifested within individuals along a continuum, which at low levels appears to be associated with adverse health outcomes and at higher levels appears to promote health (cf. Lane & Pollermann, 2002). Compared with those persons who have a capacity to differentiate pleasant and unpleasant affects, those showing less emotion differentiation report significantly more maladaptive emotion regulation strategies, such as binge eating, alcohol abuse, and somatization (cf. Taylor, Bagby, & Parker, 1997). In contrast, the capacity to preserve and maintain the boundaries between positive and negative affect is associated with less sustained negative affect (Pennebaker, Mayne, & Francis, 1997) and faster recovery (Epel, McEwen, & Ickovics, 1998) following a stressful experience. Undifferentiated emotional experiences, moreover, have been linked to poor relationship quality and less social support in both clinical (Lane, 2000) and nonclinical populations (Lopes, Salovey, & Straus, 2003).

*Emotional complexity and stress.*—One important factor that has been linked directly to emotional complexity is stress. The experience of stressful life events places significant cognitive demands on the individual, raising uncertainty, narrowing attention, and reducing information processing (cf. Linville, 1987; Ursin & Olff, 1993). Across a variety of contexts, an emerging literature suggests that stress may also alter the structure of emotional experience, leading to less differentiation of affective information (see Reich, Zautra, & Davis, 2003 for a review). During stressful periods, emotions are organized along a single good–bad continuum, for example, in patients with chronic painful conditions such as rheumatoid arthritis (Potter, Zautra, Reich, 2000), inflammatory bowel disease (Porcelli, Zaka, Leoci, Centonze, & Taylor, 1995), and gastrointestinal disorders (Porcelli, Taylor, Bagby, & De Carne, 1999). Among those undergoing a traumatic life event, such as the loss of a spouse, negative emotions predominate during times of stress, displaying a pattern of strong inverse relationships with positive emotions (Folkman, 1997; Zautra, Reich, Davis, Nicolson, & Potter, 2000). Individual differences in

perceived stress as well as variables related to exposure and reactivity to stressful life events (e.g., neuroticism) should, therefore, play an important role in the experience of emotional complexity.

*Emotional complexity and resilience.*—If stress acts to condense emotional space into a single dimension, whereby emotions are experienced as either "good" or "bad" (Reich et al., 2003), then resilient and broad-minded coping, marked by the capacity to view positive and negative emotions in a more open and tolerant fashion, should contribute to greater affect differentiation. Consistent with this prediction, greater uncoupling of positive and negative affects have been observed in individuals showing greater flexibility in the processing of emotional information (e.g., Potter et al., 2000; Terracciano, McCrae, Hagemann, & Costa, 2003; Zautra, Smith, Affleck, & Tennen, 2001). To the extent that a similar mechanism may underlie individual differences in psychological resilience or the capacity to sustain positive health in the face of adversity (Bergeman & Wallace, 1999; Block & Kremen, 1996), those with greater reserves of resilience should evidence greater emotional complexity. Consistent with this hypothesis, recent evidence indicates that, relative to their less resilient peers, resilient people are more likely to experience their positive and negative emotions as blended or intermixed (Fredrickson, Tugade, Waugh, & Larkin, 2003; Tugade & Fredrickson, 2004).

## Focus of the Present Study

The purpose of the current study was to extend previous research by testing the reliability and generalizability of previous findings in a sample of older adults. We focused on the complexity of emotions experienced over time. Following previous research, we operationalized emotional complexity by the number of factors characterizing each person's intra-individual emotional experience and by the average intra-individual correlation between positive and negative affect (cf. Carstensen et al., 2000; Larsen & Cutler, 1996). We extend previous research by relating measures of emotional complexity to a broad range of mental health indicators. In addition, we examined the relationships between selected theoretical variables and our emotional complexity measures. Consistent with previous research, we hypothesized that individual differences in perceived stress and neuroticism would be associated with less differentiation and fewer co-occurrences of affective states. In contrast, we hypothesized dispositional resilience to predict greater affect differentiation and more co-occurrences of positive and negative emotions.

## METHODS

### Participants

The participants included 40 older adults ranging in age from 60 to 85 years ($M = 75.5$, $SD = 6.28$) who participated previously in the Notre Dame Study of Optimal Aging. Half of the participants were female, and all were married at the time of the study. Participants were predominantly European-American (97.5%), and half were educated through high school. Income was normally distributed, with 2.9% reporting family income less than $14,999, 28.6% between $15,000 and $24,999, 48.6%

between $25,000 and $40,000, and 22.9% reporting income greater than $40,000. Generally, the characteristics of the sample reflect the Northern Indiana area (*Indiana Fact Book*, 1992). Overall, 50 participants were invited to participate in a study of daily emotional experience; 40 returned completed data (80%). There were no significant differences in age, gender, income, or educational status for those who did not complete the study.

### Procedures

Prior to the daily-assessment phase of the study, participants were assessed on a broad range of mental health indicators. Participants then took part in a daily diary study of emotions and stress. Participants received a diary containing a packet of daily response sheets. Each response sheet contained 12 emotion items traditionally assessed in dimensional measures of positive and negative affect (e.g., Watson, Clark, & Tellegen, 1988). Participants rated their emotional experience each day for 30 days by using a series of 12 affect terms on a 4-point scale (1 = not at all to 4 = very much). The negative emotion items included the terms *sad, depressed, stressed, upset, nervous,* and *tense.* The corresponding positive emotion items included the adjectives *hopeful, happy, relaxed, interested, calm,* and *alert.* These emotions were chosen because they represent a broad range of prototypical pleasant and unpleasant emotional states. In addition, participants completed a single item on the most stressful event of the day and then rated their perceptions of how stressful the event was on a scale of 1 (very stressful) to 5 (not very stressful). Participants were given a month's supply of diary response sheets and were instructed to respond to the daily items in the evening and return the completed diaries at the end of the 30-day period.

### Measures

*Resilience.*—We assessed trait resiliency with a modified version of the Dispositional Resilience Scale (Bartone, Ursano, Wright, & Ingraham, 1989). This measure is composed of 45 items, with 15 items each assessing perceived challenge (e.g., "changes in routine are interesting to me"), controlled processing (e.g., "planning ahead can help me avoid most future problems"), and focused engagement (e.g., "most days life is interesting and exciting for me"). A 4-point Likert scale, ranging from 1 (not at all true) to 4 (completely true), was used. Reliability data indicated alphas of .72, .68, .59, and .86 for the commitment, control, and challenge subscales and for the overall resilience measure, respectively.

*Stress and neuroticism.*—We assessed perceived stress by using the 14-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). This measure was designed to assess the degree to which individuals appraise the situations in their lives as stressful. Participants respond to items such as this: "In the last month, how often have you been upset because of something that happened unexpectedly?" Participants respond on a 4-point scale ranging from never to always. Cronbach's $\alpha = .76$. We assessed neuroticism by using a 9-item short form of the Eysenck Personality Inventory (Eysenck & Eysenck, 1975). The scale score is based on the sum of yes–no responses to 9 items. Cronbach's $\alpha = .71$.

*Physical health and well-being.*—We used measures of somatic complaints and self-reported health to assess physical health. The Somatic Complaints subscale of the Health Status Checklist (Belloc, Breslow, & Hochstim, 1971) assesses specific health symptoms, such as frequent headaches or getting tired in a short period of time. Responses from the checklist are summed to yield a score that reflects the number of somatic health complaints. Higher scores reflect a greater number of somatic complaints. We assessed self-reported health with the Health Status Checklist (Belloc et al., 1971). The scales assesses the respondents' overall health status, how it compares with that of others their age, and how their health compares with their own 5 years ago ($\alpha = .84$). We assessed well-being with the Life Satisfaction Index-Z (LSI-Z). The LSI-Z (Wood, Wylie, & Shaefor, 1969) is a 13-item modified version of the Life Satisfaction Index-A (Neugarten, Havighurst, & Tobin, 1961) that is frequently used with older adults. Items such as "I am just as happy as when I was younger" are responded to on a 5-point Likert scale, which ranges from strongly agree to strongly disagree. Cronbach's $\alpha = .83$.

### RESULTS

We organize the results into four sections. The first section describes descriptive analyses and data reduction of positive and negative emotion terms. The second section focuses on the derivation of emotional complexity scores. The third section presents correlates of our emotional complexity measures. Finally, the fourth section reports on findings that examine the relationship between selected theoretical factors and emotional complexity.

### Descriptive Analyses and Data Reduction

To test the basic assumption that individuals differ consistently with regard to the intensity and frequency with which they experience specific emotions, we computed mean intensity and frequency scores for each emotion. We derived frequency scores for each participant by computing the proportion of times across the 30-day sampling period that a participant reported experiencing the emotion to some degree (i.e., the proportion of nonzero ratings). We similarly derived intensity scores for each participant by computing the average rating for each felt emotion (i.e., the average across all nonzero ratings; see Schimmack & Diener, 1997, for a discussion of separating intensity and frequency in repeatedly measured affect ratings). Table 1 shows the average frequency and intensities for each emotion across the entire sample. As can be seen, relative to their positive emotions, participants rated their own negative emotions as being relatively less intense and report relatively fewer negative emotional experiences. Across the entire sample, happiness was the most frequently endorsed positive emotion (occurring to some degree on approximately 92% of the occasions), whereas sadness was the most frequently endorsed negative emotion (occurring to some degree on approximately 39% of the occasions), a finding consistent with previous life-span studies of emotion (e.g., Carstensen et al., 2000; Chipperfield et al., 2003).

### Derivation of Emotional Complexity Scores

*Differentiation index.*—To obtain a factor-based index of emotion differentiation, we extracted, for each participant, the number of principal component factors with eigenvalues greater

Table 1. Frequency and Intensity of Negative and Positive Emotions

| Emotion | Frequency | | Intensity | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Negative | | | | |
| Stressed | 0.29 | 0.21 | 1.23 | 0.98 |
| Depressed | 0.24 | 0.19 | 1.08 | 0.87 |
| Sad | 0.39 | 0.32 | 1.87 | 1.21 |
| Upset | 0.34 | 0.26 | 1.52 | 1.02 |
| Nervous | 0.28 | 0.23 | 1.23 | 0.92 |
| Tense | 0.31 | 0.18 | 1.41 | 0.85 |
| Positive | | | | |
| Interested | 0.87 | 0.23 | 2.85 | 0.98 |
| Hopeful | 0.69 | 0.32 | 2.06 | 0.86 |
| Relaxed | 0.81 | 0.17 | 2.76 | 1.28 |
| Happy | 0.92 | 0.13 | 2.91 | 1.31 |
| Calm | 0.84 | 0.25 | 2.81 | 0.93 |
| Alert | 0.75 | 0.36 | 2.68 | 1.05 |

*Note*: $N = 40$; frequencies range from 0 to 1.00, and intensities range from 1 to 3.00.

than unity. We took as an index of emotional differentiation the number of within-person factors needed to account for the variation in each person's emotional experience. A low score reflects little differentiation in emotional states, whereas a higher score reflects more differentiation. Across the whole sample, the average number of eigenvalues exceeding unity was 5.8 ($SD = 1.3$, range = 1–8), accounting for, on average, a total of 70.7% of the total estimated variance in emotional ratings across time.

*Co-occurrence index.*—In keeping with previous work (e.g., Carstensen et al., 2000), we also calculated, for each participant, the average intraindividual correlation between positive and negative affect over the 30-day sampling period. Positive within-subject correlations reflect greater degrees of co-occurrence and more blending between pleasant and unpleasant feeling states, whereas smaller correlations reflect little blending of emotional states (Zelinski & Larsen, 2000). On average, the correlation between positive and negative affect was .19 ($SD = .28$), suggesting that positive and negative affects tend to blend together somewhat during the same reporting period. (In earlier work, Carstensen and colleagues referred to this feature of emotional experience as "poignancy." It is noteworthy that the average intraindividual correlation between positive and negative affects observed in the present study is commensurate with the linear age trend, $r = .26$, $p < .01$, observed in the Carstensen et al., 2000, study.)

### Trait Correlates of Emotional Complexity

Table 2 displays the partial correlations of theoretical scales with our differentiation and co-occurrence indices of emotional complexity. After controlling for emotion frequency, we can see that those individuals who were higher in emotional differentiation also showed higher levels of overall psychological resilience ($r = .41$, $p < .01$) and lower levels of neuroticism ($r = -.32$, $p < .05$) and global psychological stress ($r = -.37$, $p < .05$). A similar pattern of characteristic correlates emerged for our co-occurrence indices (see Table 2). Individuals showing greater blending of positive and negative emotions

Table 2. Partial Correlations and Multiple Regression Beta Weights for Predictors of Emotion Differentiation and Co-Occurrence

| Predictor | Differentiation | | | Co-Occurrence | | |
|---|---|---|---|---|---|---|
| | r | β | B | r | β | B |
| Sociodemographic variables | | | | | | |
| Age | 0.15 | 0.12 | 0.07 | 0.24 | 0.173 | 0.11 |
| Gender | −0.14 | −0.11 | −0.05 | −0.19 | −0.13 | −0.08 |
| Ethncity | 0.17 | 0.01 | 0.01 | 0.12 | 0.14 | 0.09 |
| Income | −0.19 | −0.02 | −0.01 | −0.13 | −0.07 | −0.01 |
| Resilience factors | | | | | | |
| Perceived challenge | 0.36* | 0.31* | 0.24 | 0.35* | 0.29* | 0.22 |
| Controlled processing | 0.31* | 0.28* | 0.21 | 0.32* | 0.28* | 0.17 |
| Focused engagement | 0.17 | 0.19 | 0.08 | 0.26 | 0.21 | 0.14 |
| Global resiliency | 0.41** | 0.35** | 0.27 | 0.45** | 0.36** | 0.29 |
| Vulnerability factors | | | | | | |
| Global psychological stress | −0.37* | −0.31** | −0.23 | −0.41** | −0.35** | −0.27 |
| Daily stress | −0.33* | −0.29* | −0.21 | −0.38* | −0.31* | −0.24 |
| Neuroticism | −0.32* | −0.28* | −0.19 | −0.34* | −0.32* | −0.18 |
| Physical health and well-being | | | | | | |
| Somatic complaints | −0.24 | −0.17 | −0.11 | −0.27 | −0.18 | −0.13 |
| Self-rated health | 0.27 | 0.19 | 0.13 | 0.25 | 0.16 | 0.07 |
| Life satisfaction | 0.17 | 0.09 | 0.02 | 0.06 | 0.12 | 0.05 |
| $R^2$ (Overall) | 0.18 | | | 0.24 | | |
| Regression, F (9, 26) | 2.57* | | | 2.84* | | |

*Notes*: Emotional frequency is controlled for. $N = 40$. Greater co-occurrence reflects more blending (higher correlations) between affects of opposing valence.

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

also evidenced greater overall psychological resilience ($r = .45$, $p < .01$) and lower levels of global psychological stress ($r = −.41$, $p < .01$) and neuroticism ($r = −.34$, $p < .05$). Moreover, tests of significance indicated that the correlations among indices of differentiation ($z = 2.87$, $p < .01$) and co-occurrence ($z = 2.03$, $p < .05$) were statistically heterogeneous from each other.

*Predictors of Emotional Complexity*

To test whether selected theoretical variables predicted our emotional complexity indices, we conducted two separate multiple regression analyses, one for each of our differentiation and co-occurrence measures of emotional complexity. In particular, we considered whether, after we controlled for emotion frequency, the experience of emotional complexity would be influenced by unique sets of vulnerability (i.e., neuroticism, global psychological stress, or daily stress) and resilience (i.e., perceived challenge, controlled processing, focused engagement, or trait resilience) factors. In keeping with previous research, we also examined the influence of sociodemographic variables (e.g., gender or age) and overall physical health (e.g., self-rated health) and well-being (e.g., life satisfaction). Table 2 provides a summary of the multiple regression beta weights and overall F and $R^2$ values in each analysis. Consistent with previous findings (e.g., Chipperfield et al., 2003), sociodemographic variables were unrelated to any of the emotional complexity indices. The results regarding emotional complexity indicated that higher levels of neuroticism, global stress, and daily stress each predicted less differentiation ($β = −.28$, $β =$

−.31, $β = −.29$) and fewer co-occurrences ($β = −.32$, $β = −.35$, $β = −.31$) of positive and negatives emotions, respectively. In contrast, higher levels of global resilience predicted greater differentiation ($β = .35$) and more co-occurrences ($β = .36$) of positive and negative emotions. Finally, although our differentiation and co-occurrence indices were correlated ($r = .26$, $p < .05$), consistent with previous research (i.e., Carstensen, et al., 2000), differentiation did not account for the any of the vulnerability–resilience effects on co-occurrence, nor did co-occurrence account for any of the vulnerability–resilience effects on differentiation, suggesting that differentiation and co-occurrence are separate aspects of emotional complexity. (Mediational analyses revealed that the effects of global resilience, $β = .31$, $p < .05$, and perceived stress, $β = −.28$, $p < .05$, on differentiation remained significant even after co-occurrence was controlled for. Similarly, differentiation did not account for the resilience–co-occurrence relationship, $β = .34$, $p < .05$, nor the stress–co-occurrence relationship, $β = .29$, $p < .05$.)

## DISCUSSION

The results of the present study illustrate the presence of interindividual differences in emotional intraindividual variability (Carstensen et al., 2000; Zelinski & Larsen, 2000). Some individuals showed very little emotional complexity, evidencing a unidimensional mood structure over the 30-day period. Other participants, however, were more emotionally complex and required more factors to account for appreciable amounts of variance in their daily mood data. Our results also document the need for identifying theoretical vulnerability and resilience traits that may place individuals at greater or lesser risk for adaptational difficulties. In particular, higher levels of neuroticism and perceived stress appear to alter the structure of emotional complexity, increasing the likelihood that emotions are experienced as either good or bad. Participants who were higher on these vulnerability traits evidenced less differentiation of positive and negative affects. Thus, the relationship between stress and emotional complexity observed in prior studies of young adults (cf. Reich et al., 2003) is further documented in a sample of older, relatively healthy adults.

In addition to identifying vulnerability factors, we also sought to identify important resilience variables. Psychological resilience has been argued to be a relatively stable personality disposition characterized by the ability to overcome, steer through, and bounce back from adversity (Bergeman & Wallace, 1999; Masten, 1994). In prior research, resilient individuals were found to exhibit greater blends of both positive and negative emotions (Folkman, 1997; Fredrickson et al., 2003; Tugade & Fredrickson, 2004). In the current study, resilient individuals also showed greater co-occurrences of positive and negative emotions; however, compared with less resilient individuals, those possessing greater resilience were found also to better differentiate their positive and negative emotions. These relationships, moreover, remained even after the frequency of emotional responses was controlled.

Although the focus of the present study was on relatively short-term intraindividual variability, the results should be viewed as suggesting the possibility of more general intraindividual variations in affective experience (Horn, 1972). Nevertheless, we underscore that it will be important, in future

studies, to explore the longer term consequences of emotional complexity and how such qualities are scaffolded by various resilience dispositions, such as openness to experience (Terracciano et al., 2003), mindfulness (Brown & Ryan, 2003), and emotional intelligence (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Because the uncertainty of stressful events during later life may compete for limited cognitive resources by increasing demands on information processing (Zautra et al., 2000), emotional complexity may be a resource that resilient individuals draw upon during times of stress. Understanding how theses relationships unfold and change over longer periods of time represents an important area for future research.

Another important subject for future study is the development of alternative approaches for assessing emotional complexity. The approach used in the present study (i.e., P-technique factor analysis) is time consuming and requires repeated measurements of ongoing emotional experience. As an alternative, multidimensional scaling procedures might be used in future studies to determine the dimensionality (complexity) of the underlying observed similarities or dissimilarities (distances) between each participant's emotional ratings. Another approach is to use existing well-developed trait and state measures of emotional awareness (e.g., Trait Meta-Mood Scale; Salovey et al., 1995; State Meta-Mood Scale; Mayer & Gaschke, 1988).

In sum, the results of the present study further echo those observed by other developmental researchers (i.e., Carstensen et al., 2000; Labouvie-Vief et al., 2002), suggesting that complexity of emotions in later life may represent an important psychological resource. These findings notwithstanding, the present results also suggest that the capacity to recruit such resources is itself tied to important individual differences variables. The relevance of such variables to emotional adaptation in later life represents important directions for future research.

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