The Role of Daily Positive Emotions During Conjugal Bereavement

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The role of daily positive emotions in the stress process was examined in a sample of 34 recently bereaved older adult widows. Humor coping and perceived stress were measured in questionnaires, and positive emotions, depression, anxiety, and stress were assessed daily for 98 days. Results highlight the critical role of daily positive emotions in the months immediately following conjugal loss. Intraindividual analyses revealed significant reductions in the magnitude of the stress–depression correlation on days in which greater positive emotions were present. Results also suggest that different vulnerability and resilience factors are implicated in the emotion differentiation process. For widows with greater humor coping skills, there was less overlap in daily ratings of positive emotions and depressive symptoms. In contrast, higher levels of chronic stress resulted in less differentiation of emotional responses.

The larger literature on daily stress and mood reveals that stressful life events, particularly for older adults (Gallagher, Breckenridge, Thompson, & Peterson, 1983; Holmes & Rahe, 1967). Among older Americans, conjugal loss is three times more likely to occur in those over the age of 65 (U.S. Bureau of the Census, 1997). The resulting conjugal bereavement is associated with an increased risk of depressive symptoms, major depressive episodes (Byrne & Raphael, 1997; Reynolds et al., 1999), and anxiety-related symptoms and disorders (Jacobs et al., 1990; Turvey, Carney, Arndt, Wallace, & Herzog, 1999). Symptoms related to anxiety and depression, in turn, are highly comorbid (Clark & Watson, 1991; Mineka, Watson, & Clark, 1998), showing marked intraindividual variation in the months immediately following conjugal loss (Byrne & Raphael, 1999; Harlow, Goldberg, & Comstock, 1991).

Despite the substantial documentation of negative emotions following loss (see Bonanno & Kaltman, 1999; Stroebel & Schut, 2001 for reviews), little is known about how positive emotions counteract the upending experience of daily stress and negative emotions during the bereavement process. This is despite evidence that positive emotions co-occur with distress in bereaved individuals, often with surprising regularity (Folkman, Moskowtz, Folkman, Collette, & Vittinghoff, 1996; Stein, Folkman, Trabasso, & Richards, 1997). In a study of AIDS-related caregiving and bereavement, for example, Folkman (1997) reported that, with the exception of the period immediately before and after their partner’s death, the positive emotion scores of men whose partners had died of AIDS did not reliably differ from their negative emotion scores, and at 3 months postloss the scores had returned to their prebereavement level.

Although the finding that people can experience positive emotions with great frequency even in the most difficult of circumstances is surprising, it raises more questions than it answers. Exactly how do daily positive emotions influence and shape the experience of stress and negative emotions during bereavement? Do positive emotions on days in which a stressful event is present function to maximize resistance (Potter, Zautra, & Reich, 2000; Reich, Zautra, & Potter, 2001), interrupting the experience of bereavement-related anxiety and depression? How do certain bereaved spouses, in the face of daily stress, maintain emotional resilience? Are the benefits of positive emotions during bereavement attached to underlying individual difference variables, such as general positive affectivity and humor, which may be largely immutable? Or do the real benefits of positive emotions take place closer to actual moments of change (cf. Fredrickson & Levenson, 1998; Zautra, Smith, Affleck, & Tennen, 2001), such that there exists significant opportunity for grieving individuals to continually recruit personal resources to generate and sustain positive emotions as they cope with loss?

We addressed these questions in a daily diary study of widows coping with the recent death of a spouse. In addition to providing a framework in which to study inherently intra-individual (within-person) questions (Tennen, Affleck, Armenti, & Carney, 2000), daily diary studies confer specific methodological advantages for the study of conjugal bereavement. Daily diary assessments allow bereaved spouses to report their behavior and experiences over the range of situational circumstances encountered in everyday life. They allow for statistical modeling of bereavement-related stress and emotion over time. Daily diaries also have the potential for greater validity, because the shorter lag between experience and reporting minimizes recall biases (cf. Lazarus & Folkman, 1984; Stone, Shiffman, & DeVries, 1999). Although daily process studies have been applied successfully to study an array of psychological phenomena (for reviews, see Bolger, Davis, & Rafaeli, 2003; Tennen & Affleck, 2002), relatively less work has been directed at using daily diaries to track the adaptational processes of widows as they unfold over fairly short time intervals. That is, comparatively few published studies have examined the unfolding day-to-day concomitant relationships between stress and emotions in widowhood.

The Adaptive Functions of Positive Emotions During Stress

The larger literature on daily stress and mood reveals that negative emotions are not always present in the same degree
each time a person experiences stress (cf. Affleck, Tennen, Urrows, & Higgins, 1994; Zautra, Berkhof, & Nicolson, 2002). One psychological resource that has been directly linked to effective regulation of negative emotions is the presence of positive emotions (Fredrickson, Mancuso, Branigan, & Tugade, 2000). In addition to enhancing psychological coping and well-being, positive emotions have been posited to serve a protective function, guarding individuals from negative emotions as well as “undoing” the aftereffects of such emotions (cf. Fredrickson, 2001; Fredrickson & Levenson, 1998).

Positive emotions may be most beneficial, however, when they are present at the time of stress. Zautra and colleagues (Zautra, Reich, & Guarnaccia, 1990; Zautra et al., 2001) recently introduced the dynamic affect (DA) model to account for how positive emotions influence negative emotions during stressful periods. In contrast to most models of stress and coping, which view well-being entirely in terms of regulating and minimizing psychological distress, the DA model takes into account both negative and positive emotions in the stress process. (For discussions of the role of positive emotions in coping, see Folkman & Moskowitz, 2000, and Park & Folkman, 1997.) The model characterizes adaptation to stress as the successful uncoupling of negative and positive emotions. Across a number of studies, Zautra and colleagues (Potter et al., 2001; Reich et al., 2001; Zautra et al., 2001, 2002) demonstrated that the capacity for preserving separate, relatively independent emotion systems during stressful periods functions to maximize emotional resilience and hasten psychological recovery. The construct of emotional complexity emphasized in the DA model is also congruent with a number of life-span theories (e.g., Baltes & Staudinger, 2000; Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Labouvie-Vief & Medler, 2002) and cognitive–developmental models (Mayer & Salovey, 1997; Linville, 1987; Saarni, 1999), suggesting that differentiated representations of emotional experience that include both positive and negative emotions may be a hallmark of optimal psychological functioning.

In addition to giving a better understanding of how bereaved spouses respond emotionally to ongoing stressors on a daily basis, studying bereavement as a daily process also provides a rich context in which to examine the differential effects of daily positive emotions on anxiety and depression. One provocative hypothesis is that, although anxiety and depression share a general, nonspecific factor with negative emotions, it is anhedonia or the absence of positive emotions, which is a characteristic emotional feature of depression, that distinguishes it from anxiety (Clark & Watson, 1991; Watson, Clark, & Carey, 1988; Watson & Kendall, 1989). Evidence supporting this hypothesis ranges from neuropsychological studies of brain activity (e.g., Henrques & Davidson, 1991; Sutton & Davidson, 1997) to cognitive–behavioral interventions (e.g., Gortner, Gollan, Dobson, & Jacobson, 1998; Lewinsohn & Gotlib, 1995). Modeling processes of intrapersonal variability, thus, can help to clarify how positive emotions differentially influence the occurrence of depression- and anxiety-related symptoms during conjugal bereavement.

The Role of Humor in the Stress Process

Just as there are variations within a person in the experience of emotions and stress, so too there are differences between individuals in the use of emotions to cope with stress (Feldman-Barrett, Gross, Christensen, & Benvenuto, 2001; Salovey, Stroud, Woolery, & Epe, 2002). Considerable efforts have focused on humor as a moderator of stressful life events (for a review, see Lefcourt, 2002; but see Martin, 2001). Comparatively fewer studies have examined humor as a mechanism by which positive emotions can be both instigated and enhanced in the midst of stress (Kuiper, Martin, & Dance, 1992; Kuiper, Martin, & Olinger, 1993). Those who use humor as a coping mechanism may, for example, be more adept at harnessing the benefits of positive emotions to regulate their negative emotions during times of stress (Folkman & Moskowitz, 2000). Similarly, those who have higher average levels of positive affect should be less vulnerable to experiencing negative emotions during stressful periods (Hobfoll, 1989). From this perspective, compared with those low in humor and positive affectivity, the daily positive and negative emotions of those high on these traits should be inversely coupled during periods of stress, exhibiting a significant degree of bipolarity.

In contrast to the hypothesis that humor may represent a coping resource that can be deployed as a buffer during stressful times, an alternative hypothesis is that those who engage in humor coping during bereavement may show greater emotional resilience or the capacity to keep their positive emotions separate from negative emotions in the midst of stress. Consistent with this prediction, several investigators have reported that those who are able to engage in coping styles marked by the use of humor are better able to distance themselves from stressful events (Kuiper et al., 1992, 1993; Lefcourt, Davidson, Shepherd, Phillips, Prkachin, & Mills, 1995). Kuiper and colleagues (1992), for example, reported that, in the presence of increasing negative life events, those with a good sense of humor were able to maintain and even increase their levels of positive emotions. Keltner and Bonanno (1997) similarly reported that the occurrence of Duchenne laughter during the course of bereavement was correlated with verbal autonomic response dissociation, indicating that those who engaged in full-laughter displays were better able to emotionally dissociate or distance themselves from feelings of grief and dysphoria. To the extent that a similar resilience mechanism may underlie individual differences in humor coping during conjugal bereavement, it follows that the daily positive and negative emotions of those high in humor coping should be relatively independent, displaying a significant degree of bivalency.

In this article, we examine the question of how daily stress, positive emotions, trait humor coping, and positive affectivity each influence the daily experience of anxiety- and depression-related symptoms following the loss of a spouse. Using a multilevel daily process design, we tested predictions that positive emotions may be most beneficial when present at the time of stress (Zautra et al., 2001, 2002). We also tested whether the “undoing” effects of daily positive emotions, in the context of conjugal bereavement, are specific to symptoms of depression rather than anxiety. Further, we tested but made no prediction as to whether individual differences in positive affectivity would alter the ongoing daily relationships between positive emotions, anxiety, and depression. Finally, we examined the degree to which within-person relationships between positive and negative emotions (i.e., anxiety and
depression) are influenced by individual differences in humor coping.

**METHODS**

**Participants**

Fifty-five older adult widows from the Northern Indiana–Southwestern Michigan region satisfied the inclusion criterion of the present study, which was having a spouse at least 60 years of age at the time of his death. Participants ranged from 61 to 83 years of age ($M=71.94$, $SD=6.11$). The majority of participants had at least a high school education (97.06%). In addition, 55.87% of the women had received some education or training after high school. Income levels were difficult to assess for the period of time immediately following the death of the spouse. However, during the follow-up interview, which was approximately 4 months postloss, 16.67% of the participants reported an annual income between $7,500 and $15,000. In addition, 46.67% of the participants reported a yearly income between $15,000 and $25,000; 13.33% reported an annual income between $25,000 and $40,000; and 23.33% reported making more than $40,000 per year. The length of marriage ranged between 14 and 63 years ($M=46.97$, $SD=12.26$), and for 79.41% of the widows it was their first marriage. In addition, 61.76% of the widows expected the death of their husband to occur, and 91.18% of them were living alone following conjugal loss.

**Procedure**

At the onset of the project, we identified 266 recently widowed women on the basis of information included in newspaper death notices from a midsized Northern Indiana city as well as surrounding areas. At approximately 7 days following the death of their spouse, we sent these women a letter describing the purpose of the study. We followed up the letter with a telephone call. Of the 266 women, we corresponded with 217 of them. Seventy-one widows expressed interest in participating in the study; however, 11 canceled before the initial interview took place. This resulted in a sample of 60 widows who participated in the initial interview between 18 and 42 days following the death of their spouse ($M=28.60$, $SD=6.41$). Five of the 60 women who were enrolled in the study had too much missing data to be included in the present study, and 21 women did not take part in the daily assessments. Therefore, the data set being used is composed of 34 recently widowed women (see Appendix, Note 1).

Thirty-four participants received a battery of self-report questionnaires approximately 1 month postloss ($M=28$ days, $SD=6$). Participants then took part in a daily diary study of emotions and stress. We dated each daily packet and mailed it to the widows in bimonthly intervals. If a participant missed a day, she was instructed to leave that day’s response sheet blank. We gave the first set to the participants at the initial interview, and the set included a self-addressed, postage-paid envelope to return surveys. We instructed the participants to complete response sheets in the evening and return diaries by mail every 2 weeks. To remind participants to mail the packet of daily assessments, we made phone calls to them every 3 weeks. These conversations were also a way to keep in touch with the widows over the 3-month project. Widows received $50.00 in return for participation.

**Trait-Level Measures**

**Humor coping.**—We measured humor coping by using a subscale of the Multidimensional Sense of Humor Scale (Thorson & Powell, 1993). The scale consists of seven items that assess the degree to which individuals use humor in response to a difficult or stressful situation. Examples of items are “Humor helps me cope,” “Coping by using humor is an elegant way of adapting,” and “Humor is a lousy coping mechanism” (reverse coded). Participants were asked to indicate the extent to which they believe each item was true on a 4-point scale from 1 (not at all true) to 4 (completely true). Cronbach’s $\alpha = .87$.

**Perceived stress.**—We assessed perceived stress by using the 14-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). Widely used in studies of both mental and physical health (cf. Cohen, Doyle, & Skoner, 1999; Cohen, Tyrrell, & Smith, 1993), the Perceived Stress Scale was designed to assess the degree to which individuals appraise the situations in their lives as stressful. Participants respond to items such as “In the past month, how often have you felt that you were unable to control the important things in your life?” Participants respond on a 4-point scale (from 1, never, to 4, always). Cronbach’s $\alpha = .86$.

**Day-Level Measures**

**Positive emotions and anxiety–depression symptomatology.**—We measured daily positive emotions, anxiety symptoms, and depressive symptoms by using the subscales of the Mental Health Inventory (MHI; Veit & Ware, 1983). We assessed participants each day for 98 days on positive emotional states as well as symptom-specific indicators of anxiety and depression. In addition to being one of the most widely used mental health assessment inventories, the MHI is sensitive to intraindividual change (for reviews, see McHorney, Ware, Rogers, Anastasia, & Lu, 1992; Ware & Gandek, 1994). In the current study, participants were asked to indicate on a 4-point scale (from 1, not at all true, to 4, completely true) the extent to which they had experienced positive emotions and depression or anxiety symptoms on a daily basis. We measured positive emotions by using the 11-item subscale of the MHI (Veit & Ware, 1983). Example positive items are “Today I felt cheerful, light-hearted,” “Today, I felt calm and peaceful,” and “Today, I was a happy person.” We assessed anxiety and depressive symptoms by using the 9-item anxiety and 4-item depression subscales of the MHI (Veit & Ware, 1983). Example items assessing anxiety are “Today, I was a very nervous person,” “Today, I was anxious and worried,” and “I had difficulty trying to calm down.” Example items measuring depression are “Today, I felt downhearted and blue,” “Today, I felt depressed,” and “Today, I had low or very low spirits.”

**Stress reactivity.**—In addition to reporting on their daily mood, widows 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).

RESULTS

Descriptive Findings

We conducted preliminary analyses to obtain descriptive statistics and correlations among the trait- and day-level variables. We aggregated the daily variables across time for each participant. Correlations and descriptive statistics among these variables, and with the trait-level variables, are reported in Table 1. Age showed no significant correlations with either trait- or day-level variables. The two positive indicators of well-being (trait humor coping and daily positive emotions) correlated significantly with each other, as did the four negative indicators (trait perceived stress, daily anxiety and depressive symptoms, and daily stress). Notably, greater daily positive emotion was associated with less daily depressive symptoms, stress, and slightly fewer anxiety-related symptoms.

Overview of HLM Analyses

We tested our hypotheses by using hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992). The flexibility of multilevel modeling provides a number of advantages. First, it is appropriate for daily diary data. In the current study, the data have a hierarchical structure, with 98 daily observations nested within each of 34 participants. Second, it does not require that all individuals be measured at all occasions. We can use the data from participants who entered the study after it began and from participants who have missing data for some occasions of the study. Finally, a multilevel modeling approach allows us to estimate trait- and day-level effects simultaneously. For example, we can examine the separate and independent day-level effects of daily stress on daily positive emotions, anxiety, and depression symptoms and then test whether trait-level variables (e.g., humor coping) moderate these effects.

We developed HLM equations predicting daily anxiety and depressive symptoms to test our hypotheses. There were several common elements in each of our HLM analyses. First, following recommendations by Bryk and Raudenbush (1992), we centered all day-level variables on the individuals’ mean, and we centered all trait-level variables on sample means. Second, we rescaled variables that did not include a meaningful zero in the original scaling (e.g., day of study) to include zero. Third, we controlled for mean level of positive emotions and trait perceived stress in the prediction of daily anxiety and depressive symptoms to remove trait stability and examine only the state fluctuations.

Fourth, we modeled the lower order regression parameters (i.e., Level 1 variables) as random coefficients.

Predicting Daily Anxiety Symptoms

We estimated day-level anxiety by using the following equation:

$$\text{Anxiety}_t = \beta_0 + \beta_1 \text{Stress}_t + \beta_2 \text{PosAff}_t + \beta_3 \text{Stress} \times \text{PosAff}_t + \beta_4 \text{Dep}_t + \beta_5 \text{Day}_t + \epsilon_t$$

(1)

where $\beta_0$ refers to the intercept (i.e., a widow’s anxiety symptom level on an average day); $\beta_1$–$\beta_3$ represent unstandardized maximum likelihood estimates of the population slopes estimating daily anxiety symptoms from daily stress, positive emotions, positive emotions by stress interaction, depression symptoms, and time (in days) from loss, respectively; and $\epsilon_t$ is a random component of anxiety at time $t$. By including depression in this equation, we control for the current level of depressive symptoms in predicting daily anxiety (see Appendix, Note 2).

In the second portion of the model, we estimated trait-level effects as follows:

$$\begin{align*}
\beta_0 &= \gamma_{00} + \gamma_{01} \text{THumor} + \gamma_{02} \text{MPosAff} + \gamma_{03} \text{TStress} + u_0 \\
\beta_1 &= \gamma_{10} + \gamma_{11} \text{THumor} + \gamma_{12} \text{MPosAff} + \gamma_{13} \text{TStress} + u_1 \\
\beta_2 &= \gamma_{20} + \gamma_{21} \text{THumor} + \gamma_{22} \text{MPosAff} + \gamma_{23} \text{TStress} + u_2 \\
\beta_3 &= \gamma_{30} + \gamma_{31} \text{THumor} + \gamma_{32} \text{MPosAff} + \gamma_{33} \text{TStress} + u_3 \\
\beta_4 &= \gamma_{40} + \gamma_{41} \text{THumor} + \gamma_{42} \text{MPosAff} + \gamma_{43} \text{TStress} + u_4 \\
\beta_5 &= \gamma_{50} + \gamma_{51} \text{THumor} + \gamma_{52} \text{MPosAff} + \gamma_{53} \text{TStress} + u_5
\end{align*}$$

Here each person’s Level 1 intercept ($\beta_0$) and Level 1 slopes ($\beta_1$–$\beta_5$) are predicted by an intercept, trait humor coping, mean positive emotions, trait perceived stress, and a random error component. By including mean positive emotions and trait perceived stress, we control for these variables in predicting daily anxiety.

The results of the HLM analyses predicting daily anxiety symptoms are summarized in Table 2. The data indicate that, after we control for current level of depressive symptoms, those reporting high levels of trait perceived stress had a higher intercept for anxiety symptoms than those reporting lower levels of perceived stress ($b = 15.362, SE = 1.085, t = 13.657, p < .001$). Also evident was a significant effect of time, such that anxiety symptoms showed a significant increase over the course of the study ($b = .584, SE = .053, t = 14.362, p < .001$).

In comparison with those low in trait perceived stress, however, widows who reported high levels of chronic stress had steeper
increases in anxiety symptoms over the course of study ($b = .335, SE = .064, t = 5.974, p < .001$). Table 2 also shows that higher levels of daily stress were associated with greater anxiety symptoms ($b = .412, SE = .035, t = 13.854, p < .001$), and that the individual slopes of this stress-to-anxiety relationship were predictable from individual differences in trait perceived stress. Among more chronically stressed widows, the link between daily stress and anxiety symptoms was considerably stronger than was the link between daily stress and anxiety for less stressed widows ($b = .271, SE = .072, t = 3.252, p < .01$). Finally, Table 2 shows that mean level of positive emotion was not associated with either anxiety or the stress–anxiety relationship. It is important to note that neither daily positive emotions nor its interaction with daily stress predicted changes in level of daily depressive symptoms. We estimated day-level depression by using the following equation:

$$Depression = \beta_0 + \beta_1 (Stress \times PosAff) + \beta_2 (Stress \times Anx) + \beta_3 (Day) + \epsilon,$$

where $\beta_0$ refers to the intercept (i.e., a widow’s level of depressive symptoms on an average day); $\beta_1$-$\beta_3$ represent maximum likelihood estimates of the population slopes estimating daily depressive symptoms from daily stress, positive emotions, positive emotions by stress interaction, anxiety symptoms, and time (in days) from loss, respectively; and $\epsilon$ is a random component of anxiety at time $t$. By including anxiety symptoms in this equation, we control for current level of anxiety in predicting daily depressive symptoms. As in our analyses of anxiety, trait-level effects for depression were predicted by an intercept, trait humor coping, mean positive emotions, trait perceived stress, and a random error component.

The results of the HLM analyses predicting daily depressive symptoms are summarized in Table 3. Similar to the anxiety findings, Table 2 shows that, compared with widows who reported relatively low levels of trait stress, chronically stressed widows had higher intercepts ($b = 9.542, SE = .087, t = 12.085, p < .001$) and slopes for depressive symptoms ($b = .388, SE = .072, t = 11.624, p < .001$) and stronger daily stress–depression relationships ($b = .398, SE = .042, t = 9.795, p < .001$). It is important to note that higher levels of daily positive emotions were associated with lower symptom levels of depression, even after we controlled for current levels of anxiety ($b = -1.678, SE = .875, t = -1.924, p < .001$). Further, the relationship was strongest among those low in trait humor coping ($b = .268, SE = .316, t = 5.325, p < .05$). This interaction is depicted in Figure 1. For those high in trait humor coping, changes in positive emotions were not associated with changes in depressive

### Table 2. Predicting Daily Changes in Anxiety Symptoms

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$</th>
<th>$SE$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>31.214</td>
<td>0.843</td>
<td>26.21**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-2.643</td>
<td>0.547</td>
<td>-2.954</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-1.384</td>
<td>0.693</td>
<td>-1.527</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>15.362</td>
<td>1.085</td>
<td>13.657**</td>
</tr>
<tr>
<td>Daily stress</td>
<td>0.412</td>
<td>0.035</td>
<td>13.854**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.062</td>
<td>0.083</td>
<td>-0.911</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.045</td>
<td>0.095</td>
<td>-0.798</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.271</td>
<td>0.072</td>
<td>3.425*</td>
</tr>
<tr>
<td>Daily positive emotions</td>
<td>-0.026</td>
<td>0.033</td>
<td>-0.736</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.071</td>
<td>0.075</td>
<td>-0.981</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.057</td>
<td>0.088</td>
<td>-0.854</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.082</td>
<td>0.056</td>
<td>0.889</td>
</tr>
<tr>
<td>Daily stress × Daily positive emotions</td>
<td>-0.065</td>
<td>1.021</td>
<td>-0.651</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.025</td>
<td>0.093</td>
<td>0.554</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.074</td>
<td>1.046</td>
<td>-0.604</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.035</td>
<td>0.224</td>
<td>0.456</td>
</tr>
<tr>
<td>Daily depression symptoms</td>
<td>0.351</td>
<td>0.052</td>
<td>12.365**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.095</td>
<td>0.054</td>
<td>-1.827</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.083</td>
<td>0.083</td>
<td>-0.864</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.113</td>
<td>0.097</td>
<td>1.346</td>
</tr>
<tr>
<td>Day</td>
<td>0.584</td>
<td>0.053</td>
<td>14.362**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.057</td>
<td>0.105</td>
<td>-0.894</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>0.335</td>
<td>0.064</td>
<td>5.974*</td>
</tr>
</tbody>
</table>

Notes: Humor coping, mean positive emotions, and perceived stress are individual difference variables, mean-deviated over the sample. Levels of daily stress, positive emotions, and depression symptoms are deviated about each widow’s mean. Day represents the days since loss deviated from date of loss.

*p < .05; **p < .001.

### Table 3. Predicting Daily Changes in Depression Symptoms

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$</th>
<th>$SE$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>13.52</td>
<td>0.785</td>
<td>22.384**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-3.056</td>
<td>1.024</td>
<td>-2.651</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-1.678</td>
<td>0.875</td>
<td>-1.924</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>9.542</td>
<td>0.087</td>
<td>12.085**</td>
</tr>
<tr>
<td>Daily stress</td>
<td>0.556</td>
<td>0.046</td>
<td>16.325**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.087</td>
<td>0.056</td>
<td>-0.848</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.065</td>
<td>0.093</td>
<td>-0.638</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.398</td>
<td>0.042</td>
<td>7.985*</td>
</tr>
<tr>
<td>Daily positive emotions</td>
<td>-0.399</td>
<td>0.084</td>
<td>-11.624**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>0.268</td>
<td>0.136</td>
<td>5.325*</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.063</td>
<td>0.112</td>
<td>-0.227</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.073</td>
<td>0.107</td>
<td>0.304</td>
</tr>
<tr>
<td>Daily stress × Daily positive emotions</td>
<td>-0.445</td>
<td>0.028</td>
<td>-15.618*</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.177</td>
<td>0.097</td>
<td>-1.751</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.125</td>
<td>0.085</td>
<td>-1.488</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.087</td>
<td>0.117</td>
<td>0.551</td>
</tr>
<tr>
<td>Daily anxiety symptoms</td>
<td>0.321</td>
<td>0.084</td>
<td>10.354**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.114</td>
<td>0.068</td>
<td>-1.621</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.096</td>
<td>0.112</td>
<td>-0.761</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.169</td>
<td>0.107</td>
<td>0.994</td>
</tr>
<tr>
<td>Day</td>
<td>0.537</td>
<td>0.059</td>
<td>15.641**</td>
</tr>
<tr>
<td>Trait humor coping</td>
<td>-0.095</td>
<td>0.024</td>
<td>-1.55</td>
</tr>
<tr>
<td>Mean positive emotions</td>
<td>-0.114</td>
<td>0.087</td>
<td>-1.24</td>
</tr>
<tr>
<td>Trait perceived stress</td>
<td>0.388</td>
<td>0.075</td>
<td>5.624*</td>
</tr>
</tbody>
</table>

Notes: Humor coping, mean positive emotions, and perceived stress are individual difference variables, mean-deviated over the sample. Levels of daily stress, positive emotions, and anxiety symptoms are deviated about each widow’s mean. Day represents the days since loss deviated from date of loss.

*p < .05; **p < .001.

### Predicting Daily Depressive Symptoms

In the next set of analyses, we constructed HLM equations to predict changes in level of daily depressive symptoms. We estimated day-level depression by using the following equation:

$$Depression = \beta_0 + \beta_1 (Stress \times PosAff) + \beta_2 (Stress \times Anx) + \beta_3 (Day) + \epsilon,$$

where $\beta_0$ refers to the intercept (i.e., a widow’s level of depressive symptoms on an average day); $\beta_1$-$\beta_3$ represent maximum likelihood estimates of the population slopes estimating daily depressive symptoms from daily stress, positive emotions, positive emotions by stress interaction, anxiety symptoms, and time (in days) from loss, respectively; and $\epsilon$ is a random component of anxiety at time $t$. By including anxiety symptoms in this equation, we control for current level of anxiety in predicting daily depressive symptoms. As in our analyses of anxiety, trait-level effects for depression were predicted by an intercept, trait humor coping, mean positive emotions, trait perceived stress, and a random error component.

The results of the HLM analyses predicting daily depressive symptoms are summarized in Table 3. Similar to the anxiety findings, Table 2 shows that, compared with widows who reported relatively low levels of trait stress, chronically stressed widows had higher intercepts ($b = 9.542, SE = .087, t = 12.085, p < .001$) and slopes for depressive symptoms ($b = .388, SE = .072, t = 11.624, p < .001$) and stronger daily stress–depression relationships ($b = .398, SE = .042, t = 9.795, p < .05$). It is important to note that higher levels of daily positive emotions were associated with lower symptom levels of depression, even after we controlled for current levels of anxiety ($b = -1.678, SE = .875, t = -1.924, p < .001$). Further, the relationship was strongest among those low in trait humor coping ($b = .268, SE = .316, t = 5.325, p < .05$). This interaction is depicted in Figure 1. For those high in trait humor coping, changes in positive emotions were not associated with changes in depressive
symptoms. In contrast, those low in trait humor coping showed a strong inverse relationship between changes in positive emotions and depression symptoms. Finally, the interaction between daily stress and positive emotions indicated that positive emotions were associated with a weaker relationship between daily stress and depressive symptoms ($b = -0.445, SE = 0.028, t = -15.618, p < .001$). This interaction is depicted in Figure 2. There was a less manifest increase in depressive symptoms on days marked by greater stress when positive emotions were also high. Notably, average positive emotion was not associated with daily depressive symptoms, suggesting that only elevations in positive emotions at the time of stress appear to reduce depression-related symptoms (see Appendix, Note 3).

**DISCUSSION**

We designed the current study to examine the adaptive functions of positive emotions in the months immediately following conjugal loss. Using a multilevel daily process design, we tested predictions that the benefits of positive emotions are evident mainly during moments of stress (Zautra et al., 2001, 2002), specific to symptoms of depression rather than anxiety (Watson et al., 1988, 1995), and contoured by individual differences in humor coping (Kuiper et al., 1992, 1993). Our findings support the hypothesis that the associations between daily stress and depressive symptoms are weakened when positive emotions are also present. Intraindividual analyses revealed significant reductions in the magnitude of the stress–depression correlation on days in which greater positive emotions were present. The results also support the view that ahedonia or low positive emotionality is specific to depression symptomatology. The results are congruent with the larger literature on positive and negative emotions (Watson et al., 1988; Watson & Tellegen, 1985) as well as tripartite models of depression (Clark & Watson, 1991; Watson et al., 1988; Watson & Kendall, 1989), which suggest that, although general negative emotionality encompasses both depression and anxiety, low positive affect is unique to depression. The discriminant validity of daily positive emotions is strongly supported in the present study. The HLM results indicate that on days in which positive emotions were high, the correlation between stress and depressive symptoms was significantly attenuated. Thus, positive emotions appear to play a particular role in the regulation of ongoing depression during conjugal bereavement.

Equally important to explicating the pathways that lead to daily emotional resilience is identifying the psychological factors that contribute to sustaining resilience throughout the bereavement process. How does the ability to find humor in stressful situations promote emotional resilience during bereavement? Our results suggest that those widows low in humor coping showed a strong inverse relationship between changes in positive emotions and depression. These findings are consistent with theories of depression that link ahedonic symptoms of depression to a deficiency in approach motivation or behavioral activation strength (cf. Harmon-Jones & Allen, 1997; Lewinsohn & Gotlib, 1995). The results also broaden the scope of such theories by identifying a resilience trait (i.e., humor coping) that influences constructs thought to underlie symptom manifestations of depression during bereavement.

Our findings regarding the unique influence of positive emotions on depressive symptoms have implications for intervention. Clark and Watson (1991) postulated a theoretical model in which ahedonia was uniquely linked to depression and hyperarousal to anxiety. Cognitive and behavioral interventions for depression (e.g., Lewinsohn & Gotlib, 1995) often encourage individuals to become involved in activities that will boost their positive emotions (e.g., exercise). The results of the present study suggest that such interventions may derive their efficacy from the emotional changes that take place as a result of significant decreases in depressive symptoms coinciding with increases in positive emotions during times of
stress. In contrast to depression, anxiety-related symptoms and disorders are associated with anticipated threat or danger and an overall sense of helplessness (Beck & Emery, 1985; Brown, Harris, & Eales, 1993). Thus, helping widows shift their attention to aspects of their lives that they can control may mitigate the manifestation of anxiety-related symptoms during bereavement. Moreover, interventions designed to enhance the experience of both mastery and positive emotions may be necessary to treat bereavement-related syndromes characterized by mixed anxiety–depressive states.

Limitations
There are at least three limitations to the current study: causality, a widow sample, and the reliance on self-reports. First, although the daily process design of the study allows us some confidence in the conclusions that we have drawn from the correlations among the variables over time, causal conclusions cannot be made. In addition, the measures were completed at the end of the day, and hours could have passed since the occurrence of the daily stressor. It is possible that negative mood resulted in a distorted recollection and appraisal of events (Marco & Suls, 1993). Moreover, our measures of anxiety, depression, and positive emotions do not encompass the entire range of measurements within each of these constructs (e.g., Russell, 2003). Second, the sample for this study consisted of only widows. Whether our conclusions can be generalizable to explain gender differences in bereavement-related depression (e.g., Nolen-Hoeksema, Parker, & Larson, 1994) is an empirical question. Finally, the analyses of daily emotions and stress relied heavily on self-reports from respondents. It would have been useful to have clinical diagnoses of anxiety and depression for these analyses. Thus, firm conclusions about the relationship between positive emotions and depression during conjugal bereavement await further study.

Conclusions
Although few would question the extraordinary psychological and physical distress that is caused by the death of a spouse, there exist significant opportunities for growth and well-being throughout the grieving process (cf. Bonanno & Kaltman, 1999; Stroebe & Schut, 2001). Overall, our results highlight the critical role of daily positive emotions in the months immediately following conjugal loss. It is important that our findings also document the need for identifying theoretical vulnerability and resilience traits that may place certain widows at greater or lesser risk for adaptational difficulties. In particular, higher levels of perceived stress appear to alter the structure of daily emotional responses, leading to less differentiation of daily emotional experiences. In contrast, widows who coped with stress through humor were more likely to capitalize on daily positive emotions, thereby protecting such emotions from the upending experience of daily depression. Understanding how these relationships unfold and change over longer intervals throughout the bereavement process represents an important area for future research.

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References
ROLE OF DAILY POSITIVE EMOTIONS


APPENDIX

Notes

1. In response to one reviewer’s concern about the potential treatment effects of filling out the daily assessments, we compared the responses of our participants to a control group of widows, \( n = 23 \), who participated only in the initial and follow-up interviews, i.e., no daily assessments. There were no significant differences at the initial interview between the two groups on age, educational status, how many days since the death, how long the couple was married, whether the marriage was the widow’s first or second, the expectedness of the death, humor coping, life satisfaction, depression, or perceived stress. Moreover, there were no significant differences between the two groups at the follow-up interviews in levels of humor coping, life satisfaction, depression, or perceived stress, suggesting that completing the daily assessments did not have a differential effect on the major outcomes of interest across the 3-month study.

2. We chose not to model cross-day anxiety–depression effects because most studies in the daily stress literature fail to find any daily carryover effects for mood (Affleck et al., 1994; David, Green, Martin, & Suls, 1997; Neale, Hooley, Jandorf, & Stone, 1987). To check for mood carryover in our sample, we examined the first-order autocorrelation, which indicated whether temporally adjacent residuals were correlated. Across all models tested, the average first-order autocorrelation of residuals was .08 for anxiety and .03 for depression, indicating very little carryover effect. Moreover, including the prior day’s anxiety–depression score as control variables in Level 1 equations did not change our results. Given these various findings, we report only the results of our simultaneous multilevel regressions.

3. In response to one reviewer’s concern about whether the data were missing systematically, we included effect codes (i.e., 0 = missing, 1 = nonmissing) as Level 2 predictors to test whether there were differences in relationships among the daily variables between individuals with missing and nonmissing data, respectively. No significant differences were observed between these groups on any of our variables of interest (i.e., depression, anxiety, positive emotions, or stress; \( t_s < 1.7, \ p_s > .25 \)).