Original Research Report

Age Differences in Interpreting Ambiguous Situations: The Effects of Content Themes and Depressed Mood

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Abstract

Objectives: This study aimed to investigate the boundary conditions of the positivity effect on appraisals of ambiguous situations across content themes and emotional states. We differentiated the processes of interpretation generation and selection to see whether older adults recognize negative aspects of ambiguous situations but tend to select positive interpretations.

Method: Seventy-six younger and 67 older adults went through sad and neutral mood inductions and completed ambiguous situation tasks. Participants were asked to generate interpretations and select one as the most likely explanation for each scenario.

Results: Results demonstrated that compared with younger adults, older adults selected less negative interpretations across content themes but generated fewer negative interpretations in interpersonal but not in health situations. Depressed mood led to more negative interpretations at both generation and selection for younger adults but not older adults.

Conclusions: Our results showed that thematic factors had an effect on the positivity effect on interpretation generation, but regardless of content themes, older adults selected a less negative interpretation as the most likely, despite knowing alternative negative explanations. The positivity effect remained for older adults in high trait and state depressed mood. Together these findings are consistent with the pattern of older adults’ tendency to maximize emotional well-being through less negative interpretations of ambiguous situations.

Keywords: Age differences—Ambiguous situations—Appraisal—Depressed mood—Interpretation bias—Thematic factors

Studies have found that the way individuals interpret ambiguous information plays an essential role in the development, maintenance, and outcome of emotional disorders in younger adults (Butler & Mathews, 1983; Dearing & Gotlib, 2009; Gilboa-Schechtman, Foa, Vaknin, Marom, & Hermesh, 2008). A handful of studies have demonstrated preliminary evidence that older adults tend to interpret ambiguous information positively, using experimental stimuli, such as neutral pictures (Grühn & Scheibe, 2008; van Reekum et al., 2011), morphed facial expressions (Bucks, Garner, Tarrant, Bradley, & Mogg, 2008; Kellough & Knight, 2012), and homophones (Knight, Maines, & Robinson, 2002). It is unclear whether this positive interpretation bias can be observed in ambiguous situations that can occur in everyday life and whether this tendency holds across different content themes and emotional status. It is also unclear whether this tendency is due to lack of awareness of negative explanations or a tendency to believe in the positive ones even when negative explanations are recognized.
Interpretation Generation and Selection

To address these questions, it is important to differentiate interpretation generation and selection. Interpretations are rarely formed in one single step. They involve the generation of multiple interpretations and the selection of one “most-likely” interpretation (Huppert, Pasupuleti, Foa, & Mathews, 2007; Wisco & Nolen-Hoeksema, 2010). As such, the nature of one’s final interpretation depends in part on the pool of interpretations generated (Wisco & Nolen-Hoeksema, 2010).

Recently, researchers have begun to recognize that the ability to form positive interpretations is based in part on the ability to generate a variety of possible appraisals for a given situation (Weber, Loureiro de Assunção, Martin, Westmeyer, & Geisler, 2014). This differentiation can directly address the question of whether older adults recognize negative aspects of ambiguous situations but tend to select positive interpretations. Previous studies mostly investigated the “selection” process rather than the “generation” process, as most questionnaires exploring interpretations of various scenarios provide a list of possible interpretations and ask participants to select the most likely explanation (e.g., Amin, Foa, & Coles, 1998; Krantz & Hammen, 1979).

We hypothesized that older adults will select more positive interpretations to maintain their well-being, regardless of the valence of interpretations generated. Socioemotional selectivity theory (SST) postulated that older adults have a stronger motivation to maintain emotional well-being and improved emotion regulation skills, which results in the positivity effect (Carstensen, Fung, & Charles, 2003). Thus, it is likely that older adults will choose a less negative interpretation, as appraisals can serve to optimize one’s emotional well-being. Although we expected that older adults would select fewer negative interpretations, we hypothesized that the proportion of negative interpretations would be dependent on content themes and emotional states.

Note that although this tendency is generally referred to as the positivity effect, much of the difference between older and younger adults is due to less negativity rather than only to greater positivity. Because part of the focus of this study is the influence of depressed mood on interpretation of ambiguity, we generally frame the contrast in terms of less negative but use the term positivity effect when referring to SST and its implications.

Thematic Factors

Most studies examining older adults’ appraisals have explored interpretations of interpersonal situations. For example, older adults’ appraisals of difficult spousal interactions were more positive compared with ratings of objective coders (Story et al., 2007). Diehl, Coyle, and Labouvie-Vief (1996) found that older adults tend to think about interpersonal conflicts in a more positive or neutral manner than younger adults. Other studies have generally found that older adults were less emotionally reactive to interpersonal tensions (Birditt & Fingerman, 2003; Birditt, Fingerman, & Almeida, 2005), consistent with the notion that older adults’ appraisals of interpersonal conflicts are less negative. Whether this positivity effect occurs at generation of interpretations or at selection is not clear. It is also unclear whether older adults’ tendency to interpret ambiguous situations positively is as strong in other content areas such as health.

Charles’ (2010) Strength and Vulnerability Integration Model (SAVI) suggested that the positivity effect has limitations when older adults experience uncontrollable stressors, such as social and physical loss. Indeed, older age is associated with increased prevalence rates of several chronic health conditions (Alemayehu & Warner, 2004; Wolff, Starfield, & Anderson, 2002). These chronic health conditions and increased disabilities have been found to be associated with higher rates of depression (Mitra, Wilber, Allen, & Walker, 2005). Nevertheless, Löckenhoff and Carstensen (2004) found that in health domains, older adults sought less health-related information and preferred more positively valenced materials. Hart and Charles (2013) found that compared with younger adults, older adults reported less negative appraisals of their cancer diagnosis, which resulted in a steeper decline in negative affect.

On the other hand, one study found that the positivity effect was not observed when older adults were exposed to stimuli involving age-related themes, such as bereavement or suffering from cancer (Kunzmann & Gruhn, 2005; Kunzman & Richter, 2009). In addition, Piazza, Charles, and Almeida (2007) found that although older adults reported a higher level of global affective well-being and lower emotional reactivity to stressors, older adults with four or more chronic health conditions reported similar levels of negative affect toward stressors as younger adult did, suggesting that age-related advantages attenuated when older adults’ health is compromised. Together these findings show that older adults may still select less negative appraisals, but this tendency can be attenuated in some health situations. We hypothesized that older adults would generate more negative explanations in health-related situations than for interpersonal situations. However, older adults will tend to select a less negative explanation than younger adults across these content themes.

Emotional Status: Trait and State

Depressed Mood

Charles’ (2010) further suggested that when older adults are in a high level of emotional distress, the positivity effect with age can attenuate. Based on the SAVI model, it is theoretically possible that older adults’ tendency to interpret positively may be compromised at high levels of distress. Only a handful of studies examined this hypothesis by assessing level of depressive symptoms and inducing sad mood, which is considered to be equivalent of depressed mood. At times, induced sad mood was found to reduce positivity effects in attention toward words (Poon & Knight, 2009) and
interpretations of homophones (Knight et al., 2002), and elevated depressive symptoms were found to be associated with reduced positivity effect in memory (Yang & Rehm, 1993). In other studies, induced negative mood enhanced the positivity effects in attention, as measured via eye gaze (Isaacowitz, Toner, Goren, & Wilson, 2008), and the positivity effect was less pronounced but present in clinically depressed older adults than non-depressed older adults (Serrano, Latore, & Gatz, 2007).

To better disentangle these inconsistent findings, we distinguished between state and trait depressed mood. Although induced mood and self-reported depression are frequently conceptualized under the same umbrella of depressed mood, induced mood is more transient and state like, whereas self-reported depression is more stable and trait like (Costa & McCrae, 1994). Researchers have suggested the need to investigate the interaction between trait and state (Everaert, Koster, & Derakshan, 2012; Rusting, 1998), such that trait can moderate the effects of state, and vice versa. For example, cognitive bias may emerge when individuals are high both on trait depression and depressed mood state (Everaert et al., 2012). As such, it is hypothesized that induced depressed mood and high depression together lead to generating and selecting negative interpretations for both age groups, such that older adults’ tendency to generate and select positive interpretations will decrease.

Current Study
To examine the hypotheses, the current study assessed older adults’ generation and selection of interpretations using a novel task adapted from previous studies (Wisco & Nolen-Hoeksema, 2010). To assess the effects of thematic factors, we added ambiguous health-related situations, in addition to interpersonal situations. Finally, we examined whether trait and state depressed mood limits the positivity effect by measuring participants’ depression and utilized sad mood induction to induce sad/depressed mood state.

Method
Participants
Seventy-six younger adult participants were University of Southern California (USC) undergraduate students who were recruited from the USC Psychology Subject Pool. Younger adults ranged from 18 to 29 years old (M = 19.89, SD = 1.69) with 76% of them being women. Forty-nine percent of younger adults identified themselves as Asian, 29% as whites, 7% as Latinos, 7% as African Americans, and 8% as others. Younger adults received extra course credit as compensation. Exclusion criteria included current treatment for mood and anxiety disorders.

Older adult (n = 67) participants’ ages ranged from 60 to 87 (M = 72.73, SD = 7.02). Sixty-one percent of older adults were women, and 36% are men. The older adult sample was predominantly white (81%) with 10% African American, 4% Asian, and 5% others. Older participants were recruited from the USC Healthy Minds subject pool. They received $8 as compensation. Exclusion criteria for the older adult sample included the presence of cognitive impairment, current treatment for mood or anxiety disorder, difficulty with hearing or vision, and reading or writing difficulty. Participants were screened by telephone. Cognitive impairment or possible dementia was assessed using a brief 10-item cognitive assessment (TELE; Gatz et al., 2002) based on a cutoff score of 16.

Measures and Materials
Demographic information
Information regarding age, gender, ethnicity, educational level, primary occupation, and annual income was collected.

Center for Epidemiological Studies-Depression scale
Center for Epidemiological Studies-Depression scale (CESD; Radloff, 1977) included 20 items assessing depressive symptoms in the past week. Participants indicated the frequency of the symptoms on a 4-point scale, with responses ranging from 0 (rarely or none of the time) to 3 (most of the time). The reliability of the CESD has been well established (Cronbach’s α = 0.85–0.90), and it has been found that the CESD could discriminate between psychiatric inpatient and general populations well, indicating good discriminant validity (Radloff, 1977). Internal consistency of this measure in the current study was α = 0.87.

Visual analog scale for sad mood
Participants’ mood ratings were recorded using the visual analog scale (VAS) consisting of a 10-cm line with 11-point rating scale, with 0 being put at the left end of the line indicating “Not sad at all” and 10 at the right end indicating “Extremely sad.” The VAS scale for sad mood has been used in numerous studies and proved useful in the assessment of sad mood in both healthy and cognitively impaired individuals (Cella & Perry, 1986; Kertzman et al., 2004).

Ambiguous situation task
Ambiguous scenarios were adapted from the Interpretation Bias Questionnaire (IBQ; Wisco & Nolen-Hoeksema, 2010). The original IBQ included 10 vignettes. Six vignettes from the original measure that were not applicable to older adults were deleted (e.g., situations involving “taking exams” or “asking a professor to write letters of recommendation”), which left four vignettes from the original measure (e.g., “You’re walking down the street, and you see one of your friends coming the other way with a group of people. You wave, but your friend doesn’t respond. Why?”). We further added health-related situations that were relevant to both age groups. An example of a health-related situation is, “You asked your doctor about your condition, and your doctor did not respond immediately. Why?”
We conducted a pilot study to ensure that the vignettes were ambiguous. The selection criterion was vignettes for which participants generated a mean of three or more interpretations, as the original authors of the IBQ suggested (Wisco & Nolen-Hoeksema, 2010). We included the four original vignettes and four new vignettes of health-related situations. Nine volunteers completed the eight vignettes, and ultimately five vignettes were chosen, with three interpersonal-related situations from the original IBQ and two health-related vignettes. To see the list of vignettes, please refer to Supplementary Appendix A.

Participants were instructed to imagine that the vignettes happened to them and were asked to write down all the explanations, with no limit as to how many explanations they wished to write. Participants were instructed to write down the explanations in the order they thought of them and number each of their interpretations. Finally, they were asked to identify which explanation was deemed the most likely in that given situation by indicating the number of that interpretation.

Scoring
The valence ratings of the interpretations were based on two independent coders. A coding manual and sample interpretations as anchors were provided to ensure that the same criteria were used. Coders were blind to the age group and the mood induction condition of the responses. They were also not aware of whether responses were from the same participants because they coded randomly ordered interpretations.

This scoring criterion was based on Wisco and Nolen-Hoeksema’s (2010) previous work. “Negative” was operationalized as “being any interpretation that reflected poorly upon the participant or had negative consequences for his/ her life” and “positive” as “including a positive portrayal of the participant or suggesting beneficial outcomes for him/her.” Coders rated the degree of positivity and negativity separately for each interpretation generated on Likert-type scales from 1 (not at all) to 5 (extremely). Coders demonstrated adequate interrater reliability. Across the five vignettes, the intraclass correlation (ICC) of positivity ranged from .72 to .92 and the ICC of negativity ranged from .84 to .94. Rating discrepancies were resolved by discussing and reaching consensus between the two coders.

It should be noted that we found that there were no interpretations that were high on both positivity and negativity. Thus, for each interpretation, the final rating was calculated by subtracting the negativity score from the positivity score, resulting in a score ranging from −4 to 4 (Wisco & Nolen-Hoeksema, 2010). A higher number indicated a more positive interpretation. Negative interpretations were operationalized as interpretations with final ratings below zero. See Supplementary Appendix B for examples of interpretation responses.

Ambiguous faces task
In this task, participants were presented with 36 faces, one face at a time. They were asked to circle a number that best represents the emotions they perceived on a positivity–negativity grid, with numbers ranging from −4 to 4, while omitting the 0 in the grid. The goal of this task was to demonstrate the validity of our new mood induction procedures by replicating previous findings on the effects of induced mood on the intensity of emotional expressions (Bouhuys, Bloem, & Groothuis, 1995; Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000).

Procedures
Participants who were eligible and expressed interest were scheduled for an appointment individually or in groups of two to five participants. Upon arrival, participants were asked to sign consent forms and fill out their demographic information, CES-D and VAS. To minimize time lost after the experimental manipulations, participants were given detailed instructions of the interpretation tasks and completed the practice trials prior to experimental manipulations. Afterward, participants were induced with either sad mood or neutral mood. The experimenter then administered the interpretation task. The order of the tasks was randomly assigned. Throughout the experiment, mood was assessed periodically using VAS until the completion of the interpretation tasks. Finally, when the study ended, the experimenter debriefed all participants on the nature of the study and confirmed that their mood had returned to their baseline.

Mood Induction and Assessment
Sad mood induction
To induce and sustain sad mood throughout the experiment, participants watched two video clips on the Japanese earthquake and tsunami in 2011. The content of the video clips mainly included scenes of grieving for the loss of loved ones. The clips were excerpted and edited from several news clips and documentaries from CNN, Sky News, and a Japanese Channel that were found on the internet. Subtitles were provided in parts where the spoken language was Japanese. The first clip (total duration = 8 min and 3 s) was played before the first interpretation task to serve as the primary mood induction. The second clip (total duration = 5 min and 6 s) was played after the first task to serve as a “mood augmentation” to “boost” sad mood.

After playing the video clips, participants listened to music pieces used in previous studies to elicit sad mood throughout the experiment to sustain the emotions. These music pieces included Prokofiev’s (1939, track 1) Russia Under the Mongolian Yoke, Barber’s (n.d., track 2) Adagio for Strings, Albinoni’s (n.d., track 1) Adagio, and Sibelius’ (n.d., track 4) The Swan of Tuonela (Fox, Knight, & Zelinski, 1998).

Neutral mood induction
Participants in the neutral mood induction watched two video clips from a BBC documentary film on “Satoyama:
Japan’s Secret Water Garden.” The content mainly included scenes regarding the natural scenery, animals, and people around Satoyama. The first clip (total duration = 7 min and 35 s) was played before the first interpretation task to serve as the primary mood induction for neutral mood. The second clip (total duration = 5 min and 15 s) was played to parallel the process of sad mood induction. To sustain neutral mood, harpsichord concertos by Bach (1715; “English Suites” numbers 2 [tracks 7–12], 3 [tracks 1–6], and 6 [tracks 13–18]) were played (Fox et al., 1998).

Calm/positive mood induction
To ensure that participants’ mood returned to baseline, at the end of the two interpretation tasks, calm/positive mood induction was conducted. Specifically, for the neutral mood group, participants watched a video clip on babies. Participants in the sad mood group watched a film clip on Japan’s recovery post-earthquake and the same video clip on babies.

Mood assessment
Participants recorded their level of sad mood on VAS before and after the mood induction and between interpretation tasks. There were six time points for mood assessment, Time 0 (baseline, prior to mood induction), Time 1 (after mood induction, before Task 1), Time 2 (after Task 1, prior to mood booster), Time 3 (after mood booster, prior to Task 2), Time 4 (after Task 2, prior to calm/positive mood induction), and Time 5 (post-calm/positive mood induction).

Results
Sample Characteristics
All participants were randomly assigned to either neutral or sad mood induction. Thirty-six younger adults were randomized to the neutral mood group and 40 to the sad mood group. Thirty-five older adults were randomized to the neutral mood group, and 32 older adults to the sad mood group. No significant differences between mood groups were found in their demographic variables and baseline measures. There were some differences in the demographic variables between age groups. Older and younger participants differed significantly in ethnicity, $\chi^2(4, N = 142) = 48.41, p < .0001$; depressive symptoms, $t(140.71) = 5.12, p < .0001$; baseline sad mood, $t(136.72) = 3.73, p < .0001$; and education, $t(94.86) = −5.68, p < .0001$. See Table 1 for more details.

Mood Induction Manipulation Check
The effectiveness of the mood induction was examined using a repeated measures analysis of variance (ANOVA), with time of mood assessment as the within-subject dependent variable. Mauchly’s test indicated that the assumption of sphericity was violated, $\chi^2(14) = 56.62, p < .0001$; hence, statistics are reported using the Greenhouse–Geisser correction. The VAS ratings showed a significant induction × Time interaction, $F(4.39, 609.94) = 88.66, p < .0001$, $\eta^2 = .39$. Tests of within-subject contrasts demonstrated that all the VAS scores after baseline (Time 1, Time 2, Time 3, Time 4, and Time 5) were significantly higher compared with baseline scores (Time 0) in the sad mood but not the neutral mood group, indicating that the induction procedure was successful in producing sad mood at different time points post-baseline. There was also a significant Age × Time interaction, $F(4.39, 609.94) = 3.22, p < .05$, $\eta^2 = .02$. Tests of the within-subjects contrast showed that compared with younger adults, older adults were more reactive in response to the mood induction; the increase in VAS ratings from baseline (Time 0) to ratings right after inductions (Time 1 and Time 3) was substantially larger for older adults than younger adults. It should be noted, however, that older adults’ VAS ratings were lower than younger adults’ at baseline, and so older and younger adults reached the same VAS ratings postinductions. No significant three-way interaction emerged. Averaging the VAS rating across time points, results indicated a significant main effect of induction, $F(1, 139) = 331.73, p < .0001$, $\eta^2 = .62$. A main effect of age also occurred, indicating that older adults in general experienced less sad mood across time points, $F(1, 139) = 6.37, p < .05$, $\eta^2 = .03$. No Age × Induction interaction effect emerged.

To demonstrate external validity of this mood induction procedure, we analyzed the effects of induced mood on perceptions of facial expressions. The results were consistent with previous findings demonstrating that neutral or ambiguous faces were perceived more negatively when participants were induced into sad mood (Bouhuys et al., 1995; Niedenthal et al., 2000). Averaging the ratings of neutral and morphed expressions, tests of between-subjects differences showed a significant main effect of induction, such that those induced into a sad mood rated facial expressions more negatively, $F(1, 129) = 7.60, p < .01$, $\eta^2 = .06$. This finding showed support for the validity of this mood induction procedure.

### Table 1. Demographic Measures by Age and Mood Groups

<table>
<thead>
<tr>
<th>Demographic Measure</th>
<th>Age Group</th>
<th>Mood Group</th>
<th>Age Group</th>
<th>Mood Group</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Younger</td>
<td>Older</td>
<td>Younger</td>
<td>Older</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Neutral</td>
<td>Sad</td>
<td>Neutral</td>
<td>Sad</td>
</tr>
<tr>
<td></td>
<td>19.94.09</td>
<td>19.85.21</td>
<td>21.31</td>
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<td>14.17.181</td>
<td>16.83.343</td>
<td>16.65.268</td>
</tr>
<tr>
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<td>15.11.886</td>
<td>15.93.880</td>
<td>8.51.636</td>
<td>8.72.847</td>
</tr>
</tbody>
</table>

Note: CESD = Center for Epidemiological Studies-Depression scale.
Inclusion Criteria Based on Change in Sad Mood From Baseline to Postinduction

Although the manipulation check showed that the mood induction procedure was effective for both age groups, we further reviewed within-person changes in their state mood from baseline (Time 0) to the first time point postinduction (Time 1) to identify individuals that were either unresponsive (i.e., change equaled zero) or had an unexpected response (i.e., in the reverse direction) to the mood inductions. Review of the data indicated that one older and one younger adult from the neutral mood group became more sad postinduction. Among participants from the sad mood group, two older and one younger adults’ mood became less sad postinduction, and two younger adults were not responsive to the induction. We excluded these individuals in subsequent analysis to ensure that the effects of mood state were not diluted. This resulted in the removal of three older and four younger adults, such that in total there are 64 older adults (34 in the neutral mood group and 30 in the sad mood group) and 72 younger adults (35 in the neutral mood and 37 in the sad mood group).

Depression Group Categorization

CESD scores were stratified into two groups using the median score by age group (older adults’ CESD median = 7; younger adults’ CESD median = 13.5) in order to capture the effects of depressive symptoms for older adults, whose range of depression scores were considerably lower than were younger adults. Participants who had scores on the median were included in the group with lower CESD scores; including median scores in the group with higher CESD scores did not change the results. Therefore, within older adults, 32 individuals were categorized as “high depression” (19 in neutral and 13 in sad mood group) and 32 individuals were categorized as “low depression” (15 in neutral and 17 in sad mood group). Within younger adults, 36 individuals were categorized as “high depression” (18 in neutral and 18 in sad mood group) and 36 individuals were categorized as “low depression” (17 in neutral and 19 in sad mood group).

Analysis of Interpretation Bias

Interpretation generation: mean proportion of negative interpretations generated

We performed a repeated measure ANOVA on the proportion of negative interpretations, with situation type (health-related and interpersonal-related) as the within-subject factor and age (old–young), depression (high–low), and induction group (sad–neutral) as between-subject factors. Ethnicity was included in the analysis as a covariate, where Caucasian served as the reference group.

Tests of between-subject effects demonstrated a main effect of age, $F(1, 123) = 10.35, p < .01, \eta^2_p = 0.08$, such that older adults generated a smaller proportion of negative interpretations overall. However, the significant Age × Situation interaction effect, $F(1, 123) = 4.66, p < .05, \eta^2_p = 0.04$, suggested that the age effect was mainly due to the differences in interpersonal situations: older adults generated a significantly lower proportion of negative interpretations in ambiguous interpersonal situations, whereas no age difference was found in the ambiguous health-related situations (Figure 1).

No main effect of mood group, interaction effects of Age × Induction, or Depression × Induction was found. An Age × Depression interaction, $F(1, 123) = 5.26, p < .05, \eta^2_p = 0.04$, was found. Post hoc tests using Bonferroni corrections demonstrated that the level of depressive symptoms was associated with a larger proportion of negative interpretations among younger ($p < .05$) but not older adults. This interaction was subsumed in three-way interaction of Age × Depression × Induction group, $F(1, 123) = 5.19, p < .05, \eta^2_p = 0.04$. Post hoc tests using Bonferroni corrections demonstrated that among participants in the high depression group, the age difference was significant in the sad mood group ($p < .0001$) but not in the neutral mood group (Figure 2). The larger age difference in the sad mood and higher depression group was likely due to the increased proportion of negative interpretations in younger adults. Younger adults with higher depressive symptoms were more reactive to the sad mood induction compared with younger adults with lower depressive symptoms ($p < .01$). Although older adults were successfully induced into a sad mood and higher depression group, the age difference was significant in the sad mood group ($p < .0001$) but not in the neutral mood group (Figure 2).

![Figure 1](https://example.com/figure1.png)
mood, neither their level of depressive symptoms nor the mood induction affected the proportion of negative interpretations that they generated. Finally, to rule out the possibility that age differences were most significant due to the higher depression cutoff for younger adults, we conducted a post hoc analysis using the same median cutoff for depressive symptoms across age groups and demonstrated the same finding.

**Interpretation selection: average valence of selected interpretations**

We examined whether there were any effects of age, depression, and induction group on the valence of the interpretations that participants identified as the “most likely” explanation. See Supplementary Table 1 for the average valence of selected interpretations by age groups. Tests of between-subjects effects demonstrated a main effect of age, $F(1, 118) = 13.23, p < .0001, \eta^2_p = .10$, such that older adults selected interpretations with less negative ratings than younger adults across situation type. An Age × Depression interaction also emerged, $F(1, 118) = 6.19, p = .05, \eta^2_p = .05$. Post hoc tests using Bonferroni corrections demonstrated that the level of depressive symptoms was associated with selecting a more negative-valence interpretations as the most likely among younger ($p < .01$) but not among older adults (Figure 3). No induction-related effect was found in younger or older adults regarding the average valence of the selected interpretation. Distinct from the findings from interpretation generation, tests of within-subject effects did not demonstrate any Age × Situation interaction.

**Discussion**

This study investigated whether there was a positivity effect on appraisals of ambiguous situations while differentiating the interpretation generation and selection process. The distinction between interpretation generation and selection provided a more nuanced view of the interpretation process. Consistent with SST and previous research (Carstensen et al., 2003), older adults selected less negative interpretations than younger adults did across content themes. This tendency to select less negative interpretations can help older adults reduce negative affect more effectively (Hart & Charles, 2013), contributing to higher emotional well-being in late life.

With regard to generated interpretations, content theme was a boundary condition for the positivity effect. Older adults generated fewer negative interpretations for interpersonal situations than younger adults, but no age differences were observed in health-related situations. Our finding supported the SST tenet that older adults construct their social network proactively in order to avoid social situations that elicit negative emotions (Carstensen et al., 2003). On the other hand, older adults generated as many negative interpretations as younger adults in health-related situations. This difference was likely due to higher prevalence rate of health issues and health care usage in late life (Alemayehu & Warner, 2004; Wolff et al., 2002), leading to greater awareness of possible negative explanations in the health domain for older adults. The differentiation of interpretation generation and selection helped to clear up inconsistencies in the positivity effect literature on health. Specifically, the positivity effect was attenuated in the generation process, but advantages of selecting a less negative interpretation remained. The differentiation of the generation and selection process also demonstrated further support for SST’s motivational account for the positivity effect. Despite knowing alternative negative explanations, older adults still selected a less negative interpretation.

Younger but not older adults showed effects of combined trait and state depressed mood on generating interpretations and of trait depressed mood on selecting interpretations. Our data did not support our prediction that older adults’ tendency to interpret would be compromised by both trait and stated depressed mood. In fact, induced mood state along with trait depression led to a

![Figure 2](https://example.com/figure2.png)

**Figure 2.** Age × Depression × Induction group interaction effect for proportion of negative interpretations: age differences most pronounced in high trait depression/sad induced mood group. *Note: Error bars reflect standard errors of the mean.*

![Figure 3](https://example.com/figure3.png)

**Figure 3.** Age × Depression group interaction effect for mean ratings of selected interpretations: younger adults with high trait depression selected more negative interpretations. *Note: Error bars reflect standard errors of the mean.*
larger gap between age groups, such that younger adults generated a larger proportion of negative interpretations than older adults when trait and state depressed mood were high. This suggested that older adults were relatively more resilient toward the effects of depressed mood. This relative stability is consistent with the positivity effect (Carstensen et al., 2003; Isaacowitz et al., 2008).

This result differed from findings of other work in this lab showing that older adults were equally or more susceptible to the effects of induced sad mood on memory, attention, and interpretation of homophones (Knight et al., 2002; Poon & Knight, 2009). Our finding showed that compared with memory and attention, the positivity effect in appraisals of ambiguous vignettes is less affected by state and trait depressed mood. We suspect that the difference is due to differences in the degree of self-relevance of the materials. Mather and Carstensen (2005) suggested that personally relevant materials can increase the likelihood that older adults will implement emotional goals. In the current study, ambiguous situations were personally relevant, as participants were instructed to imagine that the situations happened to themselves. In contrast, the cognitive tasks used previously (e.g., word recall tasks, homophone tasks, and a Stroop task) were of low self-relevance. Hence, older adults may be less susceptible to the effects of mood when appraising personally relevant situations because the nature of self-relevant information increases the likelihood that older adults will engage in strategies to maximize well-being. More work is needed in order to test whether self-relevance plays a role in older adults’ tendency to interpret ambiguous situations.

Limitation
There are some study limitations. We cannot be certain that the explanations participants wrote down were their immediate and exact appraisals, given that the writing process could alter their response. However, we believe that this task is an important first step to explore the generation process of cognitive appraisals. The lack of findings related to depression may be partially due to older adults’ lower depression scores in our sample. Although the findings held when using the same median for both age groups, the majority of older adults were at the lower end of the depression spectrum and so were well below clinical significance. Previous studies in our group have found mood congruence effects at these levels with different tasks (Knight et al., 2002), but future studies should include older adults with clinically significant depressive symptoms. In addition, we only assessed for sad and happy mood as part of our mood manipulation check. We did conduct a pilot study and found that the sad mood induction procedure was specific to eliciting sad mood, rather than other negative moods, such as anxiety, anger, or disgust. However, given that it was a novel procedure, it would be important to assess for other moods and variables postinduction to ensure that mood induction had no other unintended effects. Finally, the cross-sectional nature of this study cannot rule out the possibility that age differences were due to cohort differences that could have increased older adults’ tendency to express their interpretations in a socially appropriate or desirable manner. Longitudinal studies can address whether the age differences found in this study can be attributed to age rather than cohort differences.

Conclusions
This study showed that the distinction between generation and selection was useful to understand the interpretation of ambiguous situations. Older adults generated fewer negative interpretations in interpersonal situations than in health-related situations, demonstrating that the positivity effect is influenced by thematic content. However, older adults selected less negative interpretations in ambiguous situations across content themes, despite knowing negative alternatives. Finally, older adults were found to be relatively resilient toward the effects of both trait depression and induced sad mood. These findings together were consistent with the pattern of older adults’ tendency to maximize emotional well-being through less negative interpretations of ambiguous situations.

Supplementary Material
Please visit the article online at http://gerontologist.oxfordjournals.org/ to view supplementary material.

References


