Age Differences in Reactions to Social Rejection: The Role of Cognitive Resources and Appraisals

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Abstract

Objectives. Social rejection is a negative social experience individuals of all ages may encounter in everyday life. It is unclear whether social rejection affects older adults more or less than younger adults. This study investigated age differences in reactions following a direct rejection and the moderating effects of cognitive resources and appraisals.

Method. Eighty-three younger (18–26 years) and 53 older (60–86 years) adults engaged in an online interview during which they were either accepted or rejected seemingly by another participant. We examined participants’ self-reported mood before and after the interview as well as verbal self-complexity.

Results. Older adults reported greater increases in hurt feelings following rejection than younger adults. The age difference was further moderated by cognitive resources and appraisals. Among older rejected adults, those who were poorer in processing speed and those who appraised the rejection more negatively felt more hurt feelings. Older rejected adults were also rated lower in self-complexity than older accepted adults, whereas younger rejected adults and accepted adults did not differ.

Discussion. The findings are largely consistent with life-span developmental theories and highlight the importance of cognitive processes when examining age differences in experiencing social rejection.

Key Words: Aging—Emotional numbness—Hurt feelings—Social rejection
reactions to rejection may shed light on these moderating factors. This study investigated age differences in the relationship between social rejection and emotional reactions and whether cognitive resources and appraisals moderated this relationship.

Social rejection involves the refusal of a social connection that someone attempts to form (Blackhart, Nelson, Knowles, & Baumeister, 2009). Rejection may increase anger, sadness, and hurt feelings (e.g., Buckley, Winkel, & Leary, 2004) or lead to emotional and physical numbness (e.g., DeWall & Baumeister, 2006). One moderating factor of the effects of rejection is an individual’s psychological resources such as self-esteem (Gyurak et al., 2012) and rejection sensitivity (Ayduk, Gyurak, & Luerssen, 2008). However, the role of cognitive resources is not well understood. Cognitive resources may allow individuals to exert control and emotion regulation and thus buffer the negative effects from rejection. Indeed, among individuals with low self-esteem, those with higher attention control evaluated rejection scenes as less arousing and less rejecting than those with lower attention control (Gyurak et al., 2012). Given age-related declines in fluid abilities (e.g., speed of processing), it is important to investigate how the availability of cognitive resources moderates the rejection–emotion linkage in older adults.

One possible pathway is that limited cognitive abilities may prevent older adults from detecting subtle social cues of rejection (e.g., avoiding eye contact). This possibility is supported by two studies on ostracism using the Cyberball game (Williams, Cheung, & Choi, 2000). In Hawkley, Williams, and Cacioppo (2011), older adults reported less reduction in needs satisfaction and affects than younger adults during the game. However, age differences were only observed under mild ostracism but not under severe ostracism, and the age differences in mild ostracism were accounted for by speed of processing in Löckenhoff, Cook, Anderson, and Zayas (2013). When the ostracism was severe and obvious, older adults were as negatively affected as younger adults. It appears that older adults, especially those with lower speed, did not notice the subtle cues of mild ostracism (Löckenhoff et al., 2013). In real life, many rejections are explicit and result in greater reactions than subtle rejections (Blackhart et al., 2009). Thus, explicit and severe rejections may negatively affect older adults at least as much as younger adults.

Another possible pathway linking age, limited cognitive resources, and outcomes of rejection is theorized by Dynamic Integration Theory (Labouvie-Vief et al., 2010). It posits that individuals’ available resources moderate the complexity and efficiency in affective processing under arousing situations. Individuals with less cognitive resources process affective information less efficiently and consequently demonstrate a stronger reduction in complex thinking under highly arousing situations than individuals with more resources. Given age-related declines in cognitive resources, older adults’ complex thinking (Coats & Blanchard-Fields, 2008; Charles, 2010) may be more negatively affected by highly arousing situations such as direct rejection (Leary, Koch, & Hechenbleikner, 2001) than younger adults’ complex thinking. Thus, to examine the effect of rejection on complex thinking, we added a measure of self-complexity (Labouvie-Vief & Medler, 2002). We expected rejection would negatively affect older adults’ self-complexity more than younger adults.

The experiences of social rejection involve cognitive appraisals to evaluate aspects of the situation including the causes and goal relevance. Appraisals play a crucial role in the elicitation and differentiation of emotional outcomes (Smart Richman & Leary, 2009). For example, individuals felt more anger when they attributed the rejection to perceived incompetence of the rejector but felt more sadness when they attributed the rejection to a perceived lack of warmth (Çelik, Lammers, van Beest, Bekker, & Vonk, 2013). Among appraisal dimensions, “fairness” (i.e., how fair the event is), “goal achievement expectancy” (i.e., how attainable one expects a goal to be), and “control” (i.e., the perceived ability to control what is happening) may be especially pertinent in rejection situations. Rejection can be particularly painful when it is unfair, unexpected, and out of control (Warburton, Williams, & Cairns, 2006; Wesselmann, Butler, Williams, & Pickett, 2010). Appraisals may also help older adults to dampen the negative reactivity in unpleasant interpersonal situations. For instance, in Charles and Carstensen (2008), participants listened to audio-recorded conversations and imagined themselves to be the target person of the negative comments in the conversation. Older adults made less negative appraisals, reported less anger, and were rated less emotional compared with younger adults. These findings suggest that older adults may appraise social rejection less negatively than younger adults in favoring of less emotional reactivity. In this study, we expected that older adults would appraise the rejection experience less negatively than younger adults. Older adults using more negative appraisals would be more negatively affected by the rejection than those who appraised the rejection less negatively.

**This Study**

The primary goal of this study was to investigate whether age moderates the effects of direct social rejection. To do this, we simulated an interview where participants were either rejected or accepted by another participant (who was a confederate). Building on past research, we improved two aspects in assessing emotional outcomes: First, past research mostly relied on between-subject comparison and seldom assessed affective states before and after the rejection intervention (see meta-analysis, Blackhart et al., 2009). Given general age differences in reported affect (Grühn, Kotter-Grühn, & Röcke, 2010), it is important to assess intraindividual change in mood. Thus, we assessed both baseline and posttest mood. Second, most prior studies focused on overall mood rather than specific emotions
(e.g., Hawkley et al., 2011). However, general mood measures may conceal differential age patterns in discrete emotions (Charles & Carstensen, 2008; Grühn et al., 2010). To address this issue, we assessed four discrete emotions: happiness, anger, sadness, and hurt feelings. Hurt is a distinct emotion that is directly associated with social pain (Smart Richman & Leary, 2009).

The second goal of this study was to investigate the role of cognitive resources and appraisals in differential reactions to social rejection between younger and older adults. In line with Dynamic Integration Theory, we first examined whether social rejection undermined older adults' capacities of complex thinking by assessing their self-complexity. Next, we examined whether participants' emotional reactions depended on their fluid and crystallized cognitive abilities (i.e., speed of processing and vocabulary, respectively). We also investigated whether participants' appraisals moderated age differences in emotional reactions. We hypothesized social rejection would negatively affect both younger and older adults, but older adults would report a greater increase in negative emotions and a greater decrease in self-complexity than younger rejected adults. The negative effect of rejection would be especially evident among older adults with lower cognitive resources. We also hypothesized that older adults would overall have less negative appraisals than younger adults; however, those who appraised the rejection as unexpected, unfair, and uncontrollable would react more negatively.

Method

Participants
Initially, 146 persons were recruited. Ten participants were excluded due to computer malfunction (six younger adults), missing data (one younger and one older adult), or problems understanding the procedure (one younger and one older adult). The final sample comprised 83 younger adults between the ages of 18–26 years (mean $M = 19.29$, standard deviation $SD = 1.64$; 49.4% females) and 53 older adults between the ages of 60 and 86 years ($M = 68.34$, $SD = 6.41$; 54.7% females). Younger adults were recruited from introductory psychology classes and received partial course credits for participation. Older adults were recruited through newspaper advertisements and received $15$ as compensation.

Procedure

Rejection paradigm
We adapted Buckley and colleagues’ (2004) paradigm by simulating a more dynamic interaction. Rejection was operationalized as negative feedback from another participant (a confederate) indicating no interest in future interaction. Participants were told that the study was about online communication and decision making. The instructions were as follows: A simulated online interview was designed to investigate when two persons meet online, what factors make them want to know each other in real life. To do this, two participants in two rooms will engage in an interview via the Internet. At random, one can be assigned either to be the “interviewer” or the “interviewee.” The interviewer will ask questions by typing into an instant messenger, whereas the interviewee will answer those questions aloud. The interviewer will make a decision whether he or she would like to meet with the interviewee based on the interviewee’s responses to the questions. All participants were told that they were randomly assigned to be the “interviewee.”

On the participants’ computer screen, a “feedback system” appeared to be embedded in the instant messenger, which displayed a 7-point scale that indicated how much the interviewer wanted to meet with the interviewee ranging from 1 (not at all) to 7 (very much). Below the feedback window, participants received the questions from the interviewer in a message box. The interviewer asked 15 questions and gave feedback on the scale shown on the participants’ screen after every three questions. Consistent with Buckley and colleagues’ (2004) procedure, we included two variants of rejection and acceptance condition. In the constant rejection condition, the ratings were consistently low (i.e., 3, 2, 3, 3, 2), whereas in the increasing rejection condition, the ratings were high at first but changed to low at the end (i.e., 6, 5, 3, 3, 2). Likewise, in the constant acceptance condition, ratings were consistently high (i.e., 5, 6, 5, 5, 6), whereas in the increasing acceptance condition, the ratings changed from low to high (i.e., 2, 3, 5, 5, 6). We did not expect specific (age) differences between the two variants; however, we wanted to keep the procedure similar to Buckley and colleagues (2004) in case of potential differences. Participants were told that the interviewer could only hear their voices. To encourage engagement, participants were told that if the interviewer indicated that he or she wanted to meet with them, the participants and the interviewer could participate in another project and would get a chance to win additional $10. After the experiment, all participants were offered the lottery. The experimenter was absent during the interview.

The questions were adapted from the relationship closeness induction task (Buckley et al., 2004; Sedikides, Campbell, Reeder, & Elliot, 1999). The questions began generally and gradually became more personal. We took advantage of the high self-relevancy of the last three questions (i.e., “Is it difficult or easy for you to meet people? Why?” “What is something about you that most people would consider surprising?” and “Tell me one thing about yourself that most people who already know you don’t know.”) and used them to examine individuals’ self-complexity. Interviewers were provided with a script, and questions were typed to provide a naturalistic experience. The interview took 15–20min.

Sequence of events
Participants first completed questionnaires about demographic characteristics, experiences with online chatting, rejection sensitivity, and baseline mood. Participants then engaged in the interview. Immediately after the interview, participants completed the postmood measure and...
appraisal items. Participants completed a 10-min filler task (reading two essays) before completing the cognitive tests and personality questionnaires to eliminate carry-over effects on subsequent tasks. Cognitive tasks were completed after the interview because completing the cognitive tasks before the rejection manipulation may induce age stereotype threat and thus influence how participants perceive the rejection. Participants were fully debriefed.

Measures

Measures of mood
Before and after the interview, participants indicated their current mood on 16 adjectives on a 7-point scale ranging from 1 (not at all) to 7 (very much). The adjectives formed four discrete emotion subscales including happiness (happy, delighted, cheerful, and pleased), anger (annoyed, angry, mad, and grouchy), sadness (depressed, dejected, sad, and gloomy), and hurt feelings (hurt, pained, injured, and wounded). Internal consistencies were adequate (premood: \( \alpha_{\text{happiness}} = .88, \alpha_{\text{anger}} = .66, \alpha_{\text{sadness}} = .84, \) and \( \alpha_{\text{hurt feelings}} = .86 \); postmood: \( \alpha_{\text{happiness}} = .90, \alpha_{\text{anger}} = .86, \alpha_{\text{sadness}} = .88, \) and \( \alpha_{\text{hurt feelings}} = .90 \)).

Self-complexity
Participants’ verbal responses to interviewer’s last three questions were coded to assess self-complexity. We only coded the last three questions because the rejection intention was most explicit at the end, and the questions were more personal and sophisticated to generate complex thoughts. We created a coding scheme adapted from the concept of ego levels (Loevinger, 1976) to fit the interview questions. Similar to the original ego level scale, five raters coded every response on an 8-point scale from 2 (impulsive and low complexity) to 9 (integrated and high complexity). Raters were blind to the participants’ ages and conditions. The average interrater reliability was adequate (\( k = .86 \)). We averaged the ratings across the five raters and three responses to form one score for each participant.

Cognitive resources
Participants completed the Digit Symbol Substitution task (Wechsler, 1981) as an indicator of fluid ability and the Shipley Vocabulary test (Zachary, 1986) for crystallized ability.

Appraisals
Three items were designed to assess participants’ appraisals for the specific interview. Participants rated to what extent they agreed with “I think the interviewer’s judgment of me was fair” (Fairness), “I expected the interviewer to want to meet with me” (Goal Achievement Expectancy), and “The interviewer had more control than I did” (Control) on a 7-point scale ranging from 1 (completely disagree) to 7 (completely agree). The item for control was reverse coded so that higher scores indicate more control.

Individual characteristics
To control for person characteristics that may influence the effects of rejection, we included measures of personality and rejection sensitivity. We used the Big Five Inventory (John, Naumann, & Soto, 2008) to assess extraversion, neuroticism, agreeableness, openness, and conscientiousness. Internal consistencies in this sample were adequate (\( \alpha_{\text{extraversion}} = .87, \alpha_{\text{neuroticism}} = .83, \alpha_{\text{agreeableness}} = .77, \alpha_{\text{openness}} = .70, \) and \( \alpha_{\text{conscientiousness}} = .79 \)). A short version of the Rejection Sensitivity Questionnaire (Downey & Feldman, 1996) was used to measure participants’ dispositional sensitivity to rejection. Participants indicated their degree of concern or anxiety about the outcome of each situation and the likelihood that the other person(s) would respond in an accepting fashion. We included six situations that were applicable for both younger and older adults from the Rejection Sensitivity Questionnaire (items 5, 8, 12, 13, 14, and 15). Given the small number of items, the internal consistency was adequate (\( \alpha = .56 \)).

Manipulation check
To ensure that participants understood the meaning of interviewer’s feedback, participants were asked immediately after the interview to rate “How much did the other participant indicate that he or she wanted to get to know you?” on a 7-point scale ranging from 1 (not at all) to 7 (very much). Participants also reported whether they believed in the cover story and no participants reported suspicion.

Results

Preliminary Analyses

Variants of rejection and acceptance
No dependent variables showed significant differences between the constant rejection and the increasing rejection condition or between the constant acceptance and the increasing acceptance condition. Thus, the two rejection and the two acceptance conditions were combined for all subsequent analyses.

Sample characteristics
We conducted a series of 2 (younger adults vs. older adults) \( \times \) 2 (rejection vs. acceptance) analysis of variances (ANOVAs) to examine personality and cognitive abilities. Older adults reported higher conscientiousness, higher openness, lower fluid, and better crystallized intelligence than younger adults. In addition, younger adults were more comfortable with online chatting than older adults. Table 1 provides descriptive statistics. There was no main effect of condition or age by condition interaction (all \( p > .05 \)).

Manipulation check
To determine the effectiveness of the experimental manipulation, a \( 2 \times 2 \) (Condition \( \times \) Age) ANOVA on perceived acceptance was conducted. The results revealed a significant main effect of condition \( [F(1,127) = 865.82, p < .01, \)
Table 1. Sample Characteristics for Younger (n = 83) and Older (n = 53) Adults

<table>
<thead>
<tr>
<th></th>
<th>Younger adults</th>
<th></th>
<th>Older adults</th>
<th></th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Rejection sensitivity</td>
<td>14.54</td>
<td>4.69</td>
<td>14.89</td>
<td>4.32</td>
<td>.00</td>
</tr>
<tr>
<td>Extraversion</td>
<td>4.61</td>
<td>1.14</td>
<td>4.55</td>
<td>1.08</td>
<td>.00</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>5.36</td>
<td>0.72</td>
<td>5.52</td>
<td>0.74</td>
<td>.01</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>4.85</td>
<td>0.73</td>
<td>5.42</td>
<td>0.90</td>
<td>.10**</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>3.38</td>
<td>0.99</td>
<td>3.06</td>
<td>1.05</td>
<td>.02</td>
</tr>
<tr>
<td>Openness</td>
<td>4.75</td>
<td>0.83</td>
<td>5.10</td>
<td>1.06</td>
<td>.04*</td>
</tr>
<tr>
<td>Speed of processing</td>
<td>69.74</td>
<td>9.84</td>
<td>55.25</td>
<td>11.70</td>
<td>.31**</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>29.64</td>
<td>3.81</td>
<td>34.94</td>
<td>3.77</td>
<td>.33**</td>
</tr>
<tr>
<td>Online chatting experience</td>
<td>4.77</td>
<td>1.63</td>
<td>3.81</td>
<td>1.96</td>
<td>.07**</td>
</tr>
</tbody>
</table>

Notes. M = mean; SD = standard deviation. Effect sizes are $\eta^2$.
*p < .05. **p < .01.

$\eta^2 = .87$, such that participants in the rejection condition ($M = 2.17, SD = 0.58$) perceived significantly lower acceptance than participants in the acceptance condition ($M = 5.70, SD = 0.76$). There was no main effect of age group [F(1,127) = 0.49, $p = .48$, $\eta^2 < .01$] or condition by age interaction [F(1,127) = 2.13, $p = .15$, $\eta^2 = .02$]. As we expected, both younger and older adults were able to identify the direct rejection (i.e., the manipulation was successful).

Primary Analyses

Shifts in self-reported mood

For ease of communication, difference scores (premood scores were subtracted from postmood scores) were used as dependent variables for the four emotions. Thus, positive difference scores indicate an increase from baseline and negative values indicate a decrease from baseline.

Four 2 x 2 (Condition × Age) ANOVAs were conducted with condition (rejection vs. acceptance) and age group (young vs. old) as between-subject factors and difference scores of happiness, anger, sadness, and hurt feelings as dependent variables. There were significant main effects of condition for happiness [F(1,132) = 50.16, $p < .01$, $\eta^2 = .28$], anger [F(1,132) = 10.82, $p < .01$, $\eta^2 = .08$], sadness [F(1,132) = 5.56, $p = .02$, $\eta^2 = .04$], and hurt feelings [F(1,132) = 11.25, $p < .01$, $\eta^2 = .08$]. As we expected, accepted participants felt happier, less angry, less sad, and less hurt feelings, whereas rejected participants felt less happy, slightly angrier, slightly sadder, and slightly more hurt feelings after the interview. For hurt feelings, there was also a significant main effect of age [F(1,132) = 10.39, $p < .01$, $\eta^2 = .07$] and a significant condition by age interaction [F(1,132) = 9.89, $p < .01$, $\eta^2 = .07$]. Older rejected participants showed a significant increase in hurt feelings compared with older accepted participants, but there was no difference between younger rejected and younger accepted participants in changes of hurt feelings. No other main effects of age or condition by age interaction effects reached significance ($p > .05$). Table 2 shows descriptive statistics for premood and postmood separately by age and condition.

Self-complexity

To examine the complexity of the verbal responses, we conducted a 2 x 2 (Condition × Age) ANOVA with condition and age group as between-subject factors. To ensure that complexity was not due to the length of answers, we added the total number of words in the responses as a covariate. There was a significant main effect of age [F(1,122) = 7.95, $p < .01$, $\eta^2 = .06$], indicating older adults showed higher complexity in their verbal responses. The main effect of condition was not significant [F(1,122) = 3.75, $p = .06$, $\eta^2 = .03$]. Importantly, the condition by age interaction was significant [F(1,122) = 5.70, $p = .018$, $\eta^2 = .05$]. This interaction documents that older accepted adults ($M = 4.10$, $SD = 0.64$) had higher self-complexity than older rejected adults ($M = 3.74$, $SD = 0.59$, $p < .01$). However, there was no difference between younger accepted adults ($M = 3.75$, $SD = 0.50$) and younger rejected adults ($M = 3.74$, $SD = 0.51$). The covariate, number of words, was significant [F(1,122) = 53.59, $p < .01$, $\eta^2 = .31$]. Consistent with expectations, older adults’ advantage in complex thinking was more severely diminished in face of rejection.

The role of cognitive resources

Because we found significant age by condition interaction in hurt feelings, we examined whether participants’ increases in hurting feelings depended on their speed of processing and vocabulary. Due to age differences in speed and vocabulary, we separated high- and low-functioning groups using median-split within each age group. We conducted a 2 x 2 x 2 (Condition × Age × Speed) ANOVA with condition, age group, and speed (low vs. high) as between-subject factors. The main effect of condition [F(1,127) = 12.15, $p < .01$, $\eta^2 = .09$], age [F(1,127) = 11.78, $p < .01$, $\eta^2 = .09$], and the condition by age interaction [F(1,127) = 11.78, $p < .01$, $\eta^2 = .09$] remained significant. More interestingly, the three-way interaction between condition, age, and
speed was significant \(F(1,127) = 5.97, p = .016, \eta^2 = .05\). Post hoc test revealed that among older rejected participants, those with lower speed of processing had greater increases in hurt feelings than those with higher speed of processing \(p < .05\; \text{see Figure 1}\). We conducted a similar analysis using median-split vocabulary scores as a between-subject factor, and none of the effects was significant. We also examined whether speed and vocabulary moderated the age by condition interaction on self-complexity. The condition by age effect remained significant, and neither processing speed nor vocabulary was a significant moderator. These findings suggest that fluid abilities are particularly important for older adults’ emotional functioning.

The role of appraisals
First, we conducted three 2 × 2 (Condition × Age) ANOVAs using the three appraisal items as dependent variables (i.e., fairness, goal achievement expectancy, and control) to examine whether there were age differences in appraisals. The results showed a significant main effect of age for fairness \(F(1,128) = 6.11, p = .015, \eta^2 = .05\) and control \(F(1,128) = 8.44, p < .01, \eta^2 = .06\). Older adults appraised the interview as more fair \(M_{OA} = 5.02, SD_{OA} = 1.45; M_{YA} = 4.34, SD_{YA} = 1.47\) and more in their control \(M_{OA} = 3.96, SD_{OA} = 1.76; M_{YA} = 3.22, SD_{YA} = 1.64\) than younger adults. The main effect of age for goal expectancy was not significant \(F(1,128) = 0.17, p = .68, \eta^2 < .01\; M_{OA} = 4.34, SD_{OA} = 1.12; M_{YA} = 4.21, SD_{YA} = 1.36\). The main effects of condition were significant in all three appraisal dimensions \(p < .05, \eta^2 > .04\). Rejected participants perceived the interview as less fair and reported lower goal achievement expectancy and less control than accepted participants. None of the interactions were significant \(p > .05\). Thus, older adults appraised the interview differently than younger adults.

Next, we examined whether appraisals moderated the age differences in the changes of emotions. We conducted a series of regressions with condition, age group, appraisals, and the interaction between age and appraisals as predictors and changes in the four emotions as outcomes. Table 3 summarizes the results. Controlling for condition, perceived fairness, and perceived control moderated the age differences in changes of hurt feelings. Similarly, controlling for condition, the interactions between goal expectancy and age group were significant for changes in anger, sadness, and hurt feelings. The patterns of these interactions were similar, and Figure 2 illustrates the interaction between age group and fairness on hurt feelings among rejected participants. Overall, older

![Figure 1. The interaction between processing speed and age group among rejected participants. Older rejected adults who were slower in processing speed reported significant higher increase in hurt feeling than those older adults who were faster in processing speed. The error bars represent standard errors.](image-url)

![Table 2. Premood and Postmood Means (and Standard Deviations) by Age and Condition](table-url)

<table>
<thead>
<tr>
<th></th>
<th>Younger adults</th>
<th>Older adults</th>
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<tbody>
<tr>
<td></td>
<td>Acceptance</td>
<td>Rejection</td>
</tr>
<tr>
<td></td>
<td>Premood</td>
<td>Postmood</td>
</tr>
<tr>
<td>Happiness</td>
<td>3.89 (1.23)</td>
<td>4.44 (1.37)</td>
</tr>
<tr>
<td>Anger</td>
<td>1.49 (0.74)</td>
<td>1.19 (0.52)</td>
</tr>
<tr>
<td>Sadness</td>
<td>1.51 (0.82)</td>
<td>1.17 (0.48)</td>
</tr>
<tr>
<td>Hurt feelings</td>
<td>1.29 (0.68)</td>
<td>1.11 (0.32)</td>
</tr>
</tbody>
</table>

Note. At baseline, there was a significant main effect of age on happiness. Older adults were happier than younger adults \(F(1,131) = 23.22, p < .01, \eta^2 = .15\). No other main effects of age or condition or interaction were significant at baseline \(p > .05\).
adults tended to appraise rejection less negatively (i.e., fairness, controllability) than younger adults, and such appraisals dampened the negative effects of rejection. Older adults who appraised the rejection more negatively (i.e., unfair and uncontrollable) felt the pain of rejection the most.

Covariates
All analyses were run with rejection sensitivity, Big Five personality factors, and experiences with online chatting as covariates. All effects remained significant and practically unchanged.

Discussion
The goals of this study were to investigate age differences in emotional reactions following an explicit social rejection, and whether cognitive resources and appraisals moderated the age differences. Rejection and acceptance were manipulated through an interview, where an interviewer indicated whether he or she wanted to meet the participant. There were three major findings: First, age moderated the emotional reactions following social rejection such that older adults felt greater increases in hurt feelings than younger adults. Older adults’ self-complexity was also reduced by social rejection. Second, the age differences in increased hurt feelings were further moderated by cognitive resources. Older adults who had lower processing speed felt more pain than those older adults who had higher processing speed. Third, older adults generally appraised the rejection less negatively than younger adults, but those older adults who appraised the rejection negatively showed more increased hurt feelings.

Our findings extend prior work by examining participants’ mood shifts before and after rejection. Both younger and older rejected participants showed a decrease in happiness, whereas accepted participants showed an increase in happiness. The changes in anger and sadness were not significant. These results seem to be consistent with the emotional numbness theory (DeWall & Baumeister, 2006), which predicts that rejection would lead to a reduction in positive effect, but no necessary elicitation of negative effect.

However, age differences emerged in hurt feelings. Older adults reported a greater increase in hurt feelings than younger adults after rejection. Hurt is a distinct negative emotion that is directly associated with feeling devalued, unwanted, and rejected (Smart Richman & Leary, 2009).

Table 3. Standardized Regression Weights (β) of Condition, Age Group, and Appraisals in Predicting Changes in Emotions

<table>
<thead>
<tr>
<th></th>
<th>Happiness</th>
<th>Anger</th>
<th>Sadness</th>
<th>Hurt feelings</th>
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<tbody>
<tr>
<td><strong>Fairness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>.32</td>
<td>−.14</td>
<td>−.12</td>
<td>−.14</td>
</tr>
<tr>
<td>Age group</td>
<td>−.13</td>
<td>.13</td>
<td>.13</td>
<td>.32**</td>
</tr>
<tr>
<td>Fairness</td>
<td>.39**</td>
<td>−.12</td>
<td>−.05</td>
<td>.06</td>
</tr>
<tr>
<td>Age × Fairness</td>
<td>.03</td>
<td>−.21*</td>
<td>−.20</td>
<td>−.34**</td>
</tr>
<tr>
<td><strong>Control</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>.49**</td>
<td>−.22*</td>
<td>−.20*</td>
<td>−.21*</td>
</tr>
<tr>
<td>Age group</td>
<td>−.09</td>
<td>.07</td>
<td>.06</td>
<td>.23**</td>
</tr>
<tr>
<td>Control</td>
<td>.18</td>
<td>−.08</td>
<td>.07</td>
<td>.10</td>
</tr>
<tr>
<td>Age × Control</td>
<td>−.04</td>
<td>−.16</td>
<td>−.15</td>
<td>−.26*</td>
</tr>
<tr>
<td><strong>Goal expectancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>.54**</td>
<td>−.21*</td>
<td>−.17</td>
<td>−.14</td>
</tr>
<tr>
<td>Age group</td>
<td>−.05</td>
<td>.08</td>
<td>.08</td>
<td>.28**</td>
</tr>
<tr>
<td>Goal expectancy</td>
<td>.00</td>
<td>.10</td>
<td>.11</td>
<td>−.02</td>
</tr>
<tr>
<td>Age × Goal expectancy</td>
<td>−.06</td>
<td>−.32**</td>
<td>−.24*</td>
<td>−.33**</td>
</tr>
<tr>
<td>R²</td>
<td>.28</td>
<td>.15</td>
<td>.09</td>
<td>.22</td>
</tr>
</tbody>
</table>

Note. *p = .053. **p < .05. ***p < .01.
Hurt appears to be the predominant rejection-related emotion, whereas anger and sadness are associated with other causes (MacDonald & Leary, 2005). It is possible that discrete emotions diverge in different patterns following rejection such that anger and sadness are minimized, whereas hurt feelings are not. The numbness theory posits that individuals’ physiological systems responding to social pain and physiological systems responding to physical pain share some mechanisms (DeWall et al., 2010; MacDonald & Leary, 2005). This system may be subject to age-related changes so that older adults are particularly sensitive to both social pain and physical pain. Older adults may be more likely to experience physical pain, and enhanced sensitivity to physical pain may be accompanied by enhanced sensitivity to social pain (DeWall et al., 2010; Eisenberger & Lieberman, 2004). Our finding on hurt feelings is consistent with this assertion, suggesting enhanced sensitivity to physical pain may render older adults more vulnerable to social rejection. However, we cannot exclude the possibility of cohort effects in language use. Future research may use objective measures of pain sensitivity to examine such possibility.

A novel finding is that older adults’ self-complexity (i.e., ego levels) was diminished during rejection. Although self-complexity is relatively stable, it is malleable over the life span (Lilgendahl, Helson, & John, 2013) and the ability to make complex representations can be temporarily reduced (Paulhus & Lim, 1994). Consistent with the literature, older adults exhibited higher self-complexity than younger adults in the acceptance condition. In contrast, older adults showed comparable levels of self-complexity to younger adults in the rejection condition. This finding is consistent with Dynamic Integration Theory and echoes the previously mentioned assertion that strong social rejection may be more detrimental for older adults’ emotional well-being.

We further examined adults’ cognitive resources as a moderator of age differences and found that fluid abilities were particularly important for older adults’ emotional functioning. Consistent with Dynamic Integration Theory, cognitive resources are particularly important for older adults’ ability to cope and regulate negativity under constrained situations. This finding extends prior work (e.g., Löckenhoff et al., 2013) and highlights the inseparable roles of cognitive and emotional functioning in older adulthood.

Concerning the role of appraisals, older adults on average evaluated the rejection as less negative compared with younger adults. These appraisals seemed to help them reduce the negative effects of rejection as those older adults who appraised the rejection more negatively felt more pain. This finding is consistent with the notion that older adults tend to utilize passive emotion regulation strategies such as making less negative appraisals in adverse interpersonal situations (e.g., Charles & Carstensen, 2008). To our surprise, older adults who expected the rejection demonstrated greater reactivity to rejection in all three negative emotions. There is evidence that individuals who readily expect rejection are more reactive to rejection (Downey & Feldman, 1996), and some older adults might be prone to expect age-related discrimination. Alternatively, it may reflect an after-thought process such that older adults who felt more pain from the rejection were engaging in reappraisal and attempting to elevate the negative feelings by downplaying their expectations. Future studies should measure goal achievement expectancy before rejection manipulation to tease apart these possibilities.

Taken together, this study contributes to both the social rejection and aging literature. In light of the findings from Hawkley and colleagues (2011), Löckenhoff and colleagues (2013), and this study, differential reactions to social rejection seem to depend on characteristics of both the rejection and the individuals. When the rejection is mild, those older adults who are low in cognitive resources may be less reactive (possibly due to lack of attention). Conversely, when the rejection is explicit and severe, older adults—especially those who are low in cognitive resources—are more negatively affected than their younger counterparts (possibly due to lack of regulation capacity). It is important to note the differences in manipulation paradigms between this study and prior work (i.e., Hawkley et al., 2011; Löckenhoff et al., 2013). Direct rejection and ostracism differ in many aspects. Future research may benefit from varying the severity of rejection within the same paradigm. Further, the social interaction in the present paradigm is primarily unidirectional. To control the effects of the interviewer (e.g., age, sex, or ethnicity), the participants could not see or hear the interviewer. It would be interesting to examine the effects of rejection depending on the demographic background of the rejector (e.g., age, sex, or race). Similarly, future studies may benefit from varying the composition of the sample more systematically. The older community adults might have different motivations (e.g., interests) in participating in the study than the younger college students (e.g., course requirement), which may explain why the older adults reported higher openness than younger adults in this sample. The unequal sample sizes of the two age groups were also suboptimal. Finally, future research may vary the relationships between the rejected and the rejector. Given the age-related shifts in social networks (Wrzus, Hänel, Wagner, & Neyer, 2013), older adults may react differently to rejection by a stranger and rejection by a close other.

References


