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Paths to positivity: the relationship of age differences in appraisals of control to emotional experience

Nathaniel A. Young and Joseph A. Mikels

Department of Psychology, DePaul University, Chicago, IL, USA

ABSTRACT

Evidence suggests that older adults experience greater emotional well-being compared to younger adults. Appraisal theories of emotion posit that differences in emotional experience are the result of differences in appraisal. As such, age differences in appraisal may relate to age differences in emotion. To investigate this, the present study focused on appraisals of control. Research suggests that losses of control lead to greater negative affect. Therefore, older adulthood was predicted to be associated with increased appraisal of self-control and less negative affect. To investigate this idea, we used an emotionally ambiguous scenario paradigm. Older and younger participants read fourteen ambiguous scenarios, imaging themselves as the main character. After each scenario, participants appraised the scenarios on three different control dimensions: *self-*, *other-*, and *circumstantial-control*. Afterward, they rated their feelings toward the scenarios on seven different emotional states. The results showed that compared to younger adults, older adults appraised more self-control relative to other- and circumstantial-control, and also experienced less negative affect in response to the scenarios. Importantly, in a mediation analysis, self-control relative to other-control explained age differences in emotional reactions toward the scenarios. This finding reflects the importance of considering the role of appraisal in age differences in emotional experience.

Why might two people have different emotional responses after experiencing the same event? One possibility is that these two individuals evaluate the event differently. According to appraisal theories of emotion, emotional experience is a product of evaluations (i.e. appraisals) of the environment (Moors, Ellsworth, Scherer, & Frijda, 2013). Appraisal theories posit that individual differences in emotional experience are the result of individual differences in appraisals (Moors et al., 2013). Relatedly, research indicates that individuals of different ages differ in emotional experience. Ageing is associated with increases in emotional well-being; for instance, older adults report experiencing fewer negative emotions, yet relatively similar or even sometimes higher levels of positive emotions compared to younger adults (Carstensen et al., 2011; Charles, Reynolds, & Gatz, 2001). This shift away from negativity in emotional experience for older adults

may be due to individual differences in appraisal compared to younger adults (Charles & Carstensen, 2010; Mikels & Young, 2018).

To date, few studies have examined age differences in appraisal processes. However, research has shown that older and younger adults differ in their affective expectations and interpretations of situations. For example, research has shown that when evaluating ambiguous scenarios, older adults expect more positive future events than younger adults (Steinman, Smyth, Bucks, MacLeod, & Teachman, 2013). This finding suggests that older adults evaluate ambiguous scenarios as more positive compared to younger adults. Consistently, when asked to interpret and continue ambiguous scenarios, older relative to younger adults continued the scenarios with fewer negative words, but a similar number of positive words (Mikels & Shuster, 2016). In addition, evidence

CONTACT Nathaniel A. Young ✉ nyoung19@depaul.edu, nthnyng6@gmail.com

suggests that older adults appraise social interactions differently from younger adults. For example, older adults appraise negative comments directed toward them as less negative (Charles & Carstensen, 2008), appraise stressors as less severe (Charles & Almeida, 2007), and appraise interpersonal interactions as more positive (Lefkowitz & Fingerman, 2003). Taken together, these findings suggest that older adults interpret situations differently from younger adults, at least in terms of a valence-based evaluation (Charles & Carstensen, 2010). Yet, little research has been done to more conclusively determine if other appraisal dimensions described by appraisal theory differ between younger and older adults, and to what extent they relate to patterns of emotional experience across adulthood.

Appraisal theory considers *appraisal* to be the component of the emotion process that centrally differentiates emotional experience (Scherer, 2009). Appraisal is an evaluative process that assesses the environment (both internal and external) in relation to the individual's goals (Moors et al., 2013). When an evaluation of the environment occurs, appraisals can alter other components of the emotional experience such as subjective affect, physiological arousal and action tendencies (Moors et al., 2013; Scherer, 2009). As appraisals elicit change in one or more of these components as a response to the environment, it is reflected broadly as a change in emotional experience. Importantly, individuals who experience *the same event*, but *appraise the event differently* may have different emotional experiences. A comparison of group differences between younger and older adults' appraisals and emotional responses provides a natural test of this postulate of appraisal theory.

Among appraisal theorists, control is a commonly agreed upon appraisal dimension that can contribute to emotional experience (Moors et al., 2013). The control appraisal is broadly defined as the evaluation of the ability to influence or cope with an event (Smith & Ellsworth, 1985). However, appraisal theories posit that it is important to distinguish between types of control and each control type's unique influence on emotional experience (Scherer & Moors, 2019; Smith & Ellsworth, 1985). Appraisals of control can come from different sources; for example, appraisals of control can focus on the self (i.e. the extent to which I can influence the situation), others (i.e. the extent to which someone else can influence the situation), and circumstances (i.e. the extent to which the situation is beyond anyone's control; Smith & Ellsworth,

1985). Each of these aspects of control influences emotional experience by altering an overall sense of personal control in a situation. As such, the age differences in emotional experience described above may be explained by age differences in appraisal of control across these three separate but related dimensions of control. Importantly, age differences in self-control may manifest themselves when examining relative differences between self-control and a source of opposing control such as other- or circumstantial-control. This may occur because both younger and older adults appraise self-control similarly but appraise opposing sources of control differently (i.e. others or circumstances).

Research examining older, but not younger, adults' control beliefs has shown that older adults report higher negative affect and lower positive affect when they believe other people are in control of their life (Kunzmann, Little, & Smith, 2002). Unfortunately, older adults frequently find themselves to have limited physical abilities, compared to earlier in their lives, and rely on others to perform activities they used to do independently. Broadly, research examining control and its relationship to emotional experience suggests that regularly experiencing loss of control over the environment leads to the development of depressive affect (Benassi, Sweeney, & Dufour, 1988; Price, Choi, & Vinokur, 2002; Rodin, 2014). Moreover, higher beliefs of self-control have been shown to relate to greater emotional well-being (Kunzmann et al., 2002). Although losses in control are frequently associated with increases in negative health outcomes including depression and anxiety, older adults tend to experience less negative affect, depression, and anxiety than younger adults (Carstensen et al., 2011; Kessler et al., 2005; Piazza & Charles, 2006). In light of these findings, it seems contradictory that older adults experience less depression and improved emotional well-being while also experiencing general age-related reductions in the capacity to control their environment relative to younger adults. This "paradox of ageing" regarding the relationship between loss, control, and emotional experience points to a need to more fully understand the concept of control, and control's relationship to emotional experience for younger and older adults. In other words, even though older adults may experience physical declines that reduce their capacity for control, they may still perceive higher levels of control under typical conditions that may lead them to greater emotional well-being. As such, appraisal

theory would contend that older adults may be appraising higher levels of self-control relative to younger adults, thus resulting in an overall improvement in emotional experience.

The present study

There is still much to understand about patterns of appraisal across the adult life span. Specifically, we do not know if younger and older adults differ in their appraisals across self-, other-, and circumstantial-control, or if age group differences in evaluations of control can explain age-related differences in emotional experience. The current study investigated this from an appraisal theory perspective. To investigate appraisals of control, and how control contributes to the emotional responses of younger and older adults, the present research used an ambiguous scenario paradigm to examine control appraisals of, and emotional responses toward, these scenarios. Based upon the premise that older and younger adults differ in their emotional experiences and the postulate of appraisal theory that individual differences in emotion are the result of individual differences in appraisal, we reasoned that it is possible older and younger adults differ in their appraisals of control. As such, the hypothesis for this study was that older adults would appraise more self-control relative to opposing sources of control, and this would account for age differences in emotional reactions toward the scenarios.

Method

Participants

In total, data were collected from 117 participants for this study. However, we excluded 17 participants for not completing our experiment. The final sample consisted of 50 older adults (OA; 58% female) and 50 younger adults (YA; 33.4% female). Both groups reported similar education levels (YA $M = 3.12$, SD = 1.2; OA $M = 3.28$, SD = 1.24), indicating that the average participant in both groups obtained at least two years of college. For this sample, younger adults ($M = 2.7$, SD = .86) indicated that they had a higher income than they older adults ($M = 2.2$, SD = .89), $t(98) = 2.74$, $p = .007$. Both the younger (M age = 22.8, SD = 2.1, range = 19-27) and older (M age = 62.8, SD = 5.2, range = 53–78) adults were recruited via Amazon's Mechanical Turk (MTurk) and compensated

$2 for their time. The adequate sample size for this experiment was determined by estimating the minimal sample size needed for the mixed-factors ANOVA interaction for age differences in positive and negative emotional responses. Previously, Mikels and Shuster (2016) found a large interaction effect using a similar ambiguous scenario task, but with a different outcome variable and participant recruitment method. As such, we decided to conservatively estimate the required sample size. The current power analysis consisted of the following parameters: a small to medium effect size f of .20, an alpha of .01, power at .90, with 2 between-subjects groups and 2 repeated measures and a .5 correlation between the measures. The analysis indicated that at least 98 participants were needed to detect an age group by emotion valence interaction. The study was approved by DePaul University's institutional review board (#JM051415PSY). The data presented in this paper can be found on the Open Science Framework website at Identifier: DOI 10.17605/OSF.IO/YM79R.

Materials

Ambiguous scenarios

Fourteen ambiguous scenarios were adapted from Mikels and Shuster (2016; see Appendix). The task included seven social and seven nonsocial scenarios. All of the scenarios were considered emotionally ambiguous due to the nature of how they could be interpreted. An example scenario involved waiting to hear from friends on your birthday: "It is your birthday and you wake up looking forward to your day. You wonder how many friends will wish you happy birthday. By lunchtime, no one has contacted you." Each scenario aligned with the method of Hertel, Brozovich, Joormann, and Gotlib (2008). The first statement was an introduction to the scenario, and then the second and third sentences added a total of five idea units. For example, the birthday scenario includes the following idea units: It is your birthday, you wake up looking forward to your day, you wonder how many friends will wish you happy birthday, by lunchtime, and no one has contacted you.

Control appraisals

To measure appraisals of control questions of self-, other-, and circumstantial-control were adapted from Smith and Ellsworth (1985). The *Self-control* item measured perceptions of personal control: "To what

extent do you feel you will influence what will happen in this situation?" (α = .772). The *Other-control* item measured perceptions of other people's control: "To what extent do you feel that someone other than yourself will influence what will happen in this situation?" (α = .793). The *Situational-control* item measured perceptions of control that were out of anyone's control: "To what extent do you feel that circumstances beyond anyone's control will influence what will happen in this situation?" (α = .886). Each control question was rated on a 1 (*not at all*) to 5 (*very much*) Likert scale. The overall measures of self-, other-, and circumstantial-control were calculated by averaging ratings across all scenarios.

Emotional reactions

To measure positive and negative emotional reactions to the scenarios, we adapted the modified differential emotional scale (mDES; Fredrickson, Tugade, Waugh, & Larkin, 2003) by reducing the number of items down to seven emotions for participant ease due to repeated ratings. Participants were asked to report to what extent they felt each of seven emotions as a result of each scenario. Positive items included "hope, joy, gratitude, and contentment". Negative items included "sadness, anger, and nervousness". In this study, we included nervousness to replace the typical fear item in the mDES to capture nervous or anxious feelings toward the scenarios. Each item was rated on a 1 (*not at all*) to 5 (*very much*) Likert scale. Positive (α = .930) and negative (α = .933) emotional reactions toward the scenarios were reliably measured across the scenarios.

Procedure

After agreeing to participate in the study and providing consent, participants began the ambiguous scenario task. The order of the presentation of the 14 ambiguous scenarios was random. Each scenario was presented one at a time, and participants were asked to read each scenario and imagine themselves as the main character. After reading each scenario, participants appraised the current scenario on the three-control items as if they were the main character. Afterward, they rated how they would feel as the main character on each of the seven emotions. Once all 14 scenarios were completed, the participants completed a demographic questionnaire.

Results

Given the age group differences in the ratio of men to women and income between the younger and older adult groups, the following analyses were conducted with and without controlling for gender and income. Neither gender nor income changed the pattern of results in the analyses. As such, we report the findings without controlling for gender and income. Means of all variables are presented in Table 1.

A series of analyses explored age differences in control appraisals and emotional experience. The first analysis examined age differences in positive and negative emotional reactions toward the ambiguous scenarios. The next set of analyses examined control appraisals of the scenarios by age group. One analysis examined all three-control appraisal types by age group, and another analysis examined difference scores of self-control relative to the other control types by age group. Finally, we took two approaches to explore the role of control appraisals in age differences in emotional experience. Specifically, we examined age differences in positive and negative emotional reactions with control appraisals as a covariate. Additionally, a multilevel model examined if control appraisals predicted emotional experience and explained age differences in emotional reactions.

Age differences in emotional reactions

A mixed-factors ANOVA examined emotional responses toward the scenarios with emotion valence (positive, negative) as a within-subjects

Table 1. Appraisals of control, and positive and negative emotions by age group.

	Young N = 50		Old N = 50		
	M	(SD)	M	(SD)	
Self-control	3.16	.635	3.27	.507	t(98) = −.97, p = .33
Other-control	2.89	.678	2.72	.521	t(98) = 1.3, p = .18
Circumstantial-control	2.74	.722	2.12	.715	t(98) = 4.3, p < .001
Self − other	.268	.657	.543	.604	t(98) = −2.2, p = .032
Self − circumstance	1.24	.543	1.69	.569	t(98) = −4.0, p < .001
Positive emotions	2.48	.824	2.59	.743	t(98) = −.66, p = .51
Negative emotions	2.21	.663	1.72	.561	t(98) = 4.0, p < .001

factor and age group (young, old) as a between-subjects factor. The analysis showed a main effect of emotion valence ($F(1, 98) = 41.33$, $p < .001$, $\eta^2 = .274$), indicating that across older and younger adults positive emotional responses were greater than negative emotional responses ($t(99) = -6.12$, $p < .001$, $d = -.612$, 99% CI: $-.891$, $-.330$). The analysis also revealed an interaction of valence and age group ($F(1, 98) = 11.36$, $p = .001$, $\eta^2 = .075$). Older adults reported experiencing relatively less negativity ($t(98) = 4.03$, $p < .001$, $d = .81$, 99% CI: .267, 1.34), but relatively similar positivity compared to younger adults ($t(98) = -.662$, $p = .51$, $d = -.13$, 99% CI: $-.648$, .384). There was no main effect of age group on emotional responses.

Age differences in appraisals of control

Two approaches were used to examine appraisals of control by age group. First, a mixed-factors ANOVA examined control appraisals of the scenarios with control type (self, other, circumstantial) as a within-subject factor and age group (young, old) as a between-subject factor. The analysis revealed a main effect of age group ($F(1, 98) = 4.61$, $p = .034$, $\eta^2 = .045$). Younger adults appraised more control across all three-control types than did older adults. The analysis also revealed a main effect of control type ($F(2, 196) = 75.02$, $p < .001$, $\eta^2 = .396$). Specifically, more self-control was appraised than other-control ($t(99) = 6.31$, $p < .001$, $d = .63$, 99% CI: .348, .912), more self-control was appraised than circumstantial-control ($t(99) = 9.45$, $p < .001$, $d = .95$, 99% CI: .634, 1.25), and more other-control was appraised than circumstantial-control ($t(99) = 6.70$, $p < .001$, $d = .67$, 99% CI: .384, .954). The analysis also revealed a control appraisal type by age group interaction ($F(2, 196) = 16.37$, $p < .001$, $\eta^2 = .086$). Simple effects analyses indicated that only circumstantial-control differed between younger and older adults ($t(98) = 4.27$, $p < .001$, $d = .86$, 99% CI: .314, 1.39). Self- and other-control did not differ by age group.

Next, we examined self-control appraisals relative to other- and circumstantial-control using difference scores. This analysis tested if perceptions of self-control relative to other- and circumstantial-control were greater for older and younger adults. As described in the introduction, differences in self-control perceptions may manifest themselves when opposing sources of control are taken into account. Difference scores were calculated by subtracting other- and circumstantial-control ratings from self-control ratings. A mixed-factors ANOVA examined these self-control difference scores with comparison type (other, circumstance) as a within-subjects factor and age group (young, old) as a between-subjects factor. The analysis revealed a main effect of comparison type ($F(1, 98) = 523.06$, $p < .001$, $\eta^2 = .838$). The self/circumstantial difference score was significantly larger than self/other control difference score for both younger and older adults. This analysis also revealed a main effect of age group ($F(1, 98) = 10.8$, $p = .001$, $\eta^2 = .099$). Both self-control difference scores were greater for older adults relative to younger adults (see Table 1). There was no significant interaction between age group and comparison type.

The relationship of appraisals of control and emotional experience for older and younger adults

In order to examine how control appraisals are related to emotional experience, we took two approaches. First, we re-ran the ANOVA examining age differences in emotional experiences with the three-control appraisals included as covariates. Most importantly, the results showed that the interaction of emotion valence and age group was no longer significant ($F(1, 95) = 3.29$, $p = .073$, $\eta^2 = .026$). In addition, the effects of emotion valence ($F(1, 95) = .099$, $p = .753$, $\eta^2 = .001$), and age group ($F(1, 95) = .332$, $p = .332$, $\eta^2 = .003$) were also not significant. However, valence interacted with self-control ($F(1, 95) = 21.8$, $p < .001$, $\eta^2 = .170$), and other-control ($F(1, 95) = 7.03$, $p = .009$, $\eta^2 = .055$), but did not for circumstantial-control ($F(1, 95) = 1.42$, $p = .237$, $\eta^2 = .011$). This result suggests that the self-control and other-control appraisals are related to differences in positive and negative reactions to the scenarios, but that circumstantial-control is not. In a separate analysis, we also examined both self-control difference scores as covariates, and most importantly, this analysis also showed that the interaction of valence and age group was no longer significant ($F(1, 96) = 3.89$, $p = .051$, $\eta^2 = .035$). Furthermore, the effects of emotion valence ($F(1, 96) = 0.05$, $p = .823$, $\eta^2 = .000$) and age group ($F(1, 96) = 1.39$, $p = .241$, $\eta^2 = .014$) were also not significant. However, valence interacted the self/other-control difference score ($F(1, 96) = 8.09$, $p = .005$, $\eta^2 = .073$), but not the self/circumstance-control difference score ($F(1, 96) = 2.15$, $p = .145$, $\eta^2 = .020$). This result suggests that the self/other-control control difference score is related to differences in positive and negative reactions

to the scenarios, but that self/circumstantial-control difference score is not. These results indicate that the control appraisals, especially self-control appraisals in relation to other-control appraisals, may underlie age differences in emotional reactions.

To further investigate if control appraisal can account for age differences in emotional reactions, our second approach explored how the self-control difference scores predicted emotional experience for younger and older adults for each scenario using a series of multilevel models. These analyses end with a multilevel mediation analysis to determine if self-control differences scores mediate the relationship between age group and emotional reactions. To determine if a multilevel model was necessary for these data, an intraclass correlation (ICC1) was conducted. This analysis determined that 24.3% of the variance in emotional reactions could be explained by differences between participants, exceeding the recommended level of 10% (Bryk & Raudenbush, 1992); therefore, a multilevel model was needed.

For the multilevel models, age group and the difference scores of self/other-control, and self/circumstantial-control were included as predictors of overall emotional reactions as reflected in greater relative positivity (positive minus negative reactions) toward each scenario. These analyses used the lme4 package (Bates, Mächler, Bolker, & Walker, 2015) in the software R (R Core Team, 2017). For the following analyses, we quantified the self-control difference scores at the participant-level (the average), and at the trial-level (centred within cluster by the participant's average) to determine if the self-control evaluations could uniquely predict emotional reactions at each level of analysis relative to each other.

First, a multilevel model examined if self/other-control difference scores could predict emotional reactions with age group in the model. The analysis showed that self/other-control differences scores predicted emotional reactions for both the trial-level (β = .260, SE = .02, t = 12.58, p < .001) and the participant-level (β = .68, SE = .12, t = 5.50, p < .001). These findings indicate that greater self-control relative to other-control on a given trial related to greater overall positivity on that trial. Also, the results indicate that people who, on average, reported more self-control relative to other-control tend to report greater overall positivity. In addition to this, age group predicted emotional reactions (β = −.41, SE = .16, t = −2.62, p = .010); younger adults reacted with overall less positivity compared to older adults.

Next, a multilevel model examined if self/circumstantial-control difference scores could predict emotional reactions with age group in the model. The analysis showed that self/circumstantial-control predicted emotional reactions for both the trial-level (β = .22, SE = .02, t = 9.30, p < .001) and the participant-level (β = .50, SE = .11, t = 4.70, p < .001). These findings indicate that greater self-control relative to circumstantial-control on a given trial related to greater overall positivity on that trial. In addition, the results indicate that people who on average reported more self-control relative to circumstantial-control tend to report greater positivity. Age group did not predict emotional reactions.

A final multilevel model included self/other-control, self/circumstantial-control and age group. The analysis showed that self/other-control difference scores predicted emotional reactions toward the scenario at the trial-level (β = .24, SE = .03, t = 8.29, p < .001) and at the participant-level (β = .52, SE = .18, t = 2.90, p = .005). This finding indicates that when including both types self-control comparison types in the model only self/other control at both the trial and participant-level predicted overall more positivity across the scenarios.

Finally, to investigate if age differences in self/other-control appraisals could account for age differences in emotional reactions to the scenarios, a multilevel mediation analysis was conducted using the mediation package (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014) in the software R (R Core Team, 2017). For this analysis, we included the participant-level self/other-control difference score as the mediator of the relationship between age group (young/old) and the outcome of overall emotional reactions as reflected in greater relative positivity (positive minus negative reactions) toward each scenario. The estimate for the causal mediation effect (indirect effect: IE) and the direct effect (DE) were computed for each of 5000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect and direct effects at the 2.5% and 97.5% percentiles for the mediator. The indirect effect (IE) represents the a * b path, and the direct effect (DE) represents the c′ path.

The mediation analysis indicated that the relationship between age group and emotional reactions was partially mediated by the participant-level self/other-control difference score (IE = −.187, 95% CI = −.274, −.11, p < .001). This analysis indicates that younger adulthood was associated with emotional reactions

that are .19 units more negative compared to older adulthood, as mediated by participant-level self/other control. As such, this pattern of results indicates that self/other-control appraisals are influenced by age, and this can account for age differences in emotional reactions (see Table 2 for the full model).

Discussion

The present study was designed to investigate age differences in emotional experience through the lens of appraisal theories of emotion by taking into account multiple appraisals of control. Overall, the results provide support for the importance of appraisal processes when examining age differences in emotional experience. Moreover, the data suggest that control evaluations are nuanced and explain age differences in emotional experience via comparisons of specific control appraisals. The present study found that when examining self-control in relation to the opposing sources of control, older and younger adults differed in their overall perception of self-control. Specifically, older adults appraised more self-control relative to both other- and circumstantial-control compared to younger adults. This finding suggests that, at least in terms of control, there are age differences in appraisal. Furthermore, this finding underscores the importance of taking into account various sources of control.

Importantly, the present study sought to examine age differences in appraisals of control in relation to age differences in emotional responses. The results indicate that older adults responded with less negativity, but similar positivity, to the scenarios compared to younger adults. This is consistent with past research investigating age differences in emotional experience

Table 2. Results of the multilevel mediation analysis.

Path	β (SE)	95% CI	p
Level-1:			
Affect ON T: Self/Other control	.260 (.02)	.219, .301	<.001
Level-2:			
Affect ON P: Self/Other control	.68 (.12)	.431, .922	<.001
Affect ON Age Group	−.41 (.15)	−.721, −.101	<.01
P: Self/Other control ON Age Group	−.274 (.03)	−.341, −.209	<.001
Indirect Effect:			
Affect ON Age group VIA P: Self/Other control	−.187	−.274, −.11	<.001
Total Effect:	−.597	−.903, −.30	<.001
Proportion Mediated:	.309	.168, .65	<.001

Note: T: Self/Other control refers to trial-level self/other control; P: Self/Other control refers to participant-level self/other control.

across adulthood (e.g. Carstensen et al., 2011). Notably, when controlling for appraisals of control in the analysis examining age differences in emotional reactions, the age by valence interaction effect was no longer statistically significant. This indicates that age differences in emotional reactions to the scenarios were related to age differences in appraisals of control of the scenarios. Supporting this result, the multilevel model regressions showed that both self-relative to other-control and circumstantial-control predicted emotional reactions toward the scenarios. However, when included in the same model, only self- relative to other-control predicted emotional reactions. Thus, the appraisal of self-control relative to the appraisal of other-control appears to be an important determinant of emotional reactions toward the scenarios. Supporting this idea, a mediation analysis indicated that age differences in emotional reactions were partially explained by person-level differences in self/other-control. This suggests that older adults tend to appraise more self-control relative to other-control and that leads to overall greater positive emotional experiences relative to younger adults. This finding supports the postulate of appraisal theory that individual differences in emotional responses are related to differing appraisals. As such, the idea that age differences in appraisal partially explain the experience of greater positivity in older adults was supported.

The present study adds to previous research indicating a relationship between control and emotional experience (e.g. losses in control leading to greater negative affect; Benassi et al., 1988; Price et al., 2002). This study may provide insight into the paradox that, compared to younger adults, old age is associated with reduced physical abilities, subsequent declines in control over the environment, but improvements in emotional well-being. The results show that in normal everyday circumstances, older adults respond with less negativity partially due to appraisals of more self-control relative to other-control compared to younger adults. In other words, because younger adults appraise less control relative to older adults, they experienced more negative affect toward the scenarios. As such, the paradox of ageing described above may be resolved in light of appraisals of control rather than the ability to physically control, though future work is needed to support this idea.

Additionally, the current work builds upon past research examining how older adults' control beliefs relate to affective experience. Kunzmann et al. (2002) found that older adults who had greater beliefs that

other people were in control of their lives reported increased negative affect. The present study extends this work by comparing older and younger adults' evaluations of control within several normal everyday situations and how those evaluations relate to emotional experience. Expanding the work of Kunzmann et al. (2002), the results of this study indicate that when older adults appraise greater self-control relative to other-control, they also respond less negatively to the present situation. Notably, age differences in emotional experience were uniquely explained by control in the context of others, rather than the circumstance, underscoring the importance of what factors create an overall appraisal of control. This pattern suggests that in normal everyday situations, older adults generally perceive higher levels of personal control, which contributes to the experience of positive emotional well-being relative to younger adults.

Future directions and limitations

In light of these findings, it will be important for future studies to examine other appraisal dimensions in addition to control (e.g. certainty, responsibility), and consider how they may individually contribute and interact with control appraisals to lead to age differences in emotional experience. Furthermore, future research could examine appraisals of control in the context of the Motivational Theory of Lifespan development (MTL; Heckhausen, Wrosch, & Schulz, 2010). According to MTL, control can be separated into two different types of control: *primary* and *secondary control*. Primary control involves processes that directly control or change the environment, whereas secondary control involves processes that change the self to adapt to the environment. Research supporting MTL suggests that with age comes a shift from primary control to secondary control. The use of primary or secondary control may depend upon certain appraisals of control. For example, when older adults do find themselves in a situation that is appraised with greater other-control, do older adults use secondary control strategies to attenuate the effects of an appraisal that would normally lead to a negative affective experience?

One limitation of this study is the context of the situations presented to the participants. The present research used emotionally ambiguous everyday scenarios that were relatively undemanding. Future research could investigate age differences in various appraisals in different situational domains (e.g. health, financial) that may pose differing demands for different age groups. Compared to the present set of scenarios, demanding situations may lead to different patterns of appraisal and emotion for younger and older adults. Potentially, patterns of age differences in appraisals and emotional experience will change when older and younger adults are in situations that specifically target their strengths or vulnerabilities (see Charles, 2010). For example, if older adults are not allowed to use their socioemotional strengths, their appraisal patterns may lead them to a greater negative emotional experience than a younger adult. In the current study, it is possible that since the scenarios were everyday-type situations, older adults reported higher self-control relative to younger adults as a result of greater life experience. From an alternative angle, if the self-control of younger adults were boosted, then they may experience greater positivity in their emotional reactions. Additionally, the present study only investigated control appraisals and their relation to emotional experience. Including other appraisals may help explain patterns of emotional experience in the present scenarios and in other scenarios that do place older and younger adults in more challenging situations. Lastly, the present study's sample did not include many older adults that were 75 or older, and the gender ratio included more women than men. As such, the findings may not reflect patterns of appraisal of all types of older adults. Patterns of control appraisals and emotion may differ for the old-old as abilities to exert self-control may be lower for the much older adult population. Thus, future studies will need to determine if different segments of the older adult population show different patterns than what is reported in the present study.

Conclusion

In sum, the present research, to our knowledge, is the first designed to apply appraisal theories of emotion to research on ageing and emotion and to test the idea that appraisal can at least partially explain age differences in emotional responding. The findings are consistent with the idea that appraisal is an important process in determining emotional experience. The present results indicate that older and younger adults differ in their appraisal of control. Importantly, the observed lower negative emotional responses for older adults are partially explained by greater

appraised self- relative to other-control compared to younger adults. Thus, the age-related path toward positivity is guided by how we appraise the world, at least partly because of control.

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Appendix

Ambiguous scenarios:

1) You decide to take up pottery as a hobby. You go to the art store and buy all the materials. When you work with the clay you think you should have bought an apron.

2) You have taken up painting as a hobby, and have just finished your first picture. You hang it on the wall for your

friends to see. At dinner, you overhear your friends sharing their opinions of your picture.

3) You buy a new phone and take it home. The phone doesn't work well, so you go to the store to get a refund. When you look in the bag the receipt is missing.

4) It is your birthday and you wake up looking forward to your day. You wonder how many friends will wish you happy birthday. By lunchtime, no one has contacted you.

5) You order a new hat for the winter holidays. Your choice of a hat is unusual, because you do not wear hats. You try it on; the hat is warm because it is thermal.

6) You are invited to give a speech at your friend's wedding reception. You prepare some remarks and when the time comes, get to your feet. As you speak, some people in the audience start to laugh.

7) You have an appointment in the city and decide to drive there. You are traveling in a steady stream of traffic along a two-way street. As you approach a set of traffic lights, they turn red and so you stop.

8) You are with a group of new friends at a local restaurant. You start to tell a joke you heard recently, and everyone looks at you. Their expressions change when you get to the punch line.

9) You inherit an old dining table and chairs and decide to restore them to their former glory. You spend hours in the garage working on them. When you have finished, you bring them into the house.

10) Your neighbor has a house warming party and you are invited. You arrive to find many guests whom you do not know. You try talking to some of them and get an impression of their interest in your conversation.

11) You begin reading a book that you recently found around your house. One afternoon you are reading it while sitting in your recliner. You hear a noise in the kitchen so you put the book down.

12) You get on a bus and find an empty seat, next to one that has a small rip in it. At the next stop several people get on who know you. They all sit somewhere else so the seat next to you remains vacant.

13) Every weekend you go to the park to take a walk. When you arrive at the park you notice puddles from rain the night before. You begin your stroll through the park but then you stop.

14) In the street you bump into an old friend you haven't seen for a long time, but she is in a rush. You arrange to meet later. You arrive on time and a few minutes later she is still not there.