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This is Not What I Expected: The Impact of Prior Expectations on Children's and Adults' Preferences and Emotions

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Abstract

We examined the influence of prior expectations on 4- to 10-year-olds' and adults' preferences and emotions following an undesirable outcome (N=205;49% female, 51% male; 6% Asian, 1% Black, 13% Hispanic/Latino [non-White], 57% White, 18% multiracial, and 5% another race/ethnicity; 75% with a college-educated parent). Participants attempted to win a chance game with multiple prizes; the worst prize being a pencil. The game was rigged so that half of the participants lost, and the other half won. Regardless of the game outcome, everyone received a pencil. For winning participants (high-expectation condition), the pencil was worse than the prize they expected; whereas for losing participants (low-expectation condition), the pencil was better than the "nothing" they expected. Participants rated how much they liked and felt about the pencil pre-outcome, post-outcome, when imagining having held an alternative prior expectation, and after learning that everyone received a pencil. Results showed that 6- to 10-year-olds and adults with low (versus high) expectations liked the pencil more, with emotion ratings trending in the same direction. Prior expectations did not influence younger children's affective experiences. More participants with low (versus high) expectations also expressed a positive outlook about the pencil, which increased with age and correlated with higher post-outcome emotions. More adults than children explained emotions as caused by thoughts, and only adults consistently reasoned that their preferences and emotions would have differed had they held alternative prior expectations. Once knowing that everyone received a pencil, 6- to 10-year-olds and adults liked the pencil more and felt better.

Keywords

expectations; affect; emotions; preferences; development

Imagine that you are playing a chance game. If you win, you could earn a $20 gift card, chips, gum, candy, or a pencil; if you lose, you get nothing at all. Now imagine that you lost, and therefore think that you will leave the game with nothing. Unexpectedly, you receive a pencil as a consolation prize. Now imagine that instead, you win the game and therefore think that you will win a cool prize—maybe even the $20 gift card. Unexpectedly, your prize is the pencil. How much would you like the pencil and how would you feel receiving it after losing versus winning? Prior research with adults suggests that they often feel better

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after outcomes if they previously held low compared to high expectations (Carroll et al., 2006; Sweeny & Shepperd, 2010). Here, we aim to expand theory and research on the firsthand experience of expectation-emotion connections by incorporating a developmental perspective. We assessed age-related differences between 4 and 10 years and between childhood and adulthood in how prior expectations shape future preferences and emotions for a low-value, undesirable outcome (i.e., getting a pencil). We studied both preferences and emotions to provide a broad examination of the connection between prior expectations and future *affective experiences* (Wilson et al., 1989).

At the point of having an expectation (before an outcome is known), the relation between expectations and affective experiences appears straightforward. Thinking positively feels good and thinking negatively feels bad (Carver et al., 2010), and even children as young as 4 or 5 years of age know this (Bamford & Lagattuta, 2012; Lara et al., 2019). Thus, having positive thoughts about the future (optimism) feels better than having negative thoughts (pessimism; Carver et al., 2010). Indeed, investigations into positive feelings and life outcomes associated with optimism constitute the foundation for the field of positive psychology (Seligman & Csikszentmihalyi, 2000), which has identified several connections between optimism and improved physical as well as mental health (e.g., Brown & Marshall, 2001). Researchers have further developed interventions aimed at increasing optimistic thinking, starting with school-aged children (Brenner, 2000; Gillham et al., 1995; Gross, 1999).

Optimistic thinking, however, can carry costs. Researchers have documented that once the outcome is known, individuals who previously held low expectations (pessimism) feel better than those who previously held high expectations (optimism) (Carroll et al., 2006; Sweeny & Shepperd, 2010; Sweeny et al., 2016). Indeed, *decision affect theory* posits that the valence relation between thoughts and emotions inverses once outcomes occur. Prior positive thinking can lead to future negative emotions and previous negative thinking can cause a future emotional boost (Mellers et al., 1997). For example, winning a game that had a high probability of winning does not feel as good as winning when the odds were not in your favor, and a surprising loss feels worse than an expected loss (Mellers et al., 1997). Students who expect a low (versus high) grade on an exam feel better when receiving their scores (Shepperd & McNulty, 2002; Sweeny & Shepperd, 2010). Law school graduates who had lower expectations about passing the Bar exam (after taking the exam) felt better when they passed and not as bad when they failed compared to those with higher expectations (Sweeny et al., 2016). Moreover, brain activity in response to rewards differs based on if the outcome was expected or unexpected (Glimcher, 2011). Thus, thinking positively may be helpful in boosting mood prior to outcomes or when thinking about the future more generally, but may put a person at risk for lower emotional satisfaction following actual outcomes (but see Klaaren et al., 2011 for evidence that adults' affective expectations positively correlate with their post-outcome evaluations of an experience).

Although connections between expectations and affective experiences have not been systematically studied in children, evidence suggests that high expectations may be emotionally costly in younger age groups as well. One commonly used measure to assess emotion regulation in children is the *disappointing gift paradigm.* Children are led to believe

that they will get a great prize (e.g., they get to open a large, wrapped box), but it turns out to be a worthless item (e.g., a broken crayon). Not surprisingly, children across a wide age range become upset by this outcome (Cole, 1986; Saarni, 1984). What remains, unclear, however, is whether children's negative affective experiences arise because they expected something better or because the gift is simply undesirable. To empirically test whether expectations matter, it would be essential to experimentally manipulate children's expectations and compare their post-outcome preferences and emotions. The current study is the first to do so, and we included both children and adults.

Despite minimal systematic research on whether and how children's post-outcome affective experiences are influenced by their prior expectations, an emerging literature has begun to assess children's and adults' *beliefs* about connections between expectations and emotions. College students with higher expectations know that they would be more disappointed about a poor score on an exam than those with lower expectations (Sweeny & Shepperd, 2010). Restaurant hosts deliberately overestimate waiting times so people feel better about being served earlier than expected (Shepperd et al., 2007). Adults also sometimes purposely lower their own expectations so that they can be pleasantly surprised by good outcomes and less upset when things go wrong (Martin et al., 2003). Thus, adults appear to endorse that there is a relation between expectations and emotions and that lowering expectations can be used as an emotion regulation strategy to avoid later disappointment.

Children's understanding of mind-emotion connections has been well-documented, with significant improvement between 3 and 10 years of age (Kramer & Lagattuta, in press; Lagattuta, 2014; Lagattuta & Kramer, 2021b; Lagattuta et al., 2015). Most relevant, Lara and colleagues (2019) examined children's reasoning about expectation-emotion connections. Four- to 10-year-olds and adults viewed scenarios in which characters had differing expectations for a future event. For example, participants were told that while waiting to learn the outcome of a raffle, one person thought that she would win (high expectation) and another thought that she would lose (low expectation). Participants then reasoned about how each character would feel after varying outcomes (i.e., positive, negative, and attenuated [between positive and negative] outcomes). By 6 to 7 years of age, children appreciated that individuals with prior high expectations would later feel more negatively after negative outcomes compared to those with prior low expectations. It was not until 8 to 10 years of age that children made these connections for attenuated outcomes (but see Asaba et al., 2019 as well as Doan et al., 2020 for evidence of earlier understanding in response to highly scaffolded third-person scenarios featuring salient probability information).

If children's awareness of expectation-emotion connections and their experience of these relations emerge simultaneously in development, then prior expectations may not begin to impact children's affective experiences until 6 to 7 years of age or older. Prior studies indicating that young children's optimism, wishful thinking, and positive expectations for the future start to decline around 7 years of age (Bamford & Lagattuta, 2020; Boseovski, 2010; Guttentag & Ferrell, 2008; Stipek, 1984; Wente et al., 2019) further suggest that the emotional benefits of low expectations may not emerge until around 6 to 7 years of age—prior to that age, children infrequently form low expectations about the future for self or others. Potentially, however, children may require several experiences of feeling

the emotional costs of high expectations and the emotional benefits of low expectations in their everyday lives before they can explicitly predict and explain these expectation-emotion connections in judgment tasks (similar to the developmental timetable of regret and relief; Weisberg & Beck, 2010). In this case, prior expectations may shape future affective reactions even in children as young as 4 to 5 years.

Research on counterfactual thinking also suggests age-related differences in experiential effects of differing expectations. When adults think about how an outcome could have been better, they tend to feel worse and when they think about how an event could have been worse, they typically feel better (Roese, 1997). The ability to reason counterfactually improves between 3 and 12 years (O'Connor et al., 2014; Rafetseder et al., 2013). For example, when reflecting on undesirable outcomes, 9- to 10-year-olds and adults spontaneously reference how outcomes could have been worse more often than 5- to 8-year-olds (Guttentag & Ferrell, 2008). Related studies have shown that between the ages of 5 and 10 years, children better recognize how past experiences shape thoughts and emotions, show increasing awareness that people can use mental strategies to regulate emotions, and exhibit stronger understanding that thoughts influence emotions (Bamford & Lagattuta, 2012; Beck & Riggs, 2014; Davis et al., 2010; Flavell et al., 2001; Gnepp, 1989; Lagattuta, 2005; Lagattuta et al., 2016; Lagattuta & Kramer, 2021a; Lagattuta & Sayfan, 2013; Lara et al., 2019; O'Connor et al., 2014; Sayfan & Lagattuta, 2008, 2009).

In the current research, we tested whether and how 4- to 10-year-olds' and adults' prior expectations shape their post-outcome affective experiences (emotions and preferences). Although existing research has not focused on preferences, they are intriguing to study in this context because individuals tend to view their preferences as stable, even though they can be malleable (Amir & Levav, 2008; Quoidbach et al., 2013). Preferences and emotions are also highly interconnected—for example, feeling good about something is related to liking it more (Murphy & Zajonc, 1993; Winkielman et al., 1997). Potentially then, individuals' current preferences for a particular item may also vary depending upon prior expectations. To investigate these relations, we added a twist to the disappointing gift paradigm by comparing individuals' liking of and emotional satisfaction receiving an undesirable gift (i.e., a pencil) when they anticipated receiving a better prize (*high-expectation condition*) versus when they expected getting nothing at all (*low-expectation condition*). Because the pencil surpassed the expectations of the low-expectation group but fell short of the expectations of the high-expectation group, it most closely matched the "attenuated" outcome in the reasoning task by Lara et al. (2019).

We also asked participants to explain their emotional reaction to the pencil. We were interested in participants' explicit references to mental states, as well as their use of a positive versus negative outlook on the undesirable outcome (i.e., Did they try to "make lemonade from lemons" or did they focus on the negative?). Previous studies with third-person tasks reveal that children know that positive thinking feels better than negative thinking, with improvement from 4 to 10 years (Bamford & Lagattuta, 2012; Harris, 1989; Lara et al., 2019). By soliciting explanations for post-outcome emotions, we not only tested first-person connections between prior expectations and "finding the bright side," but also the relation between current outlook and emotions. Given the wide age range of our

participants, we could also identify developmental advances in the ability to make the best of an undesirable situation.

To examine more fully how expectations shape affective responses, we included two additional questions. First, we tested whether participants would anticipate having different affective experiences had they held the opposite expectation (e.g., participants in the low-expectation conditions were asked to simulate the high-expectation condition). Unlike traditional measures of counterfactual thinking where people imagine an *alternative outcome,* we had participants imagine their current affective reactions given an *alternative prior expectation.* This is likely a more advanced type of reasoning given the greater complexity of forming mind-emotion connections versus outcome-emotion connections. Second, we explored whether children's and adults' affective experiences are shaped by learning about a shared *common fate.* Because adults dislike getting a worse reward than others (van den Bos et al., 1997), we tested whether telling participants that everyone received a pencil improved their affective responses.

Based on the literatures reviewed, we hypothesized that 8- to 10-year-olds and adults would like the pencil more and feel better when they had expected nothing after losing the game than when they had expected a better prize after winning the game. In contrast, we expected prior expectations to have lower or no impact on 4- to 7-year-olds'affective experiences, with 4- to 5-year-olds showing the weakest connection. Relatedly, we predicted that 8- to 10-year-olds and adults would reference their thoughts as the cause of their emotions, but that these explanations would be rare in younger children. We also anticipated that across age, individuals would explain their feelings about the pencil using a more positive outlook after holding low versus high expectations and that this ability to find the "bright side" would correlate with better self-reported emotions as well as increase with age. We hypothesized that 8- to 10-year-olds and adults would judge that their current preference and emotion would differ had they held an alternative prior expectation about getting a prize, whereas the younger age groups would not make this complex mental inference. We explored whether finding out that all participants received a pencil would boost participants' affective responses to a low-value outcome.

Method

Participants

Participants (N = 205) were divided into four age groups: 49 4.5- to 5-year-olds (M = 5.28 years, SD = 0.41 years, 51% females), 56 6- to 7-year-olds (M = 7.02 years, SD = 0.60 years, 48% females), 52 8- to 10-year-olds (M = 9.47 years, SD = 0.80 years, 48% females), and 48 undergraduates (M = 21.16, SD = 1.95 years, 50% females). They also participated in Kramer et al. (2021) and Lara et al. (2019; no overlapping metrics or data). Because this was part of a larger multi-visit project examining several within-subjects effects, we adhered to the rule of thumb of about 50 participants per age group (Wilson VanVoorhis & Morgan, 2007). The targeted sample size of 48 per age group was decided a priori based on resources available and previous research on mind-emotion connections (Bamford & Lagattuta, 2012; Lagattuta, 2007). We stopped data collection once reaching this targeted level for the larger multi-visit study.[1]

After collecting the data, we conducted a power analysis in GLIMMPSE (Kreidler et al., 2013) to verify that we had sufficient power. We used the means and standard deviations from the attenuated trials of Lara et al. (2019), the closest third-person analogue to the current first-person paradigm, as the parameter estimates. This analysis determined that we would need 128 participants to have .81 power to detect the key 4 (age: 4/5 years, 6/7 years, 8/10 years, adults) x 2 (expectation: high, low) x 4 (timing: pre-outcome, post-outcome, alternative outcome, common fate) interaction (i.e., 32 per age group). As further assurance, we used the means and standard deviations from Sweeny and Shepperd (2010) on adults' first-person experience of expectation-emotion connections. G*Power3 (Faul et al., 2007) determined that we would need 14 adults to have .86 power to detect a difference between the high-expectation versus low-expectation condition for that age group. Thus, our sample size exceeded both of these estimates.

Child participants were 2% Asian, 11% Hispanic or Latino, 64% White, 21% multiracial, and 3% another race or ethnicity. Adult participants were 21% Asian, 6% Black, 2% Hawaiian or Pacific Islander, 19% Hispanic or Latino, 2% Native American, 33% White, 6% multiracial, and 10% other. Most participants had at least one parent with a college degree (81% children, 56% adults). Children were recruited from a list of previous participants as well as participant referrals. Adults were recruited through a university subject pool. No participant had an affective or cognitive disorder via self- or parent-report. Children received $10 and adults received course credit. Everyone received a pencil. This study was approved by the University of California, Davis Institutional Review Board (521827-7): Expectations and Emotions.

Materials and Procedures[2]

Participants played a chance game to attempt to win one of five prizes. Participants were randomly assigned (balanced by age and gender) to one of two conditions: (a) *high-expectation* (participant won the game and expected a prize, but received the worst prize—a pencil), (b) *low-expectation* (participant lost the game and expected nothing, but still received a pencil). Because young children are more likely than older children and adults to form high expectations for the future (i.e., they expect to get what they want; Bamford & Lagattuta, 2020; Boseovski, 2010; Lagattuta & Sayfan, 2013; Guttentag & Ferrell, 2008; Stipek, 1984; Wente et al., 2019), it was essential that we empirically manipulated participants' expectations so that all age groups within each condition held the same expectation right before getting the pencil. Thus, the manipulation that determined the expectation condition was whether the participant picked a winning door (expect a desirable prize) or picked a losing door (expect no prize). Pictures of stimuli, rating scales, the full script, as well as the computerized bonus prize game can be found on OSF (https://osf.io/c2j3n/?view_only=ec1d7b74e2a6479da3339488573fa7e0).

[1]We have extra participants in three age groups because some children dropped the larger study before completing all three visits and we replaced them. Data collection for the current study occurred during visit 1.

[2]Some additional questions from the bonus prize game procedure are not included in Method and Results for this manuscript because they will be included in separate papers.

Initial Prize Ratings—An experimenter told participants that they would play a game for a chance to take home a bonus prize. The experimenter showed them five potential prizes (pictured on 4” x 4” cards) of varying values: A $20 Target gift card (“to get whatever you want”), some candy, packs of gum, bags of chips, and a pencil. Participants determined which prize they wanted the most. We included multiple prizes to build hype, help conceal the key manipulation (i.e., winning or losing the game), maximize the likelihood that the pencil would be rated as the worst prize, and decrease the likelihood that participants would expect to win the pencil. Participants then rated whether they would like or dislike getting each item (pencil, chips, gum, candy, gift card) as a prize (in random order). Children and adults first chose between “like” and “dislike” using a positive and a negative sound-making button that lit up when pressed (kids loved this!). They were then shown a 5-point pictorial scale corresponding to their dichotomous choice (like, dislike): from “like it just a little bit” to “like it a whole lot; love it” or “dislike it just a little bit” to “dislike it a whole lot; hate it” (*pre-outcome preference*). They next reported how they would feel receiving each prize on a 7-point pictorial scale (very bad, medium bad, little bad, okay—not good or bad, little good, medium good, very good; *pre-outcome emotion*). After rating their preference and emotion for each prize, children and adults answered the same questions about receiving nothing (same scales). We asked the preference question before the emotion question because it flowed more naturally in conversation to inquire about how much the participant liked something before asking them how they would feel about getting that item.

Game Orientation and Pre-Outcome Ratings—Next, participants learned about the bonus prize game. The computer game had 10 different colored doors on the screen. A pre-recorded voice said, “Here’s how to play the game. There are 10 doors. You get to pick which door you think is the luckiest one. Five doors have bonus prizes and five doors have no prizes at all.” Participants responded to comprehension checks: “How many winning doors are there?”; “How many losing doors are there?”; “How many doors do you get to pick?” (correct = 5, 5, and 1, respectively). Testing did not continue until the participant answered all questions correctly. Next the experimenter asked participants whether they thought that they would pick a winning or a losing door. Participants used a 2” x 4” card showing a gold (for winning) and a silver (for losing) circle to indicate their pre-game expectation. The experimenter also asked, “How sure are you that you are going to [win or lose] the game?” Participants responded verbally or by pointing to a picture of *not so sure, kind of sure*, and *really sure* (scale adapted from Hembacher & Ghetti, 2013). The experimenter also asked all participants which prize they thought they were going to get if they won.

Game Outcome—Once a participant clicked on the door, the computer said, “Congratulations! You picked a winning door” or “Sorry, you did not pick a winning door.” When a participant won the game, the computer displayed a star; when a person lost, a “prohibition” symbol appeared. The experimenter then said, “You did (or did not) pick a winning door. How do you feel about that?” Participants responded using the 7-point pictorial emotion scale (*post-game emotion rating*). The experimenter then turned away “to do paperwork” and told the participant to keep looking at the screen. This removed the interpersonal aspect and ensured that the experimenter kept a neutral expression

when participants learned what happened next. Forty-five seconds after telling the game outcome (win or lose), the computer said, “Guess what? You get a new pencil!” (win; high-expectation condition) or “Guess what? Just for playing, you get a new pencil!” (lose; low-expectation condition). A picture of an ordinary yellow pencil was displayed on the screen.

Post-Outcome Ratings—Next, participants reported their *post-outcome preference* for the pencil and their *post-outcome emotion*, using the same procedures as the pre-outcome questions. The experimenter also asked participants to explain their emotions. Participants were then asked to imagine experiencing the outcome after holding the opposite expectation (imagine picking a losing door if they won, or picking a winning door if they lost). They rated how much they would have liked the pencil (*alternative prior expectation preference*) and how they would have felt receiving the same pencil (*alternative prior expectation emotion*). Afterwards, participants were debriefed that everyone received a pencil, and the experimenter asked for participants’ preference and emotion ratings one last time (*common fate preference* and *common fate emotion*).

General Procedure—A female experimenter tested participants in a university laboratory (See Figure 1 for a schematic of the procedure). The session was video- and audio-recorded and responses were transcribed verbatim. Prior to the bonus prize game, participants also played chance games related to mathematical probability, completed individual differences measures (e.g., working memory), and responded to a third-person reasoning task (Lara et al., 2019). The bonus prize game lasted about 15 minutes. After the common fate questions, the experimenter asked adults if while playing the bonus prize game they had thought that it was rigged (this question came after participants already learned that the game was rigged). If they said “yes,” the experimenter asked them how sure they were as well as asked how they thought we had manipulated the outcome.

Scoring and Coding

Pre-outcome, post-outcome, alternative prior expectation, and common fate preferences were scored −5 (strongly dislike) to +5 (strongly like), with negative scores indicating disliking and positive scores indicating liking. Emotions were scored −3 (feel very bad) to +3 (feel very good), with negative scores for negative emotions and positive scores for positive emotions.

We coded emotion explanations for the presence (1) or absence (0) of reference to the *situation* (e.g., “because [the pencil] is a little bit nice,” “Because I didn’t get the Target gift card,” “Because I got the pencil”), *desire* (e.g., “Because I wanted to get candy,” “I didn’t want [the pencil],” “I like the gift card”), and *thought* (e.g., “I thought that I’d probably get something better than a pencil,” “Because I got a prize, when I thought I wouldn’t”). Sixteen percent of the data were coded collaboratively by two independent undergraduate raters (blind to study hypotheses, expectation condition, and participant demographics) and two of the authors. After agreeing on the coding scheme, the independent raters coded the remaining 84% of the data. We assessed reliability on 100% of the non-collaboratively coded data. Interrater reliability was excellent (Cohen’s kappas for situation = .80, desire =

.96, thought = 1.00). We resolved discrepancies by group discussion. We recoded the data so that situation, desire, and thought were mutually exclusive, hierarchical codes: (1) Reference to the situation (but not desires or thoughts), (2) reference to desire (but not thought), and (3) reference to thought. A minority of participants (10%) provided an explanation that did not cleanly fit into any of these categories (e.g., “Because I get to do my homework,” “Because I don’t write that often”).

The two independent raters also coded explanations for the presence (1) or absence (0) of valenced content signifying a positive or negative outlook. *Positive outlook* references included mention of the pencil being valuable, useful, or better than an alternative outcome (e.g., “‘Cause it’s nice a little bit,” “I could bring it to school and start writing,” “Because I still get a prize”). *Negative outlook* references included remarks that the pencil was valueless, useless, or worse than an alternative outcome (e.g., “Because pencils are boring,” “I have a lot of pencils at home already,” “I thought that I’d probably get something better than a pencil”). Some participants (30%) voiced neither negative nor positive outlooks (e.g., “Because it’s a pencil.”), and some participants (5%) referenced both (e.g., “It’s not the best prize, but it’s a good prize.”). Five percent of participants gave an unintelligible response or stated that they did not know the reason (e.g., “I don’t know”). Interrater reliability was excellent (Cohen’s kappas for positive outlook = .86, negative outlook = .79). Note that participants could reference the situation, desire, or thought as well as have a negative and positive outlook. These codes were not mutually exclusive (e.g., “I got a cool pencil” would be coded as situation and positive outlook).

Results

Results are separated into four sections. First, we conducted preliminary analyses to confirm that our paradigm worked as we had intended. In the second and third sections we assessed participant preference and emotion ratings. Within each of these segments, we examined how age (4/5 years, 6/7 years, 8/10 years, adults), condition (high-expectation, low-expectation), and timing (pre-outcome, post-outcome, alternative prior expectation, common fate) influenced how much participants liked the pencil and how they felt about receiving it. In the final section, we examined participants’ causal explanations for their emotional reactions. When analyzing participants’ explanations, we also tested for age and condition differences. We conducted analyses in RStudio (RStudio Team, 2016), set our alpha level at .05, and corrected for multiple comparisons for main effects using Tukey’s Honestly Significant Difference (HSD).

Preliminary Analyses

Preliminary analyses confirmed our design manipulations (*see* Table 1). The majority of participants reported that they would most want something other than the pencil, did not expect to win the pencil, and thought that they would win the game (when forced to pick whether they thought they would win or lose). These reports did not vary by expectation condition (χ^2s [1, N = 205] < 0.81, ps > .369). Descriptively, participants were “kind of sure” about whether they would win or lose the game (M = 2.04, 95% Confidence Interval [CI][1.95, 2.14]; Expected to win [n = 146]: M = 2.12, CI[2.00, 2.23]; Expected to lose [n

= 59]: M = 1.86, CI[1.67, 2.06]). Moreover, controlling for age and manipulated expectation condition, participants' expectation of winning or losing the game prior to selecting a door (scaled to include certainty) had no relation to their post-outcome pencil preferences and emotions (|r|s < .04, ps > .517).

Confirming random assignment, participants' pre-outcome pencil liking (ts < 0.99, ps > .325, ds < 0.27) and emotion ratings (ts > 1.26, ps > .215, ds < 0.36) did not differ by expectation condition. We also verified that the pencil was rated the worst of all the prizes. Two separate 5 (prize: pencil, chips, gum, candy, gift card) repeated measures ANOVAs on pre-outcome preference and emotion ratings revealed main effects for prize, Fs(1, 204) > 157.39, ps < .001, $\eta\rho^2$s > .39. Participants liked the pencil the least (Pencil: M = −2.36, CI[−2.74, −1.97]; Chips: M = 1.94, CI[1.53, 2.35]; Gum: M = 1.98, CI[1.55, 2.40]; Candy: M = 3.21, CI[2.89, 3.54]; Gift card: M = 3.65, CI[3.28, 4.01]; ps < .001, ds > 1.12) and would feel the worst receiving it (Pencil: M = −0.95, CI[−1.17, −.072]; Chips: M = 1.16, CI[0.94, 1.38]; Gum: M = 1.08, CI[0.85, 1.31]; Candy: M = 1.83, CI[1.64, 2.02]; Gift card: M = 2.09, CI[1.88, 2.29]; ps < .001, ds > 0.96).

To provide further assurance that children and adults understood the game, we analyzed participants' self-reported emotions after they first learned that they won or lost (post-game emotion rating). A 4 (age: 4/5 years, 6/7 years, 8/10 years, adults) x 2 (expectation: high, low) ANOVA on game outcome emotion ratings resulted in a main effect for age, F(3, 197) = 3,47, p = .017, $\eta\rho^2$ = .05, and expectation, F(1, 197) = 622.47, p < .001, $\eta\rho^2$ = .76, qualified by an Age x Expectation interaction, F(3, 197) = 8,10, p < .001, $\eta\rho^2$ = .11. All age groups felt significantly better when they won the game than when they lost (ps < .001, ds > 2.60). This also held at the individual level: Only 3% of participants felt good after losing or bad after winning. These data, combined with 100% of participants passing the comprehension checks, verified that even younger children understood the game at the critical moment we manipulated their expectations. Also, only 8% of adults reported being "really sure" that the game was rigged while playing.

Preference Ratings (Table 1 and Figure 2)[3]

First, we considered how much children and adults liked getting the pencil. A 4 (age: 4/5 years, 6/7 years, 8/10 years, adults) x 2 (expectation: high, low) x 4 (timing: pre-outcome, post-outcome, alternative prior expectation, common fate) repeated measures ANOVA on pencil preference ratings resulted in main effects for age, F(3, 196) = 9.96, p < .001, $\eta\rho^2$= .13, and timing, F(3, 588) = 51.96, p < .001, $\eta\rho^2$= .21, qualified by Age x Timing, F(9, 588) = 2.87, p = .003, $\eta\rho^2$ = .04, and Expectation x Timing interactions, F(3, 588) = 6.22, p < .001, $\eta\rho^2$ = .03. Main effects and two-way interactions were subsumed by an Age x Expectation x Timing interaction, F(9, 588) = 2.49, p = .008, $\eta\rho^2$= .04.[4] The

[3]We had missing data for one participant for the common fate preference question (N = 204).

[4]Results held when we removed participants who expected to win the pencil (n = 21: 10% of the sample), if we analyzed preferences using a 1 to 10 scale rather than a −5 to 5 scale with the 0 neutral placeholder (see Bamford & Lagattuta, 2020 and Lagattuta & Kramer, 2021a for use of the neutral placeholder in two-step Likert questioning), if we included expectation of the game outcome (win vs. lose; scaled) as a covariate, or if we included gender as a factor. The only exception was that when game expectation was included as a covariate, 4- to 5-year-olds in the high expectation condition liked the pencil more than in the low expectation condition, p = .027, d = 0.63, CI[0.06, 0.63].

following sections break down the Age x Expectation x Timing interaction in accord with our central questions by testing between-subjects differences (i.e., condition differences: high expectations versus low expectations; visual comparisons can be done within each row of Figure 2) as well as within-subjects changes (i.e., from pre-outcome to post-outcome, from post-outcome to alternative prior expectation, from post-outcome to common fate; visual comparisons can be done across rows in Figure 2 with the complete data for all judgments presented in Table 1).

Do Prior Expectations Influence Post-Outcome Preferences?

Between-subjects differences.: Six- to 10-year-olds and adults in the low-expectation condition reported liking the pencil more than same-aged participants in the high-expectation condition (ps < .021, ds > 0.63). Four- to 5-year-olds' preferences did not vary by expectation condition (p = .138, d = 0.42, CI[−0.14, 0.99]).

Within-subjects changes.: Whereas 8- to 10-year-olds and adults in the low-expectation condition increased their pencil preference from pre-outcome to post-outcome (ps < .001, ds > 0.73; 4 to 7 years, ps > .292, ds < 0.21), the pencil maintained a low preference rating for the 6- to 10-year-olds and adults from pre- to post-outcome in the high-expectation condition (ps >.144, ds < 0.30). In contrast, 4- to 5-year-olds in the high-expectation condition liked the pencil more post-outcome versus pre-outcome (p = .004, d = 0.57, CI [0.14, 0.99]).

Does Imagining Alternative Prior Expectations Cause Different Current Preferences?

Between-subjects differences.: When asked to imagine how much they would have liked the pencil had they held the opposite expectation, adults in the high-expectation condition (i.e., tried to simulate low expectations) inferred that they would have liked the pencil more than the adults in the low-expectation condition (i.e., tried to simulate high expectations; p = .030, d = 0.63, CI[0.04, 1.20]). For children, there was no difference by condition (ps > .780, ds < 0.08).

Within-subjects changes.: Eight- to 10-year-olds and adults in the high-expectation condition who imagined getting the pencil after losing (i.e., tried to simulate low expectations) rated that they would have liked the pencil more than their current post-outcome liking (ps < .002, ds > 0.63). Only adults judged that they would have liked the pencil less (compared to their post-outcome preference) if they had imagined getting the pencil as their prize for winning (i.e., tried to simulate being in the high-expectation condition; p = .015, d = 0.50, CI [0.07, 0.92]).

Does Learning That Everyone Shares a Common Fate Boost Preferences?

Between-subjects differences.: After learning that everyone received a pencil, there were no differences by expectation condition for any age group in pencil liking (ps > .334, ds < 0.27).

Within-subjects changes.: Six- to 10-year-olds in both expectation conditions (ps < .010, ds > 0.54), and adults in the high-expectation condition (p < .001, d = 0.71, CI[0.25, 1.15]), liked the pencil more once learning that everyone just received a pencil. There was no preference boost for adults in the low-expectation condition (p = .715, d = 0.07, CI[−0.33, 0.47]), or for 4- to 5-year-olds in either condition (ps > .068, ds < 0.37).

Emotion Ratings (Table 1 and Figure 3)

Next, we conducted a parallel repeated measures ANOVA on pencil emotion ratings. This analysis resulted in main effects for age, $F(3, 197) = 9.83$, p < .001, $\eta\rho^2$ = .13, and timing, $F(3, 591) = 43.65$, p < .001, $\eta\rho^2$ = .18, qualified by an Expectation x Timing interaction, $F(3, 591) = 6.41$, p < .001, $\eta\rho^2$ = .03. The Age x Expectation x Timing interaction was not significant, $F(9, 591) = 1.78$, p = .069, $\eta\rho^2$ = .03 (Figure 3).[6] Four- to 5-year-olds felt worse about the pencil than 8- to 10-year-olds and adults (ps < .029, ds > .80). Six- to 7-year-olds also felt worse than adults (p < .001, d= 1.20, CI[0.56, 1.83]). Below, we investigate the significant Expectation x Timing interaction in line with our focal questions.

Do Prior Expectations Influence Post-Outcome Emotions?

Between-subjects differences.: Post-outcome emotions did not vary by expectation condition. Participants felt bad about getting a pencil regardless of whether they had held high or low expectations (p = .092, d = 0.24, CI[−0.04, 0.51]). Children and adults in the low-expectation condition trended towards feeling better than those in the high-expectation condition.

Within-subjects changes.: There were no differences between pre-outcome and post-outcome emotions (ps > .128, ds < 0.15).

Does Imagining Alternative Prior Expectations Cause Different Current Emotions?

Between-subjects differences.: When asked to imagine their emotions after getting the pencil if they had lost the game (i.e., tried to simulate low expectations), high-expectation participants reported that they would have felt better receiving the pencil than low-expectation participants (i.e., tried to simulate high expectations; p = .019, d = 0.33, CI[0.05, 0.60]).

Within-subjects changes.: Participants in the high-expectation condition anticipated feeling better getting the pencil had they lost the game (i.e., tried to simulate low expectations) than their current post-outcome emotion (p < .001, d = 0.35, CI[.15, .54]). The difference between post-outcome emotions and alternative prior expectation emotions for the low-expectation condition was only at trend level (p = .056, d = 0.19, CI[−0.01, 0.38]).

[6]These results held when we excluded participants who originally thought they would win the pencil (n = 21: 10% of the sample), when we included game outcome expectation (win vs. lose; scaled) as a covariate, or if we included gender as a factor. There were two exceptions: (1) When we excluded participants who thought they would win the pencil, the mean emotion rating between 4- to 5-year-olds and 8- to 10-year-olds was no longer significant, p = .076; (2) when gender was included as a factor, there was a main effect of gender (but it did not moderate any of the primary findings), $F(1, 189) = 3.99$, p = .047, $\eta\rho^2$ = .02. Males reported feeling more emotionally negative about the pencil than did females (Male: M = −0.64, CI[−0.82, −0.46]; Female: M = −0.24, CI[−.42, −.06]).

Does Learning That Everyone Shares a Common Fate Boost Emotions?

Between-subjects differences.: We did not document expectation condition differences for the common fate emotion ratings ($p = .634$, $d = 0.07$, CI[−0.21, 0.34]).

Within-subjects changes.: Participants experienced an emotion boost from their initial post-outcome emotion once learning that everyone only got a pencil (ps < .001, ds > 0.47).

Emotion Explanations (Figure 4, Figure 5, and Figure 6)

When explaining post-outcome emotions, participants referenced the situation, desires, and thoughts a similar amount regardless of prior expectations, χ^2s (1, $N = 185$) < 1.06, ps > .304.. There were age differences in referencing desires (χ^2 [3, $N = 185$] = 10.80, $p = .013$; 4- to 5-year-olds mentioned desires more than adults, Bonferroni-corrected $p = .030$) and thoughts (χ^2 [3, $N = 185$] = 22.47, $p < .001$; adults referenced thoughts more than children, Bonferroni-corrected ps < .050), but not the situation (χ^2 [3, $N = 185$] = 3.50, $p = .320$).

Prior expectations influenced participants' ability to find the bright side of an undesirable outcome: More participants in the low-expectation condition (versus high-expectation condition) expressed a positive outlook (discussing the pencil as useful, valuable, or better than an alternative outcome, χ^2(1, $N = 185$) = 6.03, $p = .014$). Inversely, more participants voiced a negative outlook (referring to the pencil as useless, valueless, or worse than an alternative outcome) after having held high versus low expectations, χ^2(1, $N = 185$) = 9.40, $p = .002$. Developmentally, positive outlooks increased with age, χ^2(1, $N = 185$) = 34.35, $p < .001$, with adults looking on the positive side more than children (Bonferroni-corrected ps < .003). Negative outlooks were age-invariant, χ^2(1, $N = 185$) = 4.68, $p = .197$.

Participants' outlook correlated with their reported affective experiences: Controlling for age and manipulated expectation, participants with a positive outlook liked the pencil more (r[181] = .50, $p < .001$, CI[.38, .60]) and felt better about it (r[181] = .51, $p < .001$, CI[.39, .61]) than did participants without a positive outlook. As well, participants with a negative outlook liked the pencil less (r[181] = −.48, $p < .001$, CI[−.59, −.36]) and had more negative emotions (r[181] = −.46, $p < .001$, CI[−.56, −.33]) than did participants without a negative outlook.

Discussion

In the current study we experimentally manipulated children's and adults' expectations to test how this impacts their future affective experiences (preferences and emotions). Six- to 10-year-olds and adults who lost the bonus prize game (low expectation; expected nothing) liked the pencil more than individuals who won the game and received the same pencil as their prize (high expectation; expected something better). Self-reported emotional reactions to getting the pencil trended (non-significantly) in the same pattern. In contrast, prior expectations did not impact 4- to 5-year-olds' pencil liking or emotions. Across age, however, manipulated expectations shaped post-outcome emotion explanations: More individuals in the low- versus high-expectation condition looked on the bright side (e.g., said the pencil was useful) and less often stated a negative outlook about the pencil, with more adults generating a positive outlook than children. Participants who expressed a positive

outlook also felt better. Compared to children, more adults referenced thoughts as causing their current emotions, and only adults consistently reasoned that their affective experiences in response to the pencil would be different had they held alternative prior expectations. Six- to 10-year-olds and adults, but not 4- to 5-year-olds, expressed greater pencil liking and positive emotions after learning that everyone got a pencil.

The Impact of Prior Expectations on Affective Experiences

According to decision affect theory (DAT; Mellers et al., 1997), high expectations carry a future emotional cost: After previously holding high expectations, people do not feel as good when something positive happens and they feel worse when something negative happens. In the current paradigm, some participants had their expectations exceeded (i.e., they lost the game and got a pencil instead of "nothing at all") and others had their expectations fall short (i.e., they won the game and got a pencil instead of one of several more attractive prizes). We examined a wide age range to provide a more complete developmental perspective on age-related differences. Although DAT focuses on emotional consequences, our findings extend this theory to broader affective reactions. That is, 6- to 10-year-olds and adults reported liking the pencil more when they had expected nothing (low-expectation condition) versus when they expected a better prize (high-expectation condition); similar, but non-significant, findings held for emotion ratings.

In contrast to DAT, our data showed that 4- to 5-year-olds disliked the pencil equivalently and felt equivalently bad post-outcome regardless of expectation condition. Potentially, the undesirability of the outcome in both conditions (i.e., losing the game or getting a terrible prize for winning) just made them too upset. Indeed, 4- to 5-year-olds disliked the pencil the most and felt the worst after playing the game than all other age groups. Young children tend to be more outcome driven than older children and adults (Gnepp, 1989; Harris et al., 2016; Lagattuta, 2005; Miller & Aloise-Young, 2018; Weller & Lagattuta, 2014), and they less often explain emotions as caused by mental states (Bamford & Lagattuta, 2012; Harris et al., 2016; Lara et al., 2019; Sayfan & Lagattuta, 2008, 2009). This occurred in our findings as well—not a single 4- to 5-year-old referenced prior expectations as a cause of their current emotional response. Thus, 4- to 5-year-olds may have been too overwhelmed by losing the game or winning an unappealing prize for their prior expectations to have had a measurable effect on how much they liked or felt emotionally about the pencil.

Still, we did find some across-age effects of prior expectations on future affective reactions. When asked to explain their emotional reaction to getting the pencil, more children and adults in the low-expectation versus high-expectation condition voiced a positive outlook on the pencil (e.g., "I could use this pencil to draw," "It's better than getting nothing!") and fewer expressed a negative outlook (e.g., "I didn't want this pencil;" "The candy was better than this pencil"). Not only did prior expectations assist children and adults in finding the bright side of an undesirable outcome, but individuals (controlling for age and expectation condition) who expressed a positive outlook (versus not) liked the pencil more and felt better about getting it. Negative outlooks were related to liking the pencil less and feeling worse. Although there have been several studies on children's causal reasoning about connections between thoughts and emotions in response to story vignettes (Bamford & Lagattuta, 2012,

Lagattuta et al., 1997; Lagattuta, 2014; Lagattuta & Wellman, 2001; Sayfan & Lagattuta, 2008, 2009; Lara et al., 2019), here we show that emotional well-being is significantly connected to how people frame an outcome (in this case, express a positive versus negative stance about an unfortunate event). Still, because participants rated their emotions before explaining the cause, we cannot be certain of the causal direction (i.e., whether the mental frame elicited the emotion or vice-versa).

Experiencing Versus Reasoning about the Impact of Prior Expectations

Lara et al. (2019) identified significant age-related improvements between the ages of 4 and 10 and from childhood to adulthood in recognizing the influence of prior expectations on characters' future emotional satisfaction as well as in explaining characters' post-outcome emotions in relation to their prior thoughts (see also Asaba et al., 2019; Doan et al., 2020). Here, we document the first evidence that prior expectations shape children's *actual* affective experiences to a low-value outcome by 6 to 7 years of age (specifically their preferences), with these connections magnifying from age 6 to 10 years and from childhood to adulthood. Adults were also more likely than children to reference their thoughts (e.g., "Because I thought I would win a better prize") as the cause of their emotions, whereas children most often referenced desire (e.g., "Because I didn't get what I wanted") or features of the outcome itself (e.g., "Because I got a pencil"). These close age parallels between third-person measures and firsthand experience suggest synergies in the developmental timetable. Foremost, they signal that 4- to 5-year-olds may not consistently take into account prior expectations on emotion reasoning measures because this may reflect their everyday reality —their own prior expectations may not regularly shape their later affective experiences. Similarly, adults expected more robust connections between expectations and emotions than did children in response to Lara et al.'s (2019) vignettes, and their prior expectations more strongly impacted their affective experiences (compared to children's) in this first-person paradigm. Adults, then, may experience such relations in their lives more frequently and more saliently than do children.

Participants also reasoned about how much they would have liked the pencil and how they would have felt receiving the pencil if they had held an alternative prior expectation (e.g., people in the high-expectation condition imagined getting the pencil after expecting no prize). Only adults anticipated that they would have liked the pencil more and felt better if they had previously held lower expectations and liked the pencil less if they had previously held higher expectations. Eight- to 10-year-olds showed awareness of this relation, but only if they were in the high-expectation condition and imagined getting the pencil as a consolation prize (i.e., their pencil liking improved from post-outcome to reasoning about the alternative prior expectation). This form of reasoning may have been particularly difficult for children because it required holding in mind current post-outcome affect while envisioning the preferences and emotions that they would have experienced had they held alternative prior expectations. This task (thinking about could-have-been *thoughts*) also contains a larger challenge than typical counterfactual tasks that require considering could-have-been *outcomes*, as children find it is easier to reason about situational versus mental causes of emotions (Harris, 2010; Kramer & Lagattuta, in press).

Implications for Emotion Regulation

Adults feel better when they think about people who fared worse and they feel worse when they consider those who fared better (Wheeler & Miyake, 1992), with some suggestive evidence in 7- to 8-year-olds (Ruble et al., 1980). We examined changes in children's and adults' affective experiences after learning that everyone had the same common fate of getting a pencil We found that 6- to 10-year-olds and adults liked the pencil more and felt better when they knew that the same outcome happened to everyone. Indeed, expectation condition differences in affective experiences disappeared for these age groups upon hearing that everyone received a pencil. In contrast, 4- to 5-year-olds experienced no increase in their preferences and emotions following "common fate" knowledge, likely because of their focus on the undesirable outcome itself (Gnepp, 1989; Lagattuta, 2005; Harris et al., 2016; Miller & Aloise-Young, 2018; Weller & Lagattuta, 2014), their lesser concern with social comparison (Ruble et al., 1980), and their weaker understanding of what was actually possible (Shtulman, 2009; younger children may not have fully grasped that it would have been impossible to have gotten something other than a pencil). Across age, however, individuals better at finding the positive in this unfavorable outcome (e.g., "I could use this pencil for lots of things") self-reported improved emotions and stronger liking of the pencil. This ability to express a positive outlook increased with age, indicating that children may benefit from coaching in finding the positive features of a situation. Indeed, Lagattuta and Kramer (2017) documented that simple verbal instruction to focus on the positive alters children's and adults' visual attention to emotional stimuli.

Although we did not detect a significant relation between expectations and post-outcome emotion ratings, more participants in the low- (versus high-) expectation condition expressed a positive outlook and fewer expressed a negative outlook about getting the pencil. This suggests that children may benefit from expectation management for regulating emotions. That is, once children are emotionally affected by their previous expectations and recognize these connections, learning how to flexibly form expectations in different kinds of situations could improve their ability to prepare for and cope with undesirable outcomes. Research with adults has pinpointed specific times where lowering expectations carries the highest advantage: When the outcome is self-relevant, when the event is uncontrollable (like in the bonus prize game), and when feedback is proximal (Carroll et al., 2006; Sweeny et al., 2006; Sweeny & Krizan, 2013). Thus, keeping expectations high until the moment of truth may maximize the duration and frequency of positive emotions (Golub et al., 2009). In making these statements, we do not advocate that children be taught to "think small" and "aim low." Indeed, children likely require careful guidance in setting and modifying expectations over time and situation. Assistance in estimating the likelihood of future outcomes and learning to lower expectations only at specific times (i.e., if the probability of a negative event is high and that outcome is proximal and uncontrollable) could be helpful to children, especially as they transition to middle childhood and beyond.

Limitations and Future Directions

In contrast to 6- to 10-year-olds' and adults' beliefs about the influence of expectations on future emotions in third-person tasks (Lara et al., 2019), the actual *experience* of the biasing impact of prior expectations was more subtle. That is, whereas in Lara et al. (2019) 6- to 10-

year-olds and adults inferred that prior expectations carry substantial weight in determining post-outcome emotions (e.g., they judged high expectations to cause intense disappointment when outcomes were negative), firsthand experiences revealed more dampened connections (e.g., high expectations caused more mild disappointment). Although in some cases, children need to experience some emotions (e.g., regret) several times before being able to reason about them (Weisberg & Beck, 2010), prior studies have shown that people's actual affective experiences are not as intensely emotional as they forecast them to be (Christner et al., 2020; Gautam et al., 2017; Kramer & Lagattuta, 2018; Wilson & Gilbert, 2003). Here, we extend this affective forecasting research to show that 6- to 10-year-olds and adults may also hold a more exaggerated view about how much prior expectations can influence future emotions. Indeed, the effect sizes in the third-person reasoning task of Lara et al. (2019) were much larger than those in the current study testing first-person relations. Future work comparing children's and adults' third-person emotion judgments with their first-person emotion experiences are needed.

There may be ways to modify procedures to enable even younger children's preferences and emotions to be affected by their prior expectations. For example, Asaba et al. (2019) and Doan et al. (2020) found that 4- to 5-year-olds can reason about expectation-emotion connections in highly scaffolded third-person paradigms with concrete probability information and detailed expectation illustrations (e.g., a gumball machine with mostly yummy gumballs). Potentially, turning these sorts of paradigms into first-person tasks and providing children with pictorial expectation reminders could lead younger children's affective experiences to be biased by their prior expectations. Additionally, making the low-value "prize" more appealing than a pencil (e.g., small piece of candy), or experimentally inducing low expectations with a less negative event than losing a game might allow younger children's prior expectations to influence their post-outcome affective reactions more strongly. Moreover, although we have provided several explanations for the weaker impact of prior expectations on younger (versus older) children's affective experiences (e.g., younger children focus more on objective outcomes versus mental states, less often experience expectation-preference or expectation-emotion connections in their everyday lives, became too upset from losing), future work is needed to elucidate whether one of these accounts is the most viable or if they work in tandem to produce age-related differences.

We included preference ratings along with emotion judgments to expand the scope of decision affect theory. Six- to 10-year-olds' and adults' preferences were influenced by prior expectations, but their emotion ratings failed to reach statistical significance. Still, the emotion-rating pattern mirrored that of participants' preference ratings, and the effect sizes for the Age x Expectation x Timing interactions were also similar (i.e., $\eta\rho^2 = .03$ for emotions; $\eta\rho^2 = .04$ for preferences). Judgment type differences may have occurred because the preference scale had a greater number of scale points (preferences: −5 to +5 versus emotions: −3 to +3), and it forced participants to make a non-neutral preference judgment. Future studies, with identical preference and emotion scales, additional open-ended questions, with larger sample sizes and enhanced power, are needed to provide clarity on any potential distinctions between preferences and emotions when it comes to the impact of expectations over time.

Conclusion

Humans spend substantial time predicting what will happen next. These forecasts can be for benign events (e.g., I will win this game) and for more life-altering situations (e.g., I will not get the job). Because the future is unknown, every person will be wrong in their expectations at times. People's predictions are fascinating, in part, because their level of accuracy shapes emotional well-being. The current study reveals that by 6 to 7 years, individuals with prior low expectations report a stronger preference for a low-value object (a pencil) than those who previously held high expectations. Across age, more participants with prior low (versus high) expectations also expressed a positive outlook when explaining their post-outcome emotions (e.g., commented on the pencil's usefulness). Whereas the field of positive psychology stresses the importance of looking on the bright side (Seligman & Csikszentmihalyi, 2000), we show that this way of thinking can, at times, dampen future affective experiences. In conjunction with work on children's third-person reasoning about expectation-emotion connections (Asaba et al., 2019; Doan et al., 2020; Lara et al., 2019), we provide avenues for future research that will aid in developing age-appropriate ways of managing thoughts, preferences, and emotions over time.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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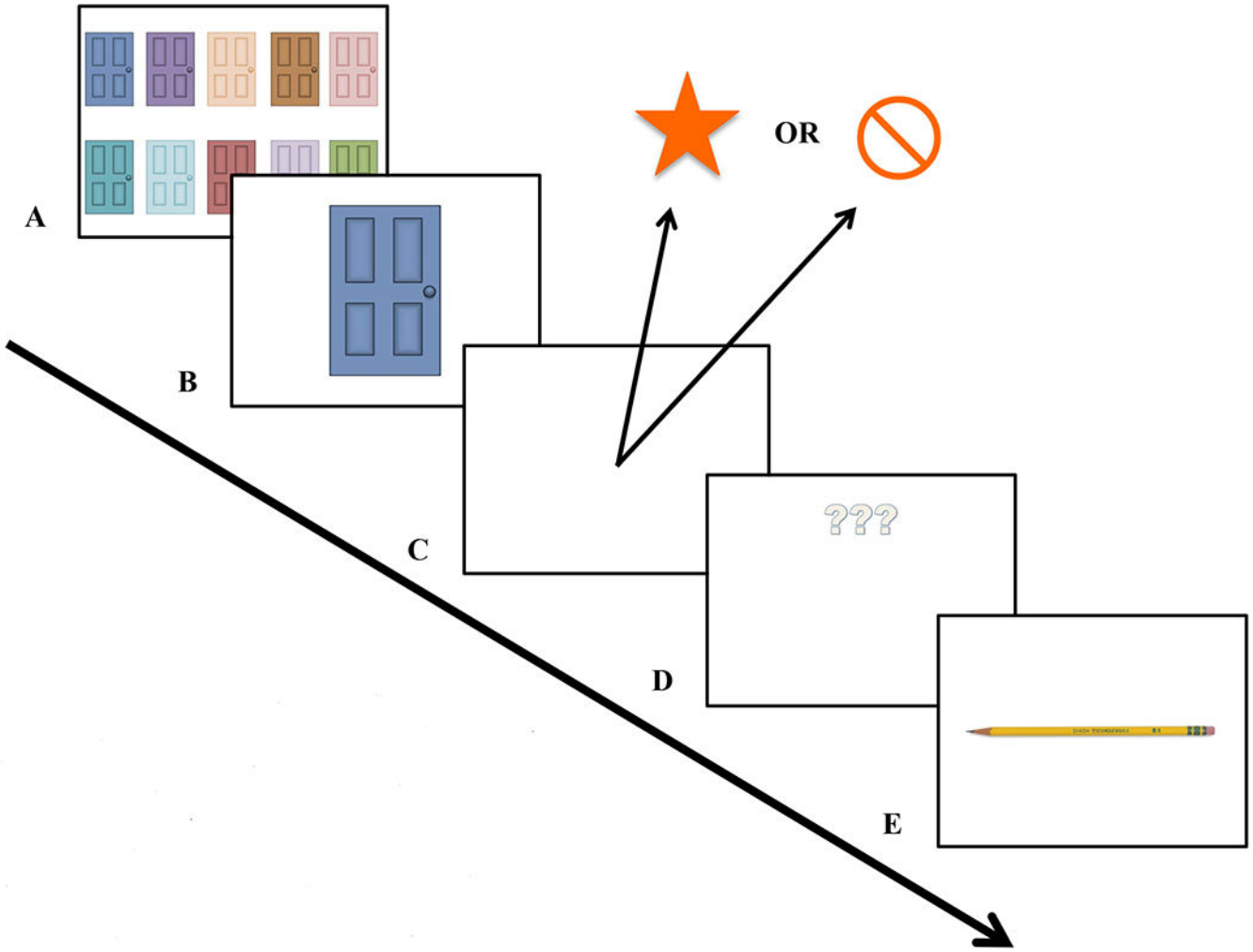

Figure 1.

Schematic of Bonus Prize Game. A=Participant sees 10 doors. B=Participant selects one door (e.g., the blue door). C=Participant learns game outcome. High-expectation=star icon paired with the computer saying, “Congratulations! You picked a winning door!” Low-expectation=prohibition icon paired with the computer saying, “Sorry! You did not pick a winning door.” D=Participant waits for 45 seconds. E=Participant learns that they will get a pencil.

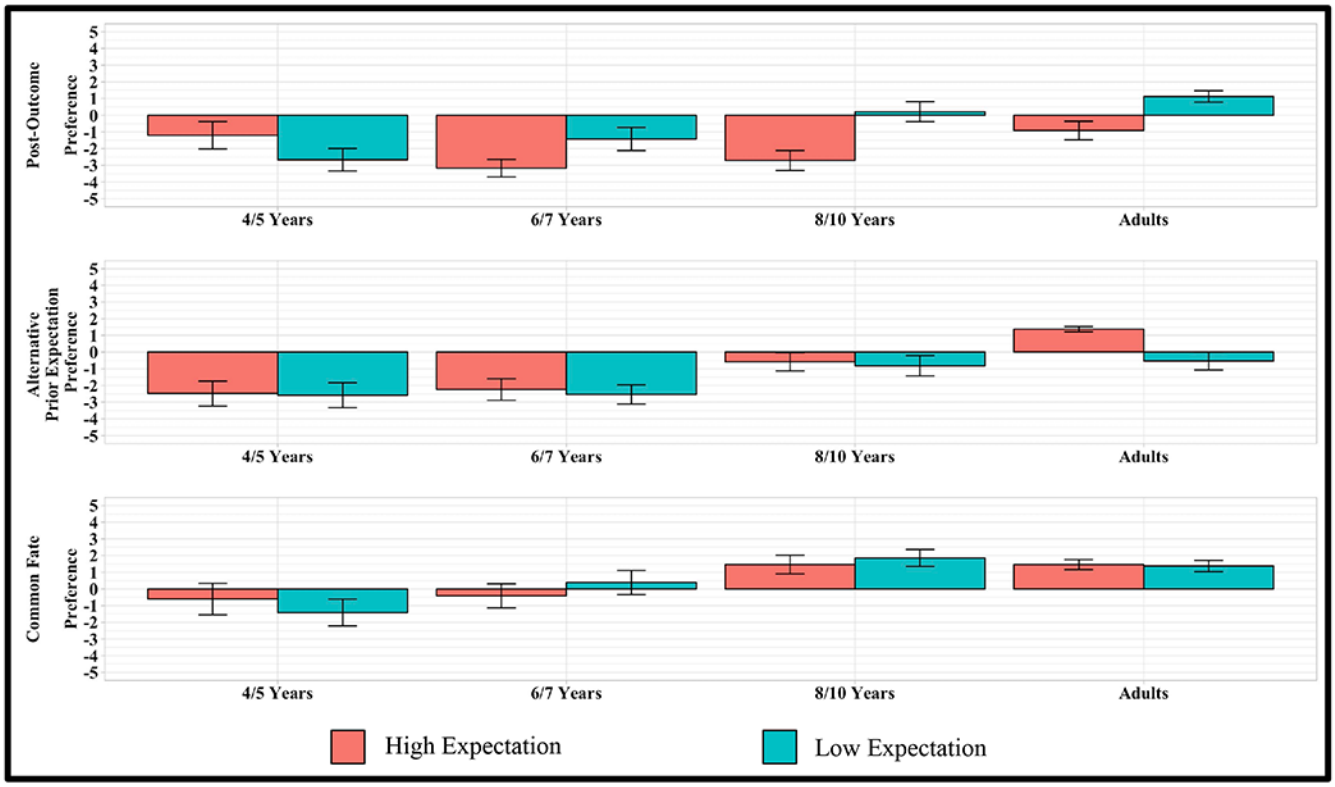

Figure 2.

Average Preference Rating by Age, Expectation, and Timing. Error bars represent standard errors. Preference ratings range from −5 (dislike a lot) to 5 (like a lot). Post-outcome Preference = Preference judgments after finding out that they get a pencil as a prize. Alternative Prior Expectation Preference = Preference ratings when imagining initially holding opposite expectations. Common Fate Preference = Preference ratings after they learned that everyone received the same prize. To compare between-subjects differences look within each row. To compare within-subjects changes look across the rows.

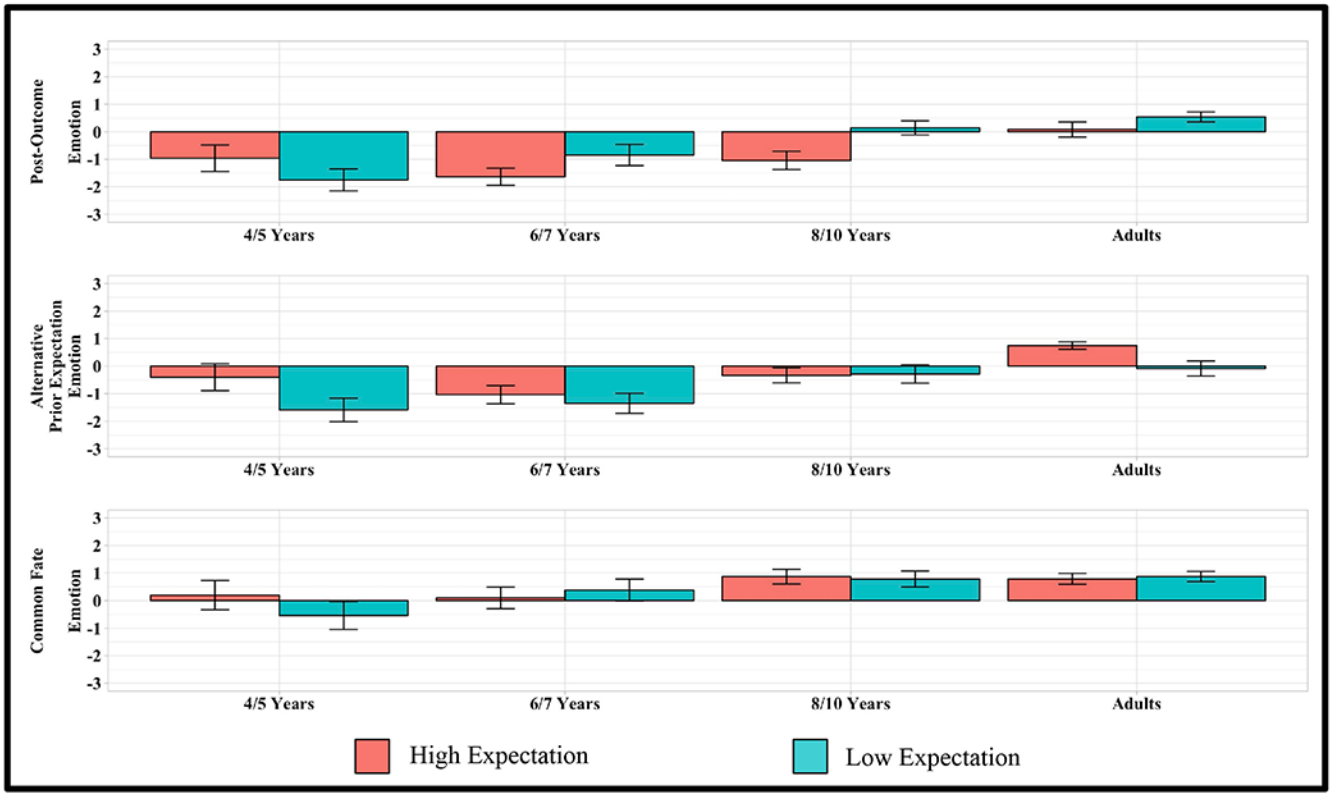

Figure 3.

Average Emotion Rating by Age, Expectation, and Timing. Error bars represent standard errors. Emotion ratings range from −3 (very bad) to 3 (very good). Post-outcome Emotion = Emotion judgments after finding out that they get a pencil as a prize. Alternative Prior Expectation Emotion = Emotion ratings when imagining initially holding opposite expectations (high vs. low). Common Fate Emotion = Emotion ratings after they learned that everyone received the same prize. To compare between-subjects differences look within each row. To compare within-subjects changes look across the rows.

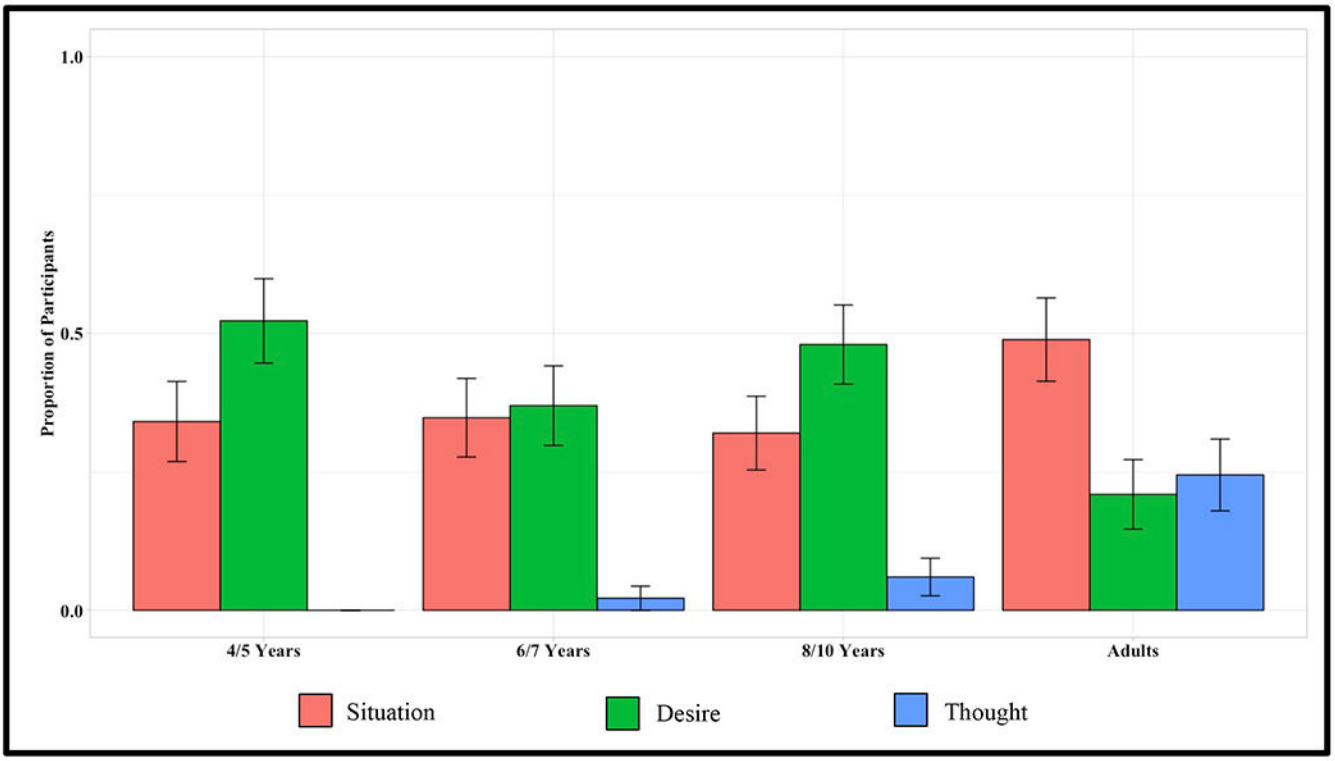

Figure 4.

Proportion of Participants Who Referenced Each Explanation Type by Age. Error bars represent standard errors. Situation = Reference to situation, but not desire or thoughts. Desire = Reference to desires, but not thoughts. Thoughts = Reference to Thoughts. Note that 10% of participants did not reference the situation, desires, or thoughts.

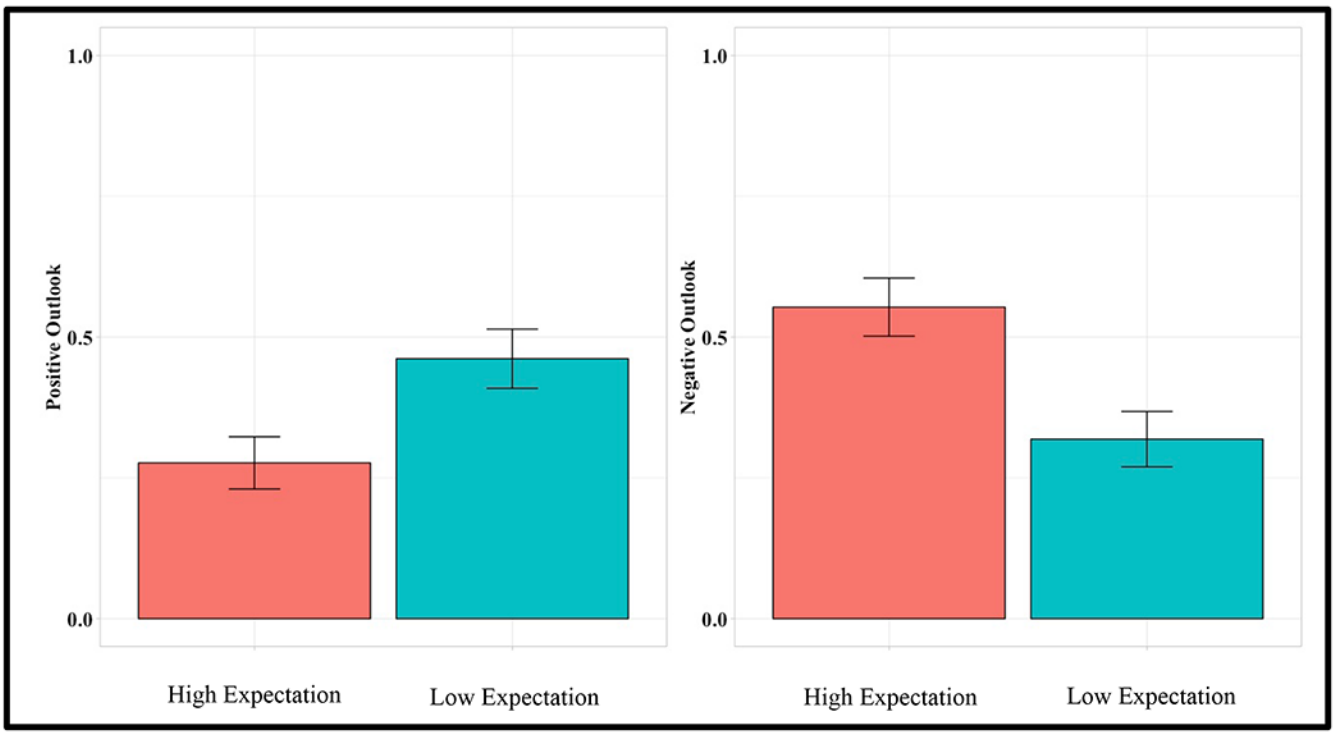

Figure 5.

Proportion of Participants Who Expressed Positive (left panel) and Negative (right panel) Outlooks by Expectation. Error bars represent standard errors. Positive outlook = Describing the pencil as useful, valuable, or better than an alternative outcome. Negative outlook = Describing the pencil as useless, valueless, or worse than an alternative outcome. Note that some participants (30%) voiced neither negative nor positive outlooks (e.g., “Because it’s a pencil.”), and some participants (5%) referenced both (e.g., “It’s not the best prize, but it’s a good prize.”).

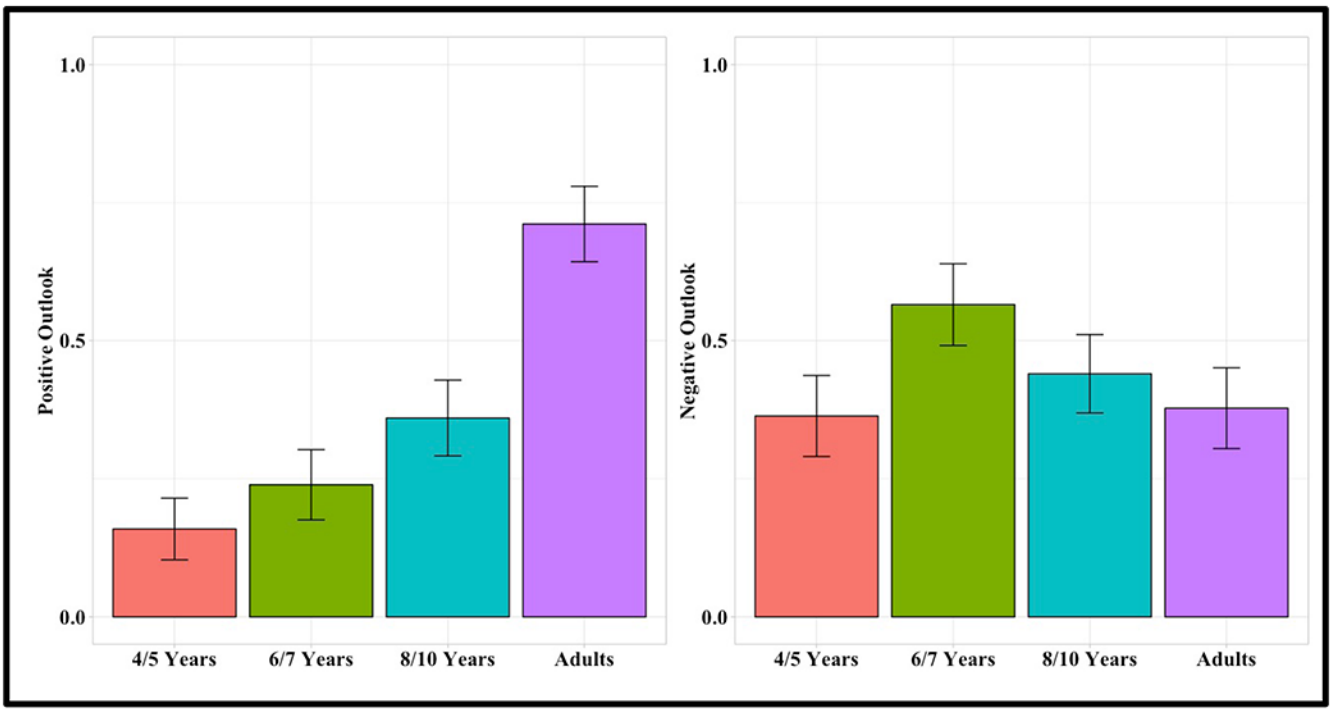

Figure 6.

Proportion of Participants Who Had Positive (left panel) and Negative (right panel) Outlooks by Age. Error bars represent standard errors. Positive outlook = Describing the pencil as useful, valuable, or better than an alternative outcome. Negative outlook = Describing the pencil as useless, valueless, or worse than an alternative outcome. Note that some participants (30%) voiced neither negative nor positive outlooks (e.g., "Because it's a pencil."), and some participants (5%) referenced both (e.g., "It's not the best prize, but it's a good prize.").

Table 1.

Preference and Emotion Ratings by Age and Expectation

	4/5 Years		6/7 Years		8/10 Years		Adults		Total		
	High	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**All**
Preliminary											
Non-pencil Prize Wanted Most	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	(0.20)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.10)	(0.00)	(0.07)
Game Win Expected	0.88	0.75	0.70	0.81	0.50	0.68	0.71	0.67	0.70	0.73	0.71
	(0.33)	(0.44)	(0.47)	(0.40)	(0.51)	(0.48)	(0.46)	(0.48)	(0.46)	(0.45)	(0.45)
Non-pencil Prize Expected	1.00	1.00	0.90	0.96	0.71	0.89	0.88	0.83	0.87	0.92	0.90
	(0.00)	(0.00)	(0.31)	(0.20)	(0.46)	(0.31)	(0.34)	(0.38)	(0.33)	(0.27)	(0.30)
Preferences											
Pre-outcome	−3.12	−2.50	−2.90	−2.11	−2.63	−2.21	−1.92	−1.33	−2.66	−2.05	−2.36
	(3.59)	(3.22)	(2.67)	(3.17)	(2.32)	(2.47)	(2.24)	(2.65)	(2.76)	(2.87)	(2.82)
Post-outcome	−1.20	−2.67	−3.17	−1.42	−2.71	0.21	−0.92	1.13	−2.06	−0.67	−1.37
	(4.08)	(3.32)	(2.89)	(3.51)	(2.94)	(3.19)	(2.72)	(1.68)	(3.30)	(3.32)	(3.37)
Alternative Prior Expectation	−2.48	−2.58	−2.23	−2.54	−0.58	−0.82	1.38	−0.54	−1.07	−1.61	−1.34
	(3.72)	(3.63)	(3.54)	(2.90)	(2.67)	(3.23)	(0.77)	(2.60)	(3.30)	(3.21)	(3.26)
Common Fate	−0.60	−1.42	−0.41	0.38	1.46	1.86	1.46	1.38	0.42	0.60	0.51
	(4.70)	(3.92)	(3.90)	(3.69)	(2.72)	(2.70)	(1.47)	(1.69)	(3.55)	(2.32)	(3.43)
Emotions											
Pre-outcome	−1.72	−1.00	−1.30	−1.00	−1.08	−0.89	−0.33	−0.13	−1.13	−0.76	−0.95
	(1.77)	(2.21)	(1.56)	(1.77)	(1.44)	(1.37)	(1.01)	(1.39)	(1.54)	(1.72)	(1.64)
Post-outcome	−0.96	−1.75	−1.63	−0.85	−1.04	0.14	0.08	0.54	−0.93	−0.46	−0.70
	(2.41)	(1.96)	(1.71)	(1.95)	(1.63)	(1.35)	(1.35)	(0.88)	(1.90)	(1.81)	(1.86)
Alternative Prior Expectation	−0.40	−1.58	−1.03	−1.35	−0.33	−0.29	0.75	−0.08	−0.30	−0.81	−0.55
	(2.45)	(2.08)	(1.79)	(1.85)	(1.34)	(1.74)	(0.68)	(1.35)	(1.80)	(1.87)	(1.85)
Common Fate	0.20	−0.54	0.10	0.38	0.88	0.79	0.79	0.88	0.46	0.39	0.43
	(2.66)	(2.48)	(2.16)	(2.06)	(1.30)	(1.52)	(0.98)	(0.90)	(1.92)	(1.89)	(1.90)

Note. Numbers represent mean scores with standard deviations shown in parentheses. For preliminary results, mean scores also represent the proportion of participants who followed the pattern. High = High expectation. Low = Low expectation. All = Expectations and age combined. Non-pencil Prize Wanted Most = Wanting any prize more than the pencil (scored 0 to 1 [no, yes]). Pre-game Expectation = Expectation of winning or losing (scored 0 to 1 [lose, win]). Non-pencil Prize Expected = Expectation of winning a prize other than the pencil (scored 0 to 1 [no, yes]). Preferences = −5 (dislike a lot) to 5

(like a lot). Emotions = −3 (very bad) to 3 (very good). Post-outcome = Judgments after finding out that they get a pencil as a prize. Alternative Prior Expectation = Ratings when imagining initially holding opposite expectations (high vs. low). Common Fate = Ratings after they learned that everyone received the same prize.