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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 48(0)

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Publication Date

2026

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Is It Better Not to Know?: Adults' and Children's Understanding of How Uncertainty Affects Emotion Over Time

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Abstract

How would you predict someone's feelings over time while awaiting an important decision? Would they feel better not knowing compared to receiving unfavourable news? Here we investigated adults' and 5–8-year-olds' (n = 35 / age group) ability to infer how others' emotions change over time in certain and uncertain contexts. Participants saw stories about protagonists receiving positive, negative, or uncertain news and rated their feelings immediately, and after one, two, and four weeks. Following certain outcomes, adults judged strong initial reactions that attenuated over time, whereas following uncertain outcomes, they judged reactions as initially mild but increasingly negative over time. Children showed a developmental progression toward this pattern, with 5.5-year-olds beginning to exhibit adult-like responses for certain outcomes and 6-year-olds for uncertain outcomes. These findings suggest that adults and children construe emotions as dynamic states shaped by what is known and unknown, with this capacity emerging around ages 5–6.

Keywords: emotion understanding; uncertainty; temporal reasoning; social cognition; intuitive theories; children

Introduction

Imagine that you recently referred a close friend for a position within your company and you found out that they got rejected. Would you break this bad news to them immediately on finding out, or withhold it in the hope of protecting their feelings? People often face this dilemma when sharing bad news with their loved ones, and their decisions are shaped by how they anticipate the recipient will feel—both in the moment and over time. How well do people understand the emotional impact of uncertainty compared to a known negative outcome? Further, how does this intuition about others' emotions develop across childhood?

Prior work has examined how adults' first-person emotional experiences unfold over time in response to uncertain events. This research suggests that uncertainty about the valence of an outcome can, in some cases, be psychologically more distressing in the long run compared to certain, negative events. For example, during predictive testing for Huntington's disease, although receiving a negative result (i.e., increased risk for the disease) increases distress initially, this distress ultimately diminishes over time. In contrast, receiving an uncertain result (i.e., the test was inconclusive) is linked with greater depression and lower well-being 12 months after testing (Wiggins et al., 1992). Similarly, studies examining adults' emotions in response to uncertainty in the context of diagnostic testing for breast cancer reveal clinical levels of anxiety and depression in patients while waiting for biopsy results (Lampic et al., 2001; Pineault, 2007; Poole et al., 1999), and patients report that the uncertainty during the waiting period is more distressing than the cancer diagnosis itself (Lebel et al., 2003; Nosarti et al., 2002). Further supporting these findings, research has also found that uncertainty is correlated with other constructs of emotion such as worry, anxiety, and depression (Buhr & Dugas, 2002) and that reducing uncertainty can improve adaptation in new environments (Gao & Gudykunst, 1990). Beyond uncertainty about outcome valence, other work suggests that uncertainty about the details of known, positive outcomes can also shape emotional experiences (Bar-Anan et al., 2009; Wilson et al., 2005). For example, after receiving a dollar coin as a random act of kindness, participants reported a longer-lasting positive mood when it was accompanied by a vague message compared to receiving it along with a clear message indicating the organization responsible for the gift (Wilson et al., 2005). This indicates that unresolved uncertainty about the *details* of a positive event can prolong emotional responses.

To explain these affective responses, Wilson and Gilbert (2008) proposed the AREA model of affective adaptation (Attend, React, Explain, Adapt). According to this framework, people attend and react intensely to inexplicable events, try to explain them, and ultimately adapt to them if they are able to reach an understanding, resulting in less attention and weaker affective reactions over time. In contrast, emotional reactions linger when people mentally engage with the event, especially when trying to assign meaning to it. Therefore, when a positive event involves unknown details (e.g.,Wilson et al., 2005), this uncertainty can impede explanation and prolong the initial pleasure it elicits. Further, in cases such as diagnostic testing (e.g., Wiggins et al., 1992), where people face a more fundamental uncertainty—whether the outcome will be positive or negative—it may hinder the explanation process altogether, resulting in mixed or even negative emotions.

Although the current literature sheds light on adults' first-person *emotional experiences* in response to uncertainty, far less is known about adults' and children's intuitive theory of how uncertainty shapes emotions over time. Specifically, first-person accounts in past research often involve participants simply reporting their current emotional states. In contrast, an intuitive theory of emotion involves abstract reasoning—predicting and explaining emotions that go beyond one's im-

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mediate feelings (Doan et al., 2025; Pons & Harris, 2019; Ruba & Pollak, 2020). Such intuitive theory is a core component of social cognition, enabling people to anticipate their own and others' emotions, thereby supporting effective decision making, planning, and social relationships.

Research with adults has only examined adults' prediction of their own emotions (i.e., affective forecasting), showing that people often fail to anticipate how uncertainty can slow adaptation and extend emotional experiences. For example, Kurtz et al. (2007) asked participants to predict how they would feel if they received one or both of their desired prizes, or remained uncertain about which one of the two they won. While participants' positive mood lasted longer under uncertainty compared to winning one or both prizes, they failed to anticipate this effect in their predictions. These systematic forecasting errors highlight a gap in people's intuitive theory of how uncertainty shapes emotional experience over time.

Research with children has primarily examined their predictions of others' emotions over time for *certain* outcomes (Harris et al., 1985; Kramer et al., 2024). Across four experiments, Harris et al. (1985) told children stories about protagonists experiencing positive (e.g., receiving a bicycle) or negative (e.g., bicycle getting stolen) events and asked them to rate the protagonist's feelings at different points during the day using a 5-point emotion scale. It was found that 6, but not 4-year-olds, successfully judged an initially intense emotional reaction, positive or negative, to gradually wane over time. This was true even for children's reactions to emotional events recalled from their own lives. Moreover, with stringent training in the use of the rating scale and comprehension check questions, the waning trend also emerged among 4-year-olds. These findings provide evidence that between ages 4 and 6, children start to understand emotions as dynamic states that evolve with time in events with known, certain outcomes, with this capacity becoming increasingly robust with development.

To our knowledge, no work has looked at children's intuitive understanding of how emotions unfold following uncertain outcomes, despite evidence that children understand uncertainty itself (Fay & Klahr, 1996; Lagattuta & Sayfan, 2011; Moore et al., 1989; Pillow, 2002; Pillow & Anderson, 2006; Pillow et al., 2000). For example, Fay and Klahr (1996) examined children's ability to distinguish between determinate and indeterminate problems (i.e., problems with certain versus uncertain solutions) by presenting them with two boxes containing construction pieces, and a pre-assembled object. For determinate problems, only one box contained the pieces required to make the target object, whereas for indeterminate problems, both boxes did. Children were asked to identify the box used to make the target object. Around ages 4–5, children could distinguish between determinate and indeterminate problems and readily acknowledge that they could not provide a response for the latter. Around the same age, children are also sensitive to uncertainty in others. For example, Moore et al. (1989) presented children with two boxes, with one containing candy. In each trial, children saw two puppets making statements like "I know (or think or guess) that the candy is in this box", and based on the statement, children had to find the box containing the candy. Between 4–5 years, children increasingly differentiated the term "know" from "think" and "guess", suggesting an awareness that the term "know" indicates a higher level of certainty than the other two. Moreover, by 8–9 years of age, children can also reliably predict a puppet to be more certain of a toy's colour if the puppet looked directly at the toy or made an inference compared to simply guessing (Pillow et al., 2000). Together, these findings suggest that children can not only predict their own and others' uncertainty across different tasks but also display an increasing awareness of the lexicon used to express uncertainty.

The most relevant evidence looked at children's understanding of how uncertainty affects emotion, without considering how the influence might unfold over time (Lagattuta, 2007; Lagattuta & Kramer, 2021; Lagattuta & Sayfan, 2011). For instance, Lagattuta and Sayfan (2011) presented children with stories about a character encountering an unknown agent and asked them to predict the likelihood of something good or bad happening. They also rated the character's emotions on a 6-point scale ranging from very worried to very happy. Given the ambiguity of the situation, ratings near the center of the scale (e.g., a little happy or worried) reflected higher awareness of uncertainty, whereas endpoint ratings (e.g., very happy or worried) reflected greater certainty. Younger children tended to provide more endpoint ratings, but with age, responses increasingly shifted towards to the center of the scale, indicating greater sensitivity to future uncertainty in ambiguous social situations. What remains unclear is how this understanding of uncertainty informs children's reasoning about emotional dynamics—specifically, how emotions unfold over time when outcomes are uncertain.

To address these gaps, the current study investigated adults' and children's ability to infer how others' emotional states change over time in response to certain and uncertain events. We tested adults' and 5- to 8-year olds' predictions of other people's emotional reactions to receiving positive, negative, and uncertain news. We chose this age range for children because prior research provides evidence that by at least 5 years of age children have some basic understanding of the influence of time on emotional intensity for events with known outcomes (Harris et al., 1985) and the mental state concept of uncertainty (Kramer et al., 2024; Moore et al., 1989). This range is also broad enough to capture both the emerging ability in children and the developmental change across conditions.

In two preregistered experiments, participants saw stories about someone awaiting their selection in a team (e.g., a lead role in a play, soccer team, and swim team). Using a within-subjects design, we manipulated whether the protagonist received positive (i.e., selected), negative (i.e., not selected), or uncertain news (i.e., the decision maker was away). Participants used a 7-point emotion scale to rate the protagonists' feelings at the time of hearing the news (zero weeks), and again after one, two and four weeks. We examined whether partic-

ipants' emotion inferences differed based on the certainty or uncertainty of the news and the amount of time elapsed.

We predicted that adults would take into account the temporal dynamics of emotional intensity when making inferences about others' feelings, with 5- to 8-year-old children showing a developmental increase in this ability. Specifically, in the certain conditions, we expected that regardless of the valence, adults would judge the protagonist to feel more intensely at the moment of hearing the news, followed by a decline in emotional intensity over time, consistent with the AREA model (Wilson & Gilbert, 2008). However, in the uncertain condition, we predicted that adults would show a pattern similar to their first-person experiences in response to uncertainty (Wiggins et al., 1992): they would judge the protagonist to initially feel relatively okay upon hearing uncertain news, followed by an increase in negative feelings over time. Among children, we expected an age-related shift, with older children showing more adult-like response patterns in both certain (replicating prior work; Harris et al. 1985) and uncertain conditions, reflecting a growing understanding of temporal dynamics and the adverse emotional impact of uncertainty. Both experiments were preregistered (Experiment 1: https://aspredicted.org/se76pp.pdf; Experiment 2: https://aspredicted.org/sf3ua5.pdf).

Experiment 1: Adults

Method

Participants We recruited 35 adults (M_{Age}=41.89 years; range: 18–62 years; 17 females; 18 males) via an online platform called *Prolific*. Participants were from the United States and reported their race/ethnicity as White (n=21), Asian or Asian American (n=2), Black or African American (n=5), Hispanic, Latino or Spanish origin (n=2), Middle Eastern or North African (n=1), or multi-racial (n=4). As preregistered, we tested but replaced 1 additional participant with a mean score below 0.75 on the calendar warm-up trials.

Procedure Participants completed an online experiment[1] on *Qualtrics*. The experiment began with a two-part warm-up phase to familiarize participants with symbols used in the test stories. This warm-up was included to maintain consistency with the child version of the task in Experiment 2.

In the first part, we introduced participants to the calendar symbols used in the stories to depict the passage of time. We used four labeled calendars representing "0 weeks (today)", "1 week", "2 weeks", and "4 weeks", each with a circle marking the current day and crosses to mark the number of weeks that had passed. To illustrate how objects change over time, we paired these calendars with images of bananas at different stages of ripeness: fresh and yellow, with tiny brown spots, with lots of brown spots, and very brown and mushy. Participants then read a short story about a child buying a fresh and yellow banana and completed two warm-up trials. On each trial, they were shown either the 1-week or 4-week calendar and asked, "After one/four week(s), how does the banana look?" They then selected the banana image that best corresponded to the week shown on the calendar.

In the second part of the warm-up, participants were introduced to a 7-point emotion scale depicting, from left to right, "very very sad," "pretty sad," "a little bit sad," "just okay," "a little bit happy," "pretty happy," and "very very happy." They were first told the emotion represented by each face and were then asked to identify three specific emotion faces ("very very sad", "just okay", and "a little bit happy") in a random order. For example, on one trial, participants answered the prompt "Which of the faces show feeling just okay?" by selecting the corresponding face on the scale.

For both the calendar and emotion-scale warm-up trials, incorrect responses prompted a reminder of what the selected option represented, followed by a second attempt. Participants received 1 point for a correct first response, 0.5 for a correct second response, and 0 if both were incorrect.

Next, participants completed the test phase, which consisted of three stories presented as image sequences with one-line text descriptions (see Figure 1). Participants were informed that their responses would be compared with those of children aged 5–8 to examine the development of the ability tested, and that the protagonists in the stories were in the same age range. The protagonists were depicted without facial features to avoid conveying emotional cues. In each story, the protagonists were awaiting the outcome of a school team selection. For example, in one story featuring a protagonist named Kathy, participants read that she wanted to be selected for her school soccer team for a tournament coming up in 5 months. Participants then read that Kathy had completed the tryout and was awaiting the decision. Subsequently, she received either positive (i.e., selected), negative (i.e., not selected), or uncertain news (i.e., the decision maker was away). Participants completed four test questions in which they rated how the protagonist would feel immediately after hearing the news (0 weeks) and after 1, 2, and 4 weeks of hearing the news using the same 7-point emotion scale as in the warm-up phase.

Each story featured a different protagonist awaiting selection for an activity (Kathy for a soccer team, Sally for a play, and Sam for a swim team). Each story had three possible outcomes: positive, negative and uncertain. Participants viewed all three stories, with outcomes randomly assigned such that each outcome appeared exactly once per participant. The order of the stories was randomized.

Results and discussion

We first analyzed participants' performance on the warm-up trials, which was near ceiling (all accuracies $\geq .96$).

Next, following our preregistered analysis plan, we used a mixed-effects model to analyze participants' emotion ratings in the test phase. The model included outcome (positive, negative, and uncertain), time (0, 1, 2, and 4 weeks; numerical), and their interaction as fixed effects. We used a maximal random

[1]Adult Experiment link: https://utorontopsych.az1.qualtrics.com/jfe/form/SV_8Akyib69ClsmFXU

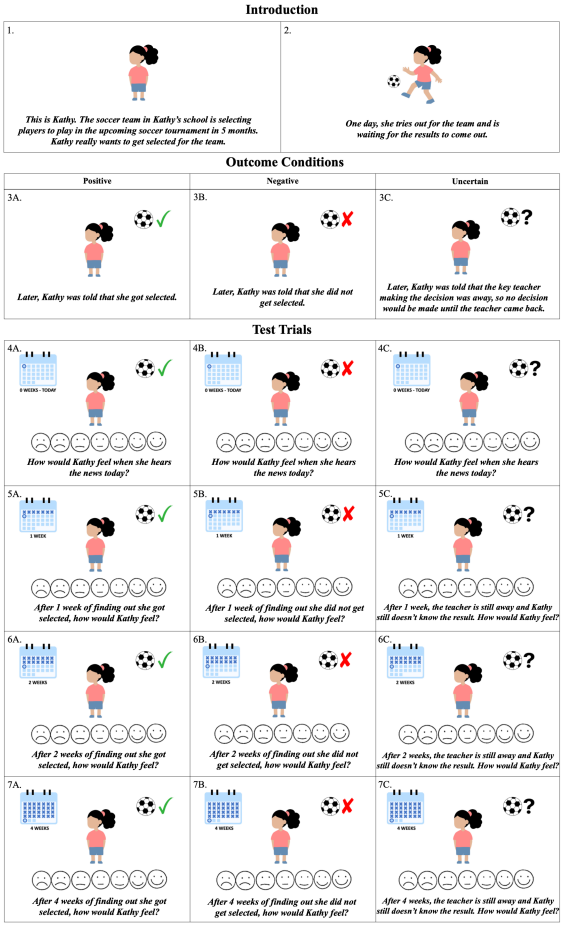

Figure 1: Sample stimuli for experimental procedure. First, participants were introduced to a protagonist awaiting their selection in a team (images 1 and 2). Next, they saw one of the outcome conditions (image 3) where the protagonist heard either positive (version A), negative (version B) or uncertain news (version C). Finally, they rated how the protagonist would feel immediately (0 weeks) and after 1, 2, and 4 weeks of hearing the news (images 4–7; versions A, B or C).

effect structure where random intercepts and random slopes of outcome, time, and their interaction were all fit by subject, resulting in the final model: `Rating ~ Outcome * Time, random = ~ Outcome * Time | SubID`. The findings revealed no main effect of time ($F\left(1,380\right) = 2.59$, $p = .109$), but a significant effect of outcome ($F\left(2,380\right) = 422.89$, $p < .001$), and an outcome×time interaction ($F\left(2,380\right) = 141.67$, $p < .001$).

We examined this interaction by looking at the effect of time for each outcome, using the model: `Rating ~ Time, random = ~ Time | SubID`. For positive outcomes, there was a significant decrease in emotion ratings with time ($\beta = -.40$, $t\left(104\right) = -8.21$, $p < .001$), suggesting less intense positive reactions over time. For negative outcomes, participants' emotion ratings increased with time ($\beta = 0.57$, $t\left(104\right) = 12.39$, $p < .001$), suggesting less intense negative reactions as time passed. For uncertain outcomes, there was a significant change in emotion ratings from initially mild to increasingly negative emotions over time ($\beta = -.19$, $t\left(104\right) = -2.90$, $p = .005$). Together, these results are consistent with our predictions that adults expected strong immediate reactions to certain outcomes that then waned, but relatively mild initial reactions to uncertain outcomes that gradually became more negative. See Figure 2A.

Experiment 2: 5- to 8-year-olds

Method

Participants We recruited and tested 140 children aged 5–8 (M_{Age}= 7.03 years; range: 5.01–8.99; 74 males, 65 females, 1 undisclosed) via *Children Helping Science* (formerly *Lookit*; Scott et al., 2017), with 35 children per age group (5-year-olds: M_{Age}=5.57, range=5.01–5.99; 6-year-olds: M_{Age}=6.47, range=6.07–6.99; 7-year-olds: M_{Age}=7.53, range=7.03–7.99; 8-year-olds: M_{Age}=8.53, range=8.04–8.99).

We preregistered both data-level and subject-level exclusion criteria. Based on these, we excluded 13 data-points from our final sample due to parental/sibling interference (n=6) and participant inattention (n=7). Moreover, we tested but replaced 36 additional children for having a prior diagnosis (e.g., autism spectrum disorder, speech delays; n=7), technical issues (n=5), parental/sibling interference on half or more test trials (n=1), and having a mean score below 0.75 on the calendar (n=8) or emotion scale (n=12) warm-up trials or both (n=3)[2]. Parents reported their children's race/ethnicity as White (n=80), Asian (n=23), Black or African American (n=3), Hispanic, Latino or Spanish origin (n=4), Middle Eastern or North African (n=1), American Indian or Alaska Native (n=1), multi-racial (n=21), or undisclosed (n=7).

Procedure Children participated remotely via *Children Helping Science* in an unmoderated, self-paced session. Parents or legal guardians provided verbal consent, followed on-screen instructions to set up the study and situated children in front of the webcam.

The experiment followed the adult version in Experiment 1 with small modifications to accommodate child participants. Specifically, instead of one-line text descriptions, all scripts were pre-recorded and played as children progressed through the task. When required, animations or visual highlights directed children's attention to relevant elements. For example, animations guided children through each calendar in the warm-up phase, and a green box highlighted the corresponding facial expression when its label was mentioned.

Results and discussion

We followed the same approach as Experiment 1 to analyze children's responses. Children's performance on the warm-up

[2]We conducted a supplementary robustness check by including participants excluded due to their performance on the warm-up trials back in the analysis. The overall pattern of results across all conditions and age groups remained robust.

trials was near ceiling (all accuracies $\geq .95$), suggesting that they understood the task instructions and response formats.

To examine the developmental change in children's emotion ratings in the test phase, we added age (continuous, centered) as a fixed effect to the model from Experiment 1. Following our preregistration, we first attempted a maximal random effects structure, but simplified the random effects because the model failed to converge. The final converged model was: `Rating ~ Outcome * Time * Age, random = ~ Outcome | SubID`. The model revealed no significant effect of age ($F\left(1,138\right) = .34$, $p = .559$), or outcome×age interaction ($F\left(2,1514\right) = 1.88$, $p = .153$), but significant effects of outcome, time, outcome×time interaction, time×age interaction, and a three-way outcome×time×age interaction (all $ps \leq .004$). As preregistered, we next probed the three-way interaction by examining the effects of time and age within each outcome, and then further splitting the analyses by age.

For positive outcomes, there were significant effects of time ($\beta = -.27$, $t\left(413\right) = -5.96$, $p < .001$), age ($\beta = .28$, $t\left(137\right) = 3.44$, $p < .001$), and their interaction ($\beta = -.10$, $t\left(413\right) = -2.48$, $p = .013$). When split by age group (preregistered), the effect of time was significant for age 5 ($p = .031$), not for age 6 ($p = .938$), and significant again for ages 7 and 8 ($ps < .001$). Since binning age imposes arbitrary cutoffs, we conducted an exploratory analysis by treating age as a continuous variable; a Johnson–Neyman test indicated that the effect of time became significant at approximately 5.66 years.

For negative outcomes, there was no main effect of age ($\beta = -.12$, $t\left(137\right) = -1.60$, $p = .111$), but there was a significant effect of time ($\beta = .26$, $t\left(413\right) = 5.37$, $p < .001$) and a marginal time×age interaction ($\beta = .07$, $t\left(413\right) = 1.69$, $p = .093$). Follow-up analyses by age group showed a significant effect of time for age 5 ($p = .004$), not for age 6 ($p = .563$), and significant again for ages 7 and 8 ($ps \leq .008$). Treating age as continuous, a Johnson–Neyman test indicated that the effect of time became significant at approximately 5.54 years.

For uncertain outcomes, there was no main effect of age ($\beta = .12$, $t\left(138\right) = 1.00$, $p = .315$), but there were significant effects of time ($\beta = -.26$, $t\left(414\right) = -4.88$, $p < .001$), and a time×age interaction ($\beta = -.13$, $t\left(414\right) = -2.87$, $p = .004$). When split by age, the effect of time was not significant for age 5 ($p = .953$) but significant for all other ages ($ps \leq .007$. A Johnson–Neyman test indicated that the effect of time became significant at approximately 6.08 years. See Figure 2B.

Together, the results indicate a developmental progression toward adult-like patterns. By approximately age 5.5, children judge emotional responses to positive and negative outcomes as initially strong but attenuating over time. By around age 6, children additionally infer that uncertain outcomes elicit relatively mild initial reactions that become increasingly negative over time.

General Discussion

In two preregistered experiments, the present study investigated adults' and children's intuitive theory of how others' emotional states change over time in response to certain and uncertain events. Following certain events, adults expected intense immediate reactions that gradually waned over time, regardless of the outcome valence. In contrast, they expected relatively mild initial reactions to uncertain events, followed by increasing negative emotions over time. Children showed a developmental trajectory: by approximately 5.5 years, they began to exhibit adult-like responses for certain outcomes, and by around 6 years, for uncertain outcomes. Together, the study shows that adults and children around ages 5–6 construe others' emotions as dynamic states that unfold over time in response to certain and uncertain events.

The current study advances our existing knowledge of adults' emotion reasoning in several ways. First, consistent with prior work on first-person emotional experiences in high-risk diagnostic testing (Lebel et al., 2003; Wiggins et al., 1992) and the AREA model of affective adaptation (Wilson & Gilbert, 2008), uncertainty leads to increasingly negative emotions over time, whereas emotions wane over time when outcomes are certain, regardless of valence. Extending this literature, our findings show that these patterns generalize beyond adults' first-person emotional experiences to their predictions of others' emotions.

Second, whereas Kurtz et al. (2007) documented forecasting errors in adults' predictions of their own emotions under uncertainty, our study shows that adults nevertheless possess an intuitive understanding of how uncertainty shapes others' emotions over time. One explanation for this discrepancy lies in differences in the type of uncertainty examined. Kurtz et al. (2007) focused on uncertainty within known-valence events, whereas we examined uncertainty about the event's valence itself—whether it would be positive or negative. Given the view that uncertainty is inherently aversive (Buhr & Dugas, 2002; Hogg, 2000), participants in the former study may have underestimated its role in prolonging the initial pleasure associated with positive outcomes. Alternatively, this discrepancy may reflect greater reliability in predicting others' emotions than one's own. Predictions about the self often rely on introspection, which may be susceptible to impact biases that inflate the intensity and duration of anticipated emotions (Gilbert et al., 1998), and these biases persist despite previous exposure to the emotional event (Ayton et al., 2020). Meanwhile, predictions about others' emotions rely more on inferences and observable cues beyond one's immediate feelings (Doan et al., 2025). Future research could further examine these possibilities to clarify the sources of this discrepancy.

Next, in the context of developmental research, we conceptually replicated the findings of Harris et al. (1985) in the certain conditions, indicating that children judge initially intense emotional reactions in response to certain events to diminish as time progresses. Finally, although prior work suggests children's awareness of uncertainty (Fay & Klahr, 1996; Lagattuta & Sayfan, 2011; Moore et al., 1989), to our knowledge, this is the first study to explicitly manipulate uncertainty to examine children's understanding of how it shapes emotions over time.

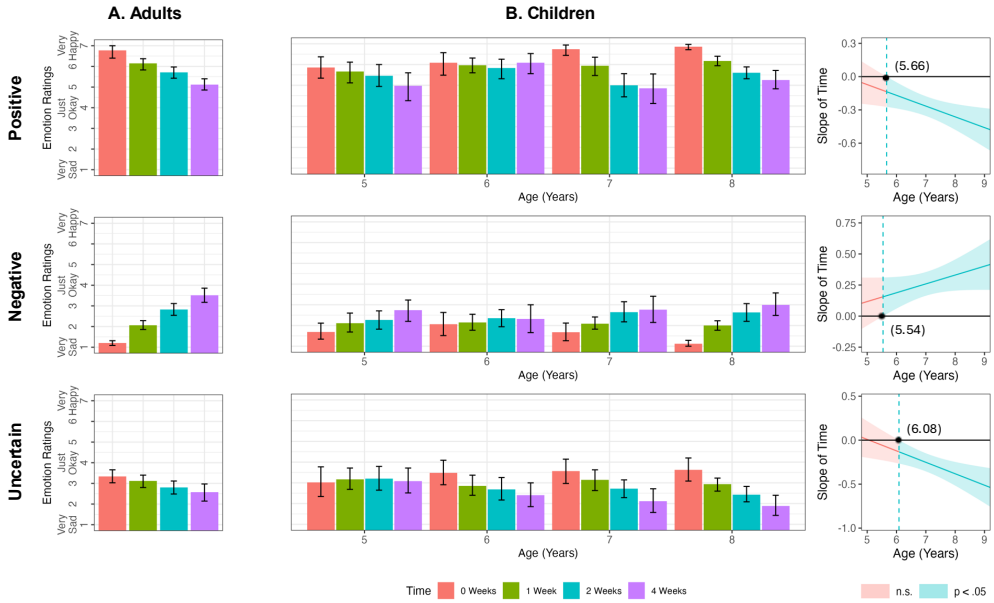

Figure 2: Results. A: Adults' emotion ratings following each outcome condition. B: The left panel displays children's emotion ratings by age. The right panel displays Johnson-Neyman plots indicating the age at which the effect of time becomes significant for each outcome, as shown by the vertical dashed line. Error bars and shaded regions indicate 95% confidence intervals.

We interpret the shift from mild initial reactions to increasing negative emotions following uncertain events as reflective of the aversive and uncomfortable nature of uncertainty (Buhr & Dugas, 2002; Hogg, 2000). On this account, not knowing what will unfold promotes rumination, thereby amplifying distress (Wilson & Gilbert, 2008). However, at least two alternative explanations merit consideration. First, as time passes, participants may infer that an unresolved outcome signals a likely silent rejection. We consider this less likely because our scenario explicitly stated that the delay was due to the decision maker being away. Future work could test this directly by asking follow-up questions (e.g., "Do you think Kathy would get selected or not?") after emotion ratings. Second, increasing negativity over time may reflect the emotional consequences of waiting, rather than uncertainty per se. Future research could disentangle these factors by comparing uncertainty with matched waiting periods for known outcomes (e.g., waiting for an upcoming vacation). More broadly, incorporating open-ended questions (e.g., "Why do you think Kathy feels this way over time?") would also help clarify the reasoning behind participants' judgments.

It should be noted that our study only viewed emotional responses in each condition as either positive or negative. However, there are finer distinctions in the types of emotions people feel under certain or uncertain events. For example, certain negative events may elicit sadness or disappointment, while uncertain events may elicit worry, fear or anxiety. Future work could extend these findings by examining how these distinct emotional constructs vary across conditions.

Further, uncertainty may not affect people in the same way, but differ based on individual differences in their dispositional traits. For example, someone with a pessimistic outlook is more likely to imagine "worst-case" scenarios and feel worse over time compared to someone who is more optimistic about the outcome (Scheier et al., 1994; Sweeny & Andrews, 2014). Alternatively, it is possible that pessimists may have very low expectations about the outcome, which can act as defense mechanisms and shield them from distress (Norem & Cantor, 1986). Future research can examine how these individual differences might affect one's emotions or their ability to reason about others' emotions in the context of uncertainty.

The current study examined adults' and 5- to 8-year-olds' reasoning about other children's emotions in the context of school activities. Can the results be generalized to other people or contexts? Future studies could examine people's intuitions when inferring the emotional states of individuals from other age groups or with different closeness levels. They could also examine whether these results are exacerbated or reduced when uncertainty pertains to more high-stakes situations like one's health or job stability. Further, since our findings are based in North America, it is also important to consider the role of cultural differences in people's understanding of the impact of uncertainty on emotions.

To conclude, we show that both adults and children possess the social-cognitive ability to reason about others' emotions by integrating temporal dynamics with event certainty, with this ability emerging around ages 5–6. This developmental trajectory suggests that children's understanding of emotion shifts from static event-emotion mappings to a more process-based representation. In this representation, emotions are construed as temporally evolving states shaped by what is known and unknown.

Acknowledgements

We would like to thank the Social Sciences and Humanities Research Council of Canada (SSHRC) Institutional Grant awarded to Y.W., our research assistant, Natashia Septirymen, for her contributions, and the members of the Affective Cognition Lab. We also thank Children Helping Science and all participating families.

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