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EMPIRICAL ARTICLE

CHILD DEVELOPMENT

Seeking versus receiving help: How children integrate suggestions in memory decisions

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Abstract

The current research examined how seeking versus receiving help affected children's memory and confidence decisions. Baseline performance, when no help was available, was compared to performance when help could be sought (Experiment 1: $N = 83$, 41 females) or was provided (Experiment 2: $N = 84$, 44 females) in a sample of predominately White 5-, 7-, and 9-year-olds from Northern California. Data collection occurred from 2018 to 2019. In Experiment 1, 5-year-olds agreed most often with sought-help, whereas 9-year-olds were the only age group reporting lower confidence for sought-help relative to baseline trials. In Experiment 2, agreement and confidence after provided help were similar across age groups. Different developmental patterns when help was sought versus provided underscore the importance of active help-seeking for memory decision-making.

Recognizing when to seek help is critical for self-regulated learning (Karabenick & Berger, 2013). For example, imagine a student completing a school worksheet. She comes across a question (e.g., Which scientist studies planets and stars?) and feels uncertain about her answer (e.g., Is it an astronomist or a geologist?). In this scenario, asking her classmate for a hint, instead of proceeding independently, may be beneficial. If a classmate hints that an astronomist may be the correct answer because "astro" refers to stars, the student can then integrate the suggestion into her final decision. This integration requires weighing her own knowledge and that of the classmate, both of which may often be, but not always, accurate. Furthermore, the student's confidence in her final decision can guide subsequent actions (e.g., if she still feels unsure, she may seek additional help or restudy the material). Previous help-seeking research in children has often focused on self-reports of general help-seeking tendencies (Newman & Goldin, 1990; Ryan & Shin, 2011), sources of help (Koenig & Harris, 2005; Newman, 2000), and the types of help sought (Gall, 1987; Gall et al., 1990), particularly during problem-solving tasks (Nelson & Fyfe, 2019). However, we have a limited understanding of how children integrate information received by others into their memory and confidence judgments and how the active choice to seek help impacts children's decision-making processes. Understanding children's ability to seek and integrate information is critical for informing theories of effective learning strategies (Zimmerman & Martinez-Pons, 1990). Selective help-seeking, defined as seeking help only when most beneficial, has also been associated with academic achievement (Selmeczy, Ghetti, et al., 2021), underscoring its importance for broader educational outcomes. In the current research, we examined developmental differences in how 5-, 7-, and 9-year-olds integrated suggestions into their recognition memory decisions and confidence judgments when they could elect to seek help (Experiment 1) or when help was provided (Experiment 2).

Benefits of active engagement

Children benefit from engaging in active learning, including choosing what information to seek or how to study material (Ronfard et al., 2018; Ruggeri et al., 2019). When given the opportunity to seek information, even

Abbreviation: PPVT Peabody Picture Vocabulary Task preschoolers ask questions that are domain-relevant (Greif et al., 2005) and effective for problem-solving (Mills et al., 2011; Ruggeri et al., 2017). Older children are more efficient, such that they are more likely to ask questions that rule out multiple candidate answers (i.e., constraint-seeking questions) compared to questions that only rule out a single answer (i.e., hypothesis-scanning questions; Ruggeri & Lombrozo, 2015). Although these studies provide powerful demonstrations of the importance of active learning, children always had the option to ask questions. Therefore, it is not possible to assess whether the choice of seeking help in itself, versus passively receiving it, alters the decision-making process.

Research that focuses on comparing active to passive learning typically compares conditions in which participants can make decisions about how they study material (e.g., for how long or in what order) compared with conditions where this choice is unavailable or made for them (Ruggeri et al., 2019; Voss et al., 2011). For example, 5- to 11-year-olds retain information better when they can actively choose the order and duration of the study, compared with yoked conditions in which they are assigned to another participant's study behaviors, and this active learning benefit increases with age (Ruggeri et al., 2019). One explanation for this increase is that older children's better metacognitive abilities support more efficient learning strategies (Finn & Metcalfe, 2008; Ruggeri et al., 2019). However, previous research examining the effects of active learning have not compared metacognition when active choice was or was not available (but see Metcalfe & Finn, 2013), making it difficult to assess the role of metacognition in this process or how metacognitive processes may be impacted by active engagement.

Help-seeking is another form of active learning because individuals must make decisions on when to seek additional information in order to improve their performance or knowledge (Gall, 1985). Help-seeking may share underlying processes with other active learning strategies, such as question asking (e.g., metacognitive processes may support the capacity to recognize knowledge gaps; Ronfard et al., 2018). Critically, despite the potential benefits of help-seeking, previous research has not directly examined how children integrate information received through actively sought help into their decision-making process.

The development of help-seeking

Adaptive help-seeking involves seeking help in a way that maximizes learning or performance, including determining when to seek help or who to seek help from (Gall, 1981; Karabenick & Berger, 2013). Adaptive help-seeking begins to emerge during toddlerhood, such that toddlers will turn to a caregiver when experiencing uncertainty (Goupil et al., 2016). During preschool, children begin to use explicit self-assessments of their knowledge to guide their decision to seek help (e.g., they report lower confidence when asking for help; Coughlin et al., 2015). Furthermore, when deciding who to seek help from, preschoolers consider the relative reliability of informants and are more likely to seek help from more compared to less knowledgeable informants (Harris & Corriveau, 2011; Pasquini et al., 2007). Preschoolers also start to consider relevant contextual information during decisions on whose help to trust. For example, they are less likely to agree with others who provide information with low confidence (Juteau et al., 2019), or information that conflicts with their own conventional knowledge (Guerrero, Cascado, et al., 2017) or moral norms (Guerrero, Elenbaas, et al., 2017). During middle childhood, children become better at selectively asking for help when it is most beneficial. For example, 7- to 12-year-old children are more likely to selectively ask for help when their initial response is incorrect or confidence is low (Gall et al., 1990; Selmeczy, Ghetti, et al., 2021), and ask for help that scaffolds their understanding as opposed to help that directly provides the correct answer (Gall, 1987; Gall et al., 1990).

Despite these demonstrations of developmental differences regarding when help is sought, the type of help that is sought, and whose help is sought, we have a limited understanding of how children use information received in their decision process. This decision process is not as relevant in other research because the information provided is perfectly accurate (Vredenburgh & Kushnir, 2016), children do not have any current knowledge (e.g., when learning novel word labels; Pasquini et al., 2007), or there is no ambiguity about the correct answer (e.g., unambiguous perceptual stimuli; Haun & Tomasello, 2011). Therefore, all of these conditions minimize the demand to weigh one's own knowledge against that provided by the informant. However, children commonly face situations in which all of these factors are uncertain, and optimal performance requires judicious weighing of uncertain information, underscoring the importance of this topic of research.

Some research has examined how children weigh other sources of information under conditions in which both one's own knowledge and the provided information varies in certainty (Harris et al., 2017). For example, 5-year-olds, but not 3- and 4-year-olds, are more likely to rely on informants when their own perceptual evidence is ambiguous and informants unanimously agree among each other (Bernard et al., 2015; Morgan et al., 2015). Furthermore, older children become more adept at weighing the accuracy of received information when they know that it is not always accurate (Betsch et al., 2014; Betsch & Lang, 2013). For example, Moses-Payne et al. (2021) demonstrated that 8- to 9-year-olds are less likely to use their own perceptual evidence to help discriminate between helpful and misleading advice compared to 12- to 17-year-olds. Despite this age difference, children with better metacognitive insight were most effective at ignoring misleading information. Overall, this research suggests a relatively early emergence of the capacity to appropriately weight one's own decision evidence relative to information provided by others, but that older children are more sensitive to the relative reliability of the informants, due, in part, to developing metacognitive skills. However, these studies focused on developmental differences in conformity when informant information was always provided. Therefore, it is not clear whether their behavior would differ if they could choose when to seek out information.

The current research

In the current research, we examined 5-, 7-, and 9-year-olds' use of information from a helpful source known to be generally, but not always, accurate during a memory task. We were interested in establishing how this information was integrated in recognition memory decisions when children had the opportunity to choose when to seek help (Experiment 1) or help was provided without a request (Experiment 2). Similar to previous research (Selmeczy & Ghetti, 2019), help was provided in the form of probabilistic hints. In other words, children were informed that the information in the hints was frequently, but not always, accurate. The hints indicated the likely status of a recognition test item (i.e., likely old or likely new). Previous research showed that children ages 5 through 9 integrated probabilistic hints into their recognition memory decisions and children relied similarly on hints across age groups. However, 5-year-olds reported higher confidence when they received hints compared with older children, particularly when hints confirmed children's incorrect answers, suggesting that hints may lead to inflated confidence in younger children (Selmeczy & Ghetti, 2019). Critically, in this previous research children did not have the chance to actively seek help because they were either always provided with hints or no hint was available at all, making it impossible to determine the role of active help seeking. In addition, children's overall recognition memory performance was higher (i.e., ~78.5% correct) than that of the hint (i.e., 70% correct), even in the youngest age group; thus, children could do well on their own and hints were not frequently needed. In our current research, we sought to lower overall recognition performance by presenting audio-recorded words referring to objects instead of pictures of objects. This change has the additional advantage of presenting verbal information orally, which is a frequent medium of information exchange in the classroom. In addition, we increased the accuracy of the hints to 75% so that children would be encouraged to use hints while still weighing the hint relative to their own memory evidence, since the hints were not perfectly accurate. We examined children's responses and confidence after they sought help (Experiment 1) or received help (Experiment 2) and compared these responses to baseline trials, during which no help was available, allowing us to examine how children's responses were affected by integrating hints.

EXPERIMENT 1

We assessed 5-, 7-, and 9-year-old children in order to achieve 3 goals. First, we aimed at examining developmental differences in how children integrate sought-out hints into their recognition decisions. We expected that children would often agree with the information provided by hints after asking for it, given that the hints were generally reliable and previous research suggests that children ask for help on decisions they feel the least confident about (Coughlin et al., 2015; Gall et al., 1990). However, we hypothesized that younger children would have greater difficulty weighing both their own memory evidence and the sought-out hint, resulting in greater agreement with the hints. This is consistent with previous research demonstrating that younger children are less likely to appropriately integrate probabilistic information (Betsch et al., 2014). In contrast, we predicted that older children would continue to evaluate their own memory evidence in relation to the hint and be less likely to fully agree with hints given that they may be occasionally wrong.

Second, we aimed at examining developmental differences in children's integration of sought-out hints into their confidence judgments. We predicted that older children would exhibit better monitoring of their memory accuracy via confidence ratings, given known developmental differences in metamemory (Destan et al., 2014; Metcalfe & Finn, 2013; Schneider & Lockl, 2008). Previous research also shows that children use confidence as a basis for their decision to seek help (Gall et al., 1990). However, we have a limited understanding of how children's confidence is impacted by sought help. Since children are likely to seek help when they are less certain, it is possible that children's confidence remains low even when receiving a hint relative to baseline conditions. However, given that younger children are expected to be more likely to agree with hints, we considered the alternative that their confidence would increase after receiving a hint relative to baseline conditions.

Finally, the design of Experiment 1 uniquely allowed us to assess developmental and individual differences in the frequency of help-seeking. We hypothesized that all age groups would actively seek hints (Coughlin et al., 2015; Vredenburgh & Kushnir, 2016), but that those children who experienced the lowest overall confidence in their performance (measured through baseline trials where hints were not available) would be the ones who would seek the most hints, accounting for memory performance. Indeed, though research demonstrates that children with low performance are more likely to seek help (Gall, 1987; Newman & Schwager, 1995), children's memory decisions are driven by subjective confidence above and beyond accuracy (Selmeczy, Kazemi, et al., 2021).

Given these a-priori predictions, examination of recognition decisions, recognition confidence, and individual differences in help-seeking frequency were confirmatory. Any additional analyses are considered exploratory.

Method

Participants

Experiment 1 included a total of 83 participants including twenty-eight 5-year-olds (N = 14 males, Age: M = 5.67, SD = 0.14), twenty-eight 7-year-olds (N = 14 males, Age: M = 7.54, SD = 0.18), and twenty-seven 9-year-olds (N = 14 males, Age: M = 9.44, SD = 0.24). Three included 5-year-old participants, and 1 included 7-year-old have partial data (64 trials) and chose not to complete the full task. Our sample size was calculated using G*Power and has 83% power to detect a medium size within-between interaction (f = .18) between condition (help available vs. baseline) and age group (5-, 7-, vs. 9-year-olds; Faul et al., 2007). An additional four 5-year-old participants were collected and removed for baseline performance below chance accuracy (<50% correct), suggesting they were inattentive during the task. Families were recruited through flyers in the Northern California region and given monetary compensation for their participation. Data collection occurred from 2018 through 2019. All participants provided informed consent in accordance with our university's institutional review board.

Participants' race was distributed as White (N = 56), Asian (N = 12), African American (N = 6), other (N = 4), and not reported (N = 5). Eighteen participants reported being Hispanic or Latino. Family reported income was between $15,000 and $25,000 ($N$ = 1), $25,000 and $40,000 ($N$ = 7), $40,000 and $60,000 ($N$ = 7), $60,000 and $90,000 ($N$ = 15), more than $90,000 ($N$ = 52), and not reported (N = 1).

Materials

Stimuli included 128 audio bytes of animals and objects names used in previous research (Cycowicz et al., 1997; Selmeczy & Ghetti, 2019) with a maximum length of 1.25 s. Stimuli were divided into 4 sets of 32 items each. Two sets were used as target items and 2 sets as distractors, counterbalanced across participants. Participants completed a total of 128 recognition test trials (64 targets and 64 distractors), including 32 baseline trials and 96 trials where hints were available. Hints were correct on 75% of the hint available trials. All the trials were randomly intermixed for each participant.

Vocabulary assessment

We used the Peabody Picture Vocabulary Task (PPVT; Dunn & Dunn, 2007) to verify the typical development of verbal ability.

Procedure

The experiment involved one laboratory session lasting approximately 90 min, during which children completed an interactive computer task delivered on a touchscreen monitor. As children progressed through sections of the experiment, they received a gold star on the screen along with a stamp or sticker on a paper certificate in order to maintain motivation.

Study Phase

During the Study Phase (Figure 1a), children incidentally encoded 64 items by providing a living/non-living judgment via touchscreen. Each 3.5-s encoding trial consisted of 1.5 s for the audio-recording presentation and 2 s for living/non-living judgment. Participants completed 9 practice trials before starting the study task.

Interval phase

Following encoding, a brief delay period was included prior to the testing phase in order to minimize ceiling effects in recognition memory. During the delay, 5-year-olds watched a 10-min a documentary video about bees. Seven and 9-year-olds watched the same documentary video and spent an additional 10 min solving non-verbal matrix puzzles (McCrimmon & Smith, 2013). This additional delay was introduced in older children to further lower performance and minimize known memory accuracy differences across these age groups (Destan et al., 2014; Selmeczy & Ghetti, 2019).

Test Phase

During the Test Phase (Figure 1b), children completed a self-paced recognition memory task and indicated whether an item had been previously heard with a yes/no response via touchscreen. Each trial began with the auditory presentation of the test item. Trials were presented in alternating blocks of baseline trials (8 trials) and help available trials (24 trials). Participants were presented with 8 blocks for a total of 128 trials (96 help, 32 baseline). Alternating blocks were counterbalanced across participants such that half the participants began with a baseline block and half with the help available block. During baseline blocks, children were told they would

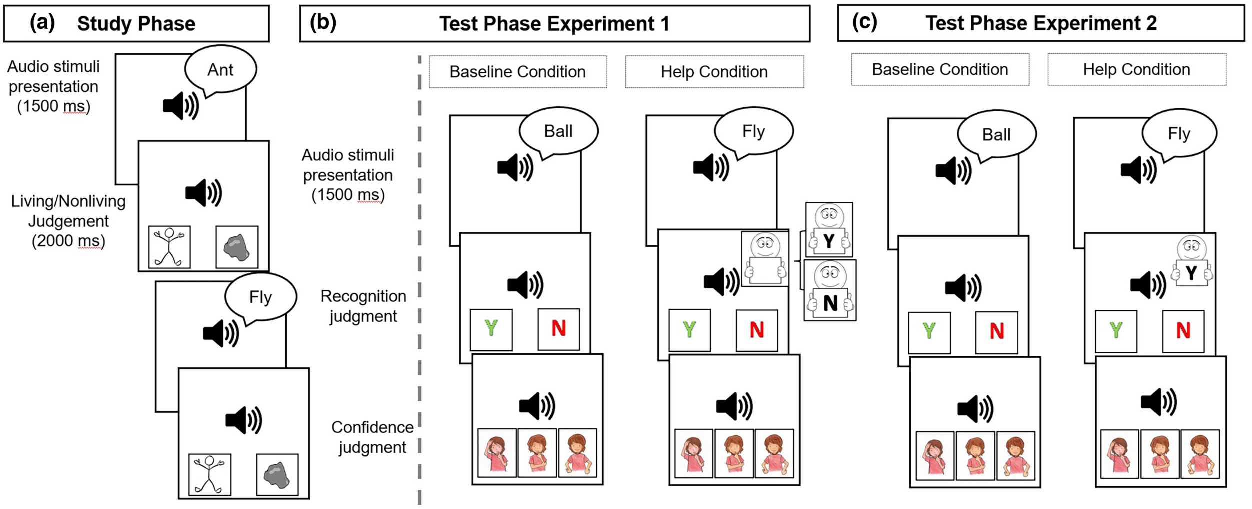

FIGURE 1 Experimental design. (a) Study Phase: Participants made living/non-living judgments for presented items. (b) Test Phase Experiment 1: Participants completed blocks of baseline trials (no hint was available) and help trials during which participants could select when to receive hints. (c) Test Phase Experiment 2: Participants completed blocks of baseline trials (no hint was available) and help trials during which participants always received hints.

answer on their own without any hints (i.e., "Sometimes there will be no hint. This means that you have to answer all by yourself."). During help available blocks, children were told they could ask for hints. During these trials, a smiley face was presented on the screen, holding an empty card. Children were instructed to touch the smiley face if they wanted to receive a hint (i.e., "Sometimes you will play with a hint. When you see a smiley face that means you can ask for a hint. You will hear a word and your job is to tell if the word was in the word game [encoding phase]. If you want to hear the hint then you should press on the smiley face".). If they elected to receive a hint, the card presented either a "Y" along with an audio recording playing "Likely Yes," suggesting that the item was heard before, or an "N" along with an audio recording playing "Likely No" suggesting that the item was not heard before. If they elected not to seek help, they could submit their response on their own, and no hint was provided. After providing a recognition judgment, children were asked to indicate how confident they were in their a using a 3-point rating scale used in previous research (Hembacher & Ghetti, 2014).

The task instructions informed children that hints were correct most, but not all, of the time (i.e., "During the memory game you will also get some hints to help you! Most of the time, but not all of the time, this hint will give you the right answer"). Children were told they should use the hints to help their performance during the memory task (i.e., "The hints are there to help you, so they will be right most of the time. We still want you to pay attention and think for yourself, so every once in a while the hints will be wrong. But again, the hints are helpful, so your job is to try and use the hints to help you do better during the memory game"). To verify their understanding of the hints, children were asked to indicate hint reliability by pointing to a rectangle filled with varying levels of color on the screen twice during the study (i.e., "Do you think the hint will give you the right answer never, a little bit of the time, most of the time, or all of the time?"). Children were corrected if they did not appropriately indicate the hint was right most of the time. In addition, at the end of the study, children were asked to indicate how reliable they found the hint by choosing one of 11 buckets filled with varying levels of color ranging from 0 (i.e., never) to 10 (i.e., always). Prior to starting the Test Phase, participants completed 18 practice recognition trials including 8 baseline and 10 help available trials. After completing the memory task, children completed the PPVT.

Results

Preliminary analyses

Receptive vocabulary

We conducted a one-way ANOVA on standardized PPVT scores across age groups. There were no significant differences between age groups ($F(2, 79) = 0.74$, $p = .480$; 5-year-olds $M = 117.39$, SD = 13.1; 7-year-olds $M = 115.43$, SD = 14.7; 9-year-olds $M = 112.81$, SD = 13.74).

Help reliability assessment

We conducted a one-way ANOVA on children's estimate of the hint accuracy submitted at the end of the task across age groups. There were no significant differences between age groups ($F(2, 76) = 1.07$, $p = .347$). Overall children reported hint accuracy as approximately 6.4 (SD = 2.18) on a 0 to 10 rating scale (5-year-olds $M = 6.84$, SD = 3.17; 7-year-olds $M = 5.69$, SD = 1.93; 9-year-olds M

= 6.48, SD = 0.89). Thus, children understood that hints were generally accurate and there were no developmental differences in children's estimates of hint accuracy.

Help-seeking frequency

To examine developmental differences in the frequency of help seeking, we conducted a one-way ANOVA on the proportion of times help was sought across age groups. The main effect of age did not reach statistical significance, $F(2, 80) = 2.59$, $p = .081$, $\eta^2_p = .06$, and follow-up pairwise comparisons showed numerical differences such that 7-year-olds sought more help ($M = 0.36$, SD = 0.28) compared to 9-year-olds ($M = 0.20$, SD = 0.20, $p = .020$, $p_{bonf} = .059$, Cohen's $d = .65$), but not to 5-year-olds ($M = 0.27$, SD = 0.28, $p = .277$, $p_{bonf} = .831$, Cohen's $d = .29$). Five and 9-year-olds did not significantly differ from each other ($p = .258$, $p_{bonf} = .774$, Cohen's $d = .31$).

Main analyses

Agreement with hints and recognition memory decisions

To examine developmental differences in how children integrated information from help into their recognition memory decisions, we assessed how frequently children agreed with the content of the hint they received (i.e., responded 'yes' when the hint indicated the answer was likely yes or responded 'no' when the hint indicated the answer was likely no). We conducted a confirmatory analysis using a multilevel logistic regression model with trial-level data. A multilevel model allowed us to appropriately weight differences in a number of trials across participants (Zuur et al., 2009) in order to account for the varying number of times participants sought help. We predicted whether participants agreed with the hint (1-agreed, 0-disagreed) using a fixed main effect of age group (dummy coded in reference to 5-year-olds) and random effect of participants. Results revealed that 5-year-olds were more likely to agree with the hints relative to 7- (OR = 0.39, SE = .10, $p < .001$, 95% CI [0.23, 0.64]) and 9-year-olds (OR = 0.40, SE = .11, $p = .001$, 95% CI [0.23, 0.69]), who did not differ from each other (OR = 1.04, SE = .25, $p = .870$, 95% CI [0.65, 1.67]; see Figure 2a). Critically, although 5-year-olds agreed more often with hints than older age groups, they did not always agree with hints (Model Estimated Effects: $M = 0.88$, SE = .02, 95% CI [0.83, 0.92]; statistically different from 100%), suggesting that they did not completely outsource the decision to the hint, but continued to consider their own memory evidence in addition to the information provided by the hint.

One potential reason why 5-year-olds agreed more often with hints may be that they had lower memory performance compared to older children and, therefore, they needed to rely more heavily on hints as opposed to their own memory. Indeed, when we examined baseline recognition discrimination accuracy (d'), a main effect of age was observed, $F(2, 80) = 7.52$, $p = .001$, $\eta^2_p = .16$. Five year-olds ($M = 1.27$, SD = 0.64) were numerically less accurate than 7-year-olds ($M = 1.55$, SD = 0.60, $p = .099$, $p_{bonf} = .296$, Cohen's $d = .45$) and significantly less accurate than 9-year-olds ($M = 2.05$, SD = 0.96, $p = .001$, $p_{bonf} = .003$, Cohen's $d = .95$); 7-year-olds were also less accurate compared to 9-year-olds, ($p = .025$, $p_{bonf} = .075$, Cohen's $d = .62$). Thus, we conducted an exploratory

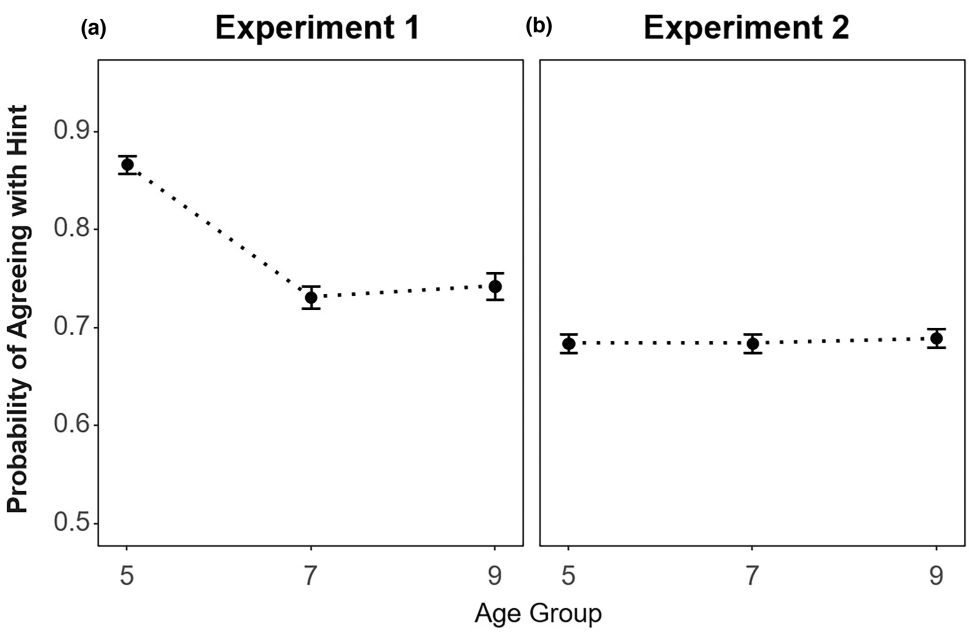

FIGURE 2 Estimated likelihood of agreeing with hints in Experiment 1 (a) and Experiment 2 (b). Error bars represent ±1 SE around the mean.

analysis using the previously described multilevel logistic regression and included baseline recognition discrimination accuracy (d') as a covariate to rule out the possibility that developmental differences in agreement were due to age differences in baseline recognition memory. Results showed that 5-year-olds were more likely to agree with help relative to 7- (OR = 0.40, SE = .10, p < .001, 95% CI [0.24, 0.67]) and 9-year-olds (OR = 0.43, SE = .13, p = .004, 95% CI [0.24, 0.77]) even when controlling for baseline discrimination accuracy (OR = 0.92, SE = .13, p = .578, 95% CI [0.70, 1.22]). We also showed similar effects when controlling for accuracy by matching baseline recognition accuracy across age groups and comparing 5-year-olds to low-performing 7- and 9-year-olds (see Supporting Information, Results). Overall, these results suggest that 5-year-olds were more likely to agree with the information provided in the hints compared to older age groups and this difference was not due to their overall lower recognition memory performance.

Help-seeking and recognition confidence

To examine developmental differences in how children integrated information provided by sought help into their recognition confidence decisions, we assessed confidence judgments using a confirmatory multilevel logistic regression model of trial-level data to account for the varying number of times participants sought help. We predicted participants' confidence (low confidence = 0, medium confidence = 1, high confidence = 2) using fixed effects of: 1) age group (dummy coded in reference to 5-year-olds) to examine developmental differences, 2) accuracy (1-correct, 0-incorrect) to examine children's ability to monitor the accuracy of their memory, and 3) help condition (0-baseline, 1-help-sought) to examine whether confidence differed between baseline trials and when help was sought. In addition, we modeled higher-level interactions, including: (1) accuracy by age group, to assess whether the ability to monitor accuracy via confidence judgments improved with age, and (2) help condition by age group, to assess whether developmental differences emerged when comparing baseline and help-sought conditions. A random effect of participant was also included.

Results are reported in Table 1. There was a significant 2-way interaction between age group and accuracy such that confidence ratings in 5- (b = .19, SE = .06, p = .003, 95% CI [0.07, 0.32]) and 7-year-olds (b = .15, SE = .06, p = .020, 95% CI [0.02, 0.27]) discriminated between accurate and inaccurate recognition decisions to a lesser extent than they did in 9-year-olds. Five and 7-year-olds did not differ from each other (b = .05, SE = .06, p = .409, 95% CI [−0.06, 0.16]; see Figure 3a). Follow-up analyses conducted separately in each age group including main effects of accuracy and condition showed significant effects of accuracy for each age group, such that all age groups reported higher confidence when correct compared to incorrect (Tables S1 through S3). Overall, these results demonstrate typical developmental improvements in metamemory.

There was also a significant 2-way interaction between age group and help condition such that the difference in confidence between baseline and help-sought trials was smaller in both 5- (b = −.36, SE = .06, p < .001, 95% CI [−0.48, −0.24]) and 7-year-olds (b = −.34, SE = .06, p < .001, 95% CI [−0.45, −0.23]) compared with 9-year-olds (see Figure 3b). Follow-up analyses conducted separately in each age group, including main effects of accuracy and help condition, demonstrated significantly lower confidence on hint-sought compared to baseline trials in 9-year-olds, (b = −.36, SE = .04, p < .001, 95% CI [−0.45, −0.28]), but not 7- (b = −.02, SE = .04, p = .537, 95% CI [−0.09, 0.05]), and 5-year-olds (b = −.01, SE = .04, p = .929, 95% CI [−0.09, 0.08]). Thus, 9-year-olds experienced lower confidence after seeking hints compared to baseline

TABLE 1 Multilevel logistic regression model predicting confidence for Experiment 1.

Confidence					
Predictors	**Estimates**	**SE**	**CI**	**Statistic**	***p***
(Intercept)	1.29	.08	1.13 to 1.44	15.95	**<.001**
Age [7]	−0.05	.11	−0.28 to 0.17	−0.48	.634
Age [9]	−0.21	.12	−0.44 to 0.02	−1.77	.077
Accuracy [correct]	0.15	.04	0.07 to 0.23	3.77	**<.001**
Help condition [help]	−0.01	.04	−0.09 to 0.08	−0.13	.897
Age [7] × accuracy [correct]	0.05	.06	−0.06 to 0.16	0.83	.409
Age [9] × accuracy [correct]	0.19	.06	0.07 to 0.32	3.02	**.003**
Age [7] × help condition [help]	−0.02	.05	−0.12 to 0.09	−0.31	.758
Age [9] × help condition [help]	−0.36	.06	−0.48 to −0.24	−6.10	**<.001**
Random effects					
σ^2 .49; $\tau_{00\ subj}$ .14; ICC .22; N_{subj} 83; observations 4722					

Bold indicates significance level at p value < .05.

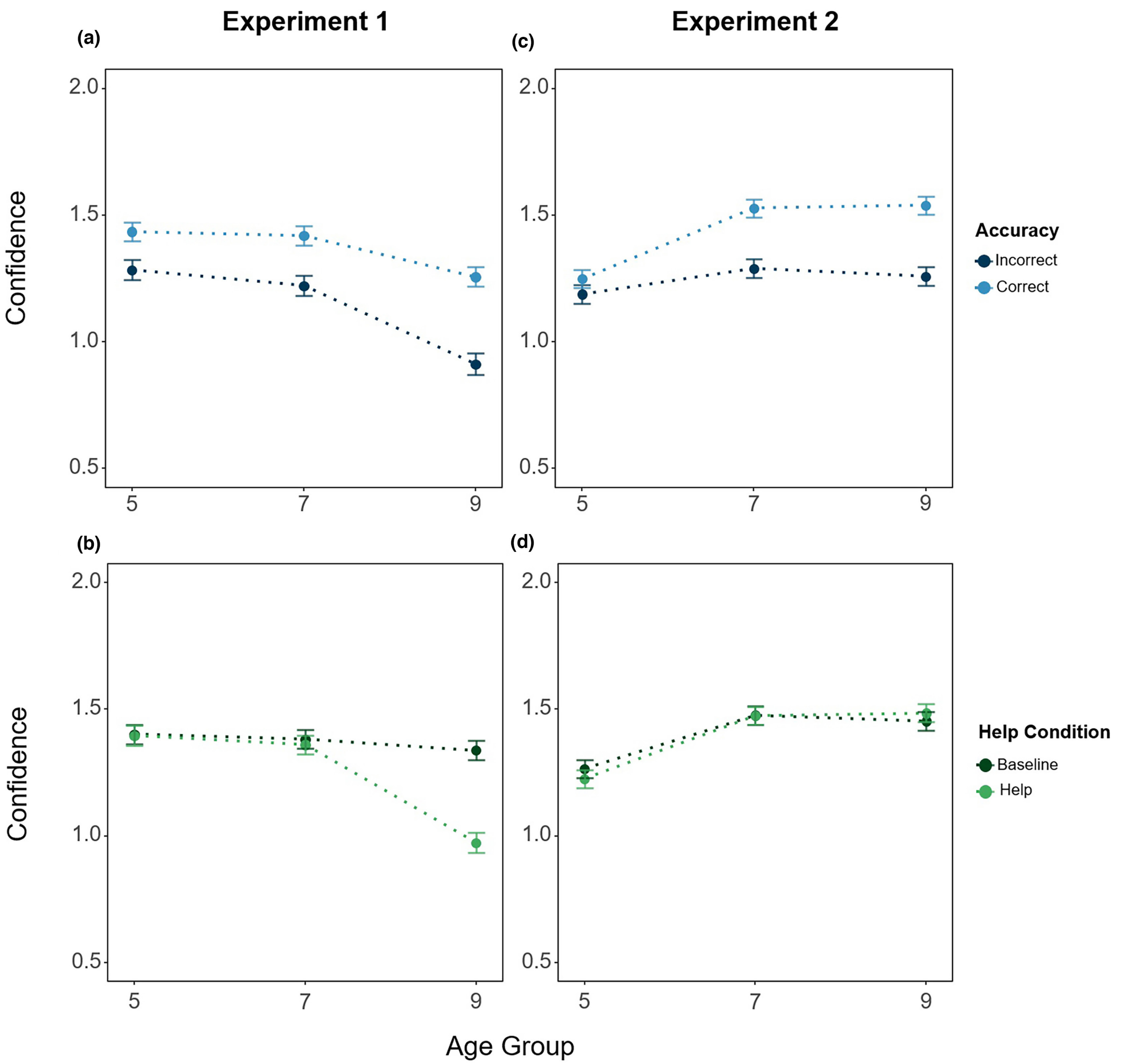

FIGURE 3 Estimated confidence across age groups as a function of accuracy (top panels) and help condition (bottom panels) for Experiment 1 (a, b) and Experiment 2 (c, d). Error bars represent ±1 SE around the mean.

trials, whereas younger children's confidence was higher after seeking help and similar to baseline trials. Follow-up analyses in 9-year-olds revealed that confidence was numerically lower when they disagreed compared to when they agreed with sought sought-out hints ($b = -.11$, SE = .07, $p = .12$, 95% CI [−0.25, −0.03]), and critically both these conditions were significantly lower compared to baseline trials (agree: $b = -.34$, SE = .05, $p < .001$, 95% CI [−0.43, −0.25]; disagree: $b = -.45$, SE = .07, $p < .001$, 95% CI [−0.58, −0.32]). Thus, 9-year-olds reported lower confidence after seeking help compared to baseline, regardless of whether or not they agreed with the hints.

Additional exploratory analyses demonstrated that results did not change when we added baseline recognition memory (d') as a covariate into the main model (Table S4). Adding the 2-way interaction between the help condition and accuracy and the 3-way interaction between help condition, age group, and accuracy did not significantly increase overall model fit, $\chi^2(3) = 5.27$, $p = .15$.

Finally, we conducted additional exploratory analyses that included confidence when children elected not to seek help. Results demonstrated that confidence was higher when children did not ask for hints compared to when they asked for hints in each age group (5-year-olds: $b = .13$, SE = .04, $p = .001$, 95% CI [0.05, 0.20]; 7-year-olds: $b = .16$, SE = .03, $p < .001$, 95% CI [0.09, 0.22]; 9-year-olds: $b = .49$, SE = .04, $p < .001$, 95% CI [0.41, 0.56]). Confidence was also higher when children did not seek help compared to baseline trials ($b = .08$, SE = .03, $p = .006$, CI [0.13, 0.02]) and this effect did not interact with age group ($ps > .410$). Thus, all children appropriately elected not to seek help when they felt confident in their answer.

Individual difference in help-seeking frequency and confidence

Next, we examined whether individual differences in help-seeking were related to confidence. We predicted that those children who experienced the lowest overall confidence in their baseline recognition skill would be the most likely to seek help during the task, above and beyond the effect of recognition accuracy. We conducted a confirmatory multiple regression analysis predicting the frequency of help-seeking using (1) average confidence during baseline trials, (2) age group (dummy coded in reference to 5-year-olds), and (3) average recognition discrimination accuracy (d') during baseline trials. Results revealed a significant effect of baseline confidence ($b = -.21$, SE = .07, $p = .003$, 95% CI [−0.35, −0.07]) such that those children who reported lower confidence during baseline trials were more likely to ask for help. In addition, consistent with the preliminary analysis, 9-year-olds were less likely to seek help than 7-year-olds ($b = -.15$, SD = 0.07, $p = .027$, 95% CI [−0.29, −0.02]). No additional effects were significant ($ps > .21$), including the main effect of recognition accuracy ($b = -.02$, SE = .04, $p = .675$, 95% CI [−0.09, 0.06]). Zero-order correlations also confirmed that the frequency of help-seeking was correlated with baseline confidence ($r = -.32$, $p = .004$), but not accuracy ($r = -.14$, $p = .207$). Adding the interaction between age group and confidence did not increase model fit, $F(2, 76) = .70$, $p = .501$. Overall, these results suggest that children were adaptive in their help-seeking, such that those children who experienced lower levels of overall baseline confidence were more likely to seek help.

EXPERIMENT 2

The main goal of Experiment 2 was to examine whether the help-related effects reported in Experiment 1 depended on children being able to ask actively for help. This experiment also provided the opportunity for a conceptual replication of a previous study during which children did not have the opportunity to choose when hints would be given (Selmeczy & Ghetti, 2019). In this previous study, developmental differences were not observed in children's recognition and confidence judgments when hints were given, suggesting that the developmental differences found in Experiment 1 were due to children having the opportunity to actively determine when to seek help. However, there were several other differences between Selmeczy and Ghetti (2019) and Experiment 1 that may have discouraged participants from incorporating hints and potentially prevented us from observing developmental differences. Specifically, in Selmeczy and Ghetti (2019), memory accuracy was higher than the average accuracy of the hints compared to those in Experiment 1. The use of visual stimuli in the previous study likely explains the higher level of accuracy. Thus, in Experiment 2, we used the same materials and the same hint reliability as those in Experiment 1.

Experiment 2 also provided an opportunity to explore how differences in help contexts may impact metacognition. Metacognition is a critical component of adaptive help-seeking (Gall, 1981; Gall et al., 1990) and actively seeking help may promote children to engage in a deeper self-reflection process to appropriately determine when help would be most beneficial. In contrast, when help is always provided children may be less encouraged to self-reflect about the quality of their knowledge since the help is available regardless of whether it is needed. Indeed, research in adults demonstrates that actively choosing when to seek help, as opposed to always being provided help, decreases over-confidence during memory judgments (Fisher & Oppenheimer, 2021). In addition, research in children demonstrates that 5- to 6-year-olds can improve their metacognitive skills under contexts that scaffold self-reflection (e.g., when provided with feedback; van Loon & Roebers, 2020), suggesting the children can flexibly enhance their metacognitive ability as a function of experimental contexts. Thus, it is possible that children's metamemory monitoring ability (i.e., the difference in confidence for correct compared to incorrect responses) may be higher in Experiment 1 when children actively sought help relative to Experiment 2 when children were provided with help.

Although the results of Experiment 1 are informative in their own right, data for the two experiments were collected at the same time, and we sought to formally compare the results of Experiments 1 and 2 on behavioral variables common across experiments to highlight differences in how children integrate actively sought compared to provided help. We predicted that children would agree less frequently with hints in Experiment 2 compared with Experiment 1, given that hints in Experiment 2 were always provided even when they may not be needed. Critically, we expected this difference would be larger in 5-year-olds compared to 7- and 9-year-olds suggesting that younger children are more impacted by differences across help-sought versus help-provided contexts. In addition, we predicted that the decrease in confidence during the help compared to baseline conditions in 9-year-olds would not occur in in the help-provided context, consistent with previous research (Selmeczy & Ghetti, 2019).

Method

Participants

Experiment 2 included a total of 84 participants across three age groups including twenty-eight 5-year-olds ($N = 14$ males, Age: $M = 5.63$, SD = 0.18), twenty-eight 7-year-olds ($N = 13$ males, Age: $M = 7.47$, SD = 0.22), and twenty-eight 9-year-olds ($N = 13$ males, Age: $M =$

9.43, SD = 0.22). Two included 5-year-old participants had partial data (minimum of 60 trials) and chose not to complete the full task. Our sample size was calculated using G*Power and has 83% power to detect a medium size within-between interaction (f = .18) between condition (Help available vs. baseline) and age group (5-, 7-, vs. 9-year- olds; Faul et al., 2007). An additional 5 participants (5 year old: N = 3; 7 year old: N = 1; 9 year old: N = 1) were collected and removed for baseline performance below chance accuracy (<50% correct). Families were recruited through flyers in the Northern California region area and given monetary compensation for their participation. Data collection occurred from 2018 through 2019. All the participants provided informed consent in accordance with our university's institutional review board.

Participants' race was distributed as White (N = 63), Asian (N = 10), African American (N = 6), other (N = 3), and not reported (N = 2). Nineteen participants reported being Hispanic or Latino. Family reported income was less than $15,000 ($N$ = 2), between $15,000 and $25,000 ($N$ = 2), $25,000 and $40,000 ($N$ = 1), $40,000 and $60,000 ($N$ = 8), $60,000 and $90,000 ($N$ = 18), more than $90,000 ($N$ = 51), and not reported (N = 2).

Materials and procedure

Materials and procedure were identical to Experiment 1 with the following exception. During help blocks, children were always presented with a 75% reliable hint (i.e., "Likely Yes" or "Likely No") following the presentation of the recognition test items and prior to providing a response (see Figure 1c). The instructions were identical to Experiment 1 with the exception that when describing the hints children were told: "You will hear a word, then you will see a smiley face and hear a hint, and your job is to tell if the word was in the word game [encoding phase]."

Results

Preliminary analyses

Receptive vocabulary

There were no significant differences in PPVT standardized scores between age groups (F(2, 75) = 0.16, p = .851; 5-year-olds M = 119.00, SD = 12.19; 7-year-olds M = 116.85, SD = 11.47; 9-year-olds M = 118.62, SD = 18.89).

Help reliability assessment

There were no significant differences between age groups on children's estimate of the hint accuracy submitted at the end of the task (F(2, 77) = 0.54, p = .587). Overall children reported hint reliability as approximately 6.78 (SD = 1.83) on a 0 to 10 rating scale (5-year-olds M = 7.08, SD = 2.52; 7-year-olds M = 6.70, SD = 1.56; 9-year-olds M = 6.57, SD = 1.29). Thus, children understood that hints were generally reliable and there were no developmental differences in children's estimates of hint reliability.

Main analyses

Agreement with hints and recognition memory decisions

We evaluated whether there were developmental differences in how frequently children agreed with the provided hint (i.e., responded 'yes' when the hint indicated the answer is likely yes or responded 'no' when the hint indicated the answer is likely no) including all the trials where hints were provided and using the same confirmatory multilevel analysis as Experiment 1. Results revealed no significant differences between age groups (ps > .793; see Figure 2b). Follow-up exploratory analyses controlling for baseline recognition discrimination accuracy (d') also did not reveal a significant effect of age group (ps > .743; see Supporting Information, Results). Thus, our results demonstrate that children agree similarly across age groups with the content of the hints, if they did not seek them.

Help availability and recognition confidence

We assessed confidence judgments using the same confirmatory analysis as Experiment 1 using all trials where hints were presented for the help condition and compared them with those in the baseline condition (see Tables S5 and S6). There was a significant 2-way interaction between age group and accuracy such that the 5-year-olds exhibited a smaller difference in confidence between correct and incorrect responses compared with 7-year-olds (b = .18, SE = .04, p < .001, 95% CI [0.11, 0.25]) and 9-year-olds (b = .22, SE = .04, p < .001, 95% CI [0.15, 0.29]), who did not differ from each other (b = .04, SE = .04, p = .282, 95% CI [−0.03, 0.12]; see Figure 3c). Follow-up analyses conducted separately in each age group, including main effects of accuracy and help condition, verified significant effects of accuracy for each age group (ps < .024; Tables S7–S9).

The 2-way interaction between help condition and age group also reached significance such that 5-year-olds were slightly less confident during hint-provided compared to baseline trials, while the opposite pattern occurred in 9-year-olds (b = .07, SE = .04, p = .045, 95% CI [0.00, 0.14]; see Figure 3d). However, follow-up analyses conducted separately in each age group, including the main effects of accuracy and help condition, did not demonstrate a significant effect of help condition in any group (ps > .152, Tables S7–S9). Thus, overall confidence was largely similar when comparing baseline compared to hint-provided trials and 9-year-olds did not demonstrate a large decrease in confidence on help trials as in Experiment 1.

Seeking versus being given help: A formal comparison of the two experiments

Experiments 1 and 2 differed in their behavioral indices and analytical approaches. For example, in Experiment 1 children had the option to seek help and we examined results related to when they sought versus did not seek help (e.g., confidence, help-seeking frequency). In Experiment 2, children were always provided with hints during the Help Condition and therefore the condition during which available help is not sought does not occur. However, both experiments included baseline trials and trials during which hints were shown, making it possible to formally confirm statistical differences between when help was sought versus provided across these conditions.

Agreement with hints

To examine whether the rates of agreement significantly differed between Experiment 1 and Experiment 2, we conducted a confirmatory analysis examining the interaction between age group and Experiment (dummy coded 0-Experiment 1, 1-Experiment 2). Results revealed an interaction between age group and Experiment (Experiment 1: hint sought vs. Experiment 2: hint given), such that children agreed more with hints in Experiment 1 compared to Experiment 2 and this difference was larger in 5-year-olds compared with 7-year-olds (OR = 2.38, SE = .55, p < .001, 95% CI [1.52, 3.74]), and 9-year-olds (OR = 2.30, SE = .56, p = .001, 95% CI [1.43, 3.70]); 7- and 9- year-olds did not differ from each other (OR = 0.97, SE = .21, p = .876, 95% CI [0.63, 1.49]). Follow-up analyses in each age group confirmed that children agreed more with hints in Experiment 1 compared to Experiment 2 (5-year-olds: OR = 0.27, SE = .08, p < .001, 95% CI [0.15, 0.50]; 7-year-olds: OR = 0.82, SE = .09, p = .075, 95% CI [0.65, 1.02]; 9-year-olds OR = 0.77, SE = .10, p = .039, 95% CI [0.60, 0.99]). Thus, children, particularly 5-year-olds, agreed more overall with actively sought help compared to provided help.

Help and recognition confidence

To examine whether recognition confidence patterns significantly differed between Experiments 1 and 2, we conducted our trial-level multilevel logistic regression predicting participants' confidence while also including a main effect and interactions with Experiment (dummy coded 0-Experiment 1, 1-Experiment 2; see Table 2).

Significant experiment differences were confirmed such that the decrease in confidence for help compared to baseline trials in 9-year-olds was only observed in Experiment 1 and not Experiment 2. This was demonstrated by a significant 3-way interaction between age group, help condition, and experiment when comparing

TABLE 2 Multilevel logistic regression model predicting confidence for both experiments.

	Confidence				
Predictors	**Estimates**	**SE**	**CI**	**Statistic**	***p***
(Intercept)	1.29	.08	1.13 to 1.44	16.30	**<.001**
Age [7]	−0.05	.11	−0.27 to 0.16	−0.49	.626
Age [9]	−0.21	.12	−0.44 to 0.02	−1.81	.070
Accuracy [correct]	0.15	.04	0.08 to 0.23	4.03	**<.001**
Experiment [Exp 2]	−0.07	.11	−0.28 to 0.15	−0.63	.530
Help condition [help]	−0.00	.04	−0.08 to 0.07	−0.11	.910
Age [7] × accuracy [correct]	0.05	.05	−0.06 to 0.15	0.88	.379
Age [9] × accuracy [correct]	0.19	.06	0.08 to 0.31	3.22	**.001**
Age [7] × help condition [help]	−0.02	.05	−0.12 to 0.08	−0.33	.740
age [9] × help condition [help]	−0.36	.06	−0.47 to −0.25	−6.52	**<.001**
Age [7] × experiment [Exp 2]	0.13	.16	−0.18 to 0.43	0.82	.411
Age [9] × experiment [Exp 2]	0.23	.16	−0.08 to 0.54	1.43	.153
Accuracy [correct] × experiment [Exp 2]	−0.09	.05	−0.18 to −0.00	−1.98	**.048**
Experiment [Exp 2] × help condition [help]	−0.03	.05	−0.13 to 0.06	−0.75	.455
Age [7] × accuracy [correct] × experiment [Exp 2]	0.13	.06	0.00 to 0.26	2.02	**.043**
Age [9] × accuracy [correct] × experiment [Exp 2]	0.03	.07	−0.11 to 0.17	0.37	.710
Age [7] × experiment [Exp2] × help condition [help]	0.05	.06	−0.07 to 0.18	0.87	.383
Age [9] × experiment [Exp2] × help condition [help]	0.43	.07	0.30 to 0.56	6.52	**<.001**
Random effects					
σ^2 .43; $\tau_{00\ subj}$ .14; ICC .24; N_{subj} 167; observations 15,302					

Bold indicates significance level at p value < .05.

9-year-olds to both 7- (b = .38, SE = .06, p < .001, 95% CI [0.25, 0.50]) and 5-year-olds (b = .43, SE = .07, p < .001, 95% CI [0.30, 0.56]). Follow-up analysis in each age group demonstrated a help condition by experiment interaction in 9-year-olds (b = .40, SE = .04, p < .001, 95% CI [0.31, 0.48]), but not 5- and 7-year-olds (ps > .45; Figure 3b vs. Figure 3d).

Experiment differences were also found in metamemory monitoring. We found a 3-way interaction between age group, accuracy, and Experiment (5- vs. 7-year-olds; b = .13, SE = .06, p = .043, 95% CI [0.00, 0.26]). This interaction was driven by differences in metacognitive monitoring (i.e., confidence for correct compared to incorrect answers) between experiments for 5-year-olds (see Figure 3a vs. Figure 3c). Follow-up analyses in 5-year-olds confirmed the main effect of response accuracy was larger in Experiment 1 (b = .15, SE = .04, p < .001, 95% CI [0.07, 0.23]) than Experiment 2 (b = .06, SE = .03, p = .024, 95% CI [0.01, 0.11]), leading to an accuracy by Experiment interaction approaching significance (b = −.09, SE = .05, p = .063, 95% CI [−0.19, 0.00]); this interaction was not present in 7- and 9-year-olds (ps > .21). We also conducting separate analyses examining baseline trials only in order to verify whether the general experimental context of asking for help promotes metamemory beyond those trials where help is available and because these trials were identical across Experiments. This analysis confirmed that the accuracy by Experiment interaction occurred for baseline trials in 5-year-olds, (b = −.18, SE = .08, p = .018, 95% CI [−0.33, −0.03]), but not 7- and 9-year-olds (ps > .655). We also confirmed that baseline recognition accuracy did not significantly differ between Experiments for any age group (ps < .245) and therefore any differences observed in metamemory could not be due to changes in accuracy across Experiments. Thus, overall these results demonstrate that for 5 year old' metamemory was greater in contexts where children actively sought help (Experiment 1) compared to when children were given help (Experiment 2).

DISCUSSION

Successful learning requires that children recognize when they may not know or remember (Karabenick & Berger, 2013). Seeking new information and using it as it becomes available is fundamental to help children correct gaps in knowledge. However, we have a limited understanding of how children integrate helpful suggestions into their memory decisions and whether the opportunity to actively seek these suggestions plays a role in whether this new information will be used. In the current research, we investigated developmental differences in 5-, 7-, and 9-year-olds' ability to integrate suggestions, in the form of probabilistic hints, during recognition memory decisions when hints were actively sought (Experiment 1) or were provided (Experiment 2).

The impact of help-seeking on memory decisions

We found that children were more likely to agree with hints when they actively sought them compared to when they were provided. These results suggest that children ask for help when they think they might need it the most. Agreement with hints is a subtle way to operationalize subjective assessments of the need for help and may prove informative even in other contexts during which children may not have the opportunity to ask (e.g., agreeing more with the hint when decisions are more complex, when the task is more difficult, or when the consequences of a mistake are more severe). Critically, no age group fully agreed with actively sought help, suggesting that children continued to consider both their own memory as well as the probabilistic hint. However, 5-year-olds were significantly more likely to agree with the hints compared to 7- and 9-year-olds. This difference remained even when we controlled for baseline memory skill, ruling out that the possibility that 5-year-olds relied more heavily on hints because they objectively needed more help. These findings demonstrate that young children are less likely to consider their own memory evidence after seeking out help, whereas older children are more cautious and continue to consider their own memory evidence even after seeking help. This is consistent with research suggesting that older children are more adept at incorporating probabilistic information and multiple sources of information (Betsch et al., 2014; Betsch & Lang, 2013). Critically, this developmental difference did not occur when children were provided with help, replicating previous research (Selmeczy & Ghetti, 2019). It is possible that younger children are more used to relying on adults for their decisions and thus are less likely to continue engaging in the decision-process after asking for help (Geurten & Bastin, 2018), even though this tendency did not obliterate their ability to engage in selective help-seeking for their least confident responses.

Help and metamemory

Our examination of the effects of hints on confidence judgments revealed several developmental differences. First, only 9-year-olds reported lower confidence after seeking help compared with the baseline trials in Experiment 1, suggesting that help alone did not fully correct their uncertainty, apparently exhibiting a form of skepticism. Here, we decided against requiring confidence ratings before and after seeking help, given evidence of spillover effects (Poole & White, 1995). Therefore, we cannot establish if 9-year-olds were even less confident than the other age groups before asking for help, which the hint only partially corrected, or whether the hint did not boost 9-year-olds' confidence at all. Nevertheless, 9-year-olds' potential skepticism in the face of help may reveal important differences in older children's learning strategies. For example, older children may be more likely to engage in adaptive strategies following their help-seeking decision (e.g., checking their answer, restudying material) or signal to others that they need additional information, consistent with previous evidence that metamemory assessments guide decision-making (Hembacher & Ghetti, 2013; Metcalfe & Finn, 2013).

Second, we observed developmental differences in how help contexts impacted metamemory monitoring. Exploratory analysis revealed that actively asking for help improved metamemory monitoring in 5-year-olds compared to when help was provided. Critically, this also occurred during the baseline condition, which did not differ in accuracy across Experiments, suggesting that the focus on determining when to seek help may engage deeper self-reflection during the entire task in the youngest group. The fact that the result was specific to metamemory processes, provides confirming evidence that metacognitive and cognitive processes are dissociable in children (Selmeczy, Kazemi, et al., 2021). Metamemory monitoring was also higher in 7- and 9-year-olds compared with 5-year-olds, consistent with previous research (Destan et al., 2014; Gonzales et al., 2022), and older children did not show any difference in metamemory monitoring in the two experiments, consistent with more robust and easily engaged skills across contexts.

Finally, we observed that metamemory also played a role in individual differences in help-seeking, such that children who experienced lower confidence during baseline trials also sought help most frequently. Previous research showed that those children with low academic or limited domain knowledge are more likely to seek help (Gall et al., 1990; Newman & Schwager, 1995). However, increasing research with adults (Desender et al., 2018) and children (Selmeczy, Kazemi, et al., 2021) demonstrates that decisions are often driven by metacognitive assessments above and beyond objective performance and our current findings are consistent with this literature.

In conclusion, we provided novel insights into children's ability to integrate helpful suggestions, and the role of help-seeking as an active learning process, and developmental differences therein. Taken together, our results underscore the importance of letting children identify if and when they need help in order to gain awareness of how they approach memory decisions.

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DATA AVAILABILITY STATEMENT

The data and analytic code necessary to reproduce the analyses presented here are not publicly accessible. The materials necessary to attempt to replicate the findings presented here are not publicly accessible. The analyses presented here were not preregistered.

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REFERENCES

Bernard, S., Harris, P., Terrier, N., & Clément, F. (2015). Children weigh the number of informants and perceptual uncertainty when identifying objects. *Journal of Experimental Child Psychology*, *136*, 70–81. https://doi.org/10.1016/j.jecp.2015.03.009

Betsch, T., & Lang, A. (2013). Utilization of probabilistic cues in the presence of irrelevant information: A comparison of risky choice in children and adults. *Journal of Experimental Child Psychology*, *115*, 108–125. https://doi.org/10.1016/j.jecp.2012.11.003

Betsch, T., Lang, A., Lehmann, A., & Axmann, J. M. (2014). Utilizing probabilities as decision weights in closed and open information boards: A comparison of children and adults. *Acta Psychologica*, *153*, 74–86. https://doi.org/10.1016/j.actpsy.2014.09.008

Coughlin, C., Hembacher, E., Lyons, K. E., & Ghetti, S. (2015). Introspection on uncertainty and judicious help-seeking during the preschool years. *Developmental Science*, *18*, 957–971. https://doi.org/10.1111/desc.12271

Cycowicz, Y. M., Friedman, D., Rothstein, M., & Snodgrass, J. G. (1997). Picture naming by young children: Norms for name agreement, familiarity, and visual complexity. *Journal of Experimental Child Psychology*, *65*, 171–237. https://doi.org/10.1006/jecp.1996.2356

Desender, K., Boldt, A., & Yeung, N. (2018). Subjective confidence predicts information seeking in decision making. *Psychological Science*, *29*, 761–778. https://doi.org/10.1177/0956797617744771

Destan, N., Hembacher, E., Ghetti, S., & Roebers, C. M. (2014). Early metacognitive abilities: The interplay of monitoring and control processes in 5- to 7-year-old children. *Journal of Experimental Child Psychology*, *126*, 213–228. https://doi.org/10.1016/j.jecp.2014.04.001

Dunn, D. M., & Dunn, L. M. (2007). *Peabody Picture Vocabulary Test manual* (4th ed.). NCS Pearson.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191. https://doi.org/10.3758/bf03193146

Finn, B., & Metcalfe, J. (2008). Judgments of learning are influenced by memory for past test. *Journal of Memory and Language*, *58*, 19–34. https://doi.org/10.1016/j.jml.2007.03.006

Fisher, M., & Oppenheimer, D. M. (2021). Harder than you think: How outside assistance leads to overconfidence. *Psychological Science*, *32*, 598–610. https://doi.org/10.1177/0956797620975779

Gall, S. N. (1985). Chapter 2: Help-seeking behavior in learning. *Review of Research in Education*, *12*, 55–90. https://doi.org/10.3102/0091732x012001055

Gall, S. N.-L. (1981). Help-seeking: An understudied problem-solving skill in children. *Developmental Review*, *1*, 224–246. https://doi.org/10.1016/0273-2297(81)90019-8

Gall, S. N.-L. (1987). Necessary and unnecessary help-seeking in children. *The Journal of Genetic Psychology*, *148*, 53–62. https://doi.org/10.1080/00221325.1987.9914536

Gall, S. N.-L., Kratzer, L., Jones, E., & DeCooke, P. (1990). Children's self-assessment of performance and task-related help seeking. *Journal of Experimental Child Psychology*, *49*, 245–263. https://doi.org/10.1016/0022-0965(90)90057-f

Geurten, M., & Bastin, C. (2018). Behaviors speak louder than explicit reports: Implicit metacognition in 2.5-year-old children. *Developmental Science*, *22*, e12742. https://doi.org/10.1111/desc.12742

Gonzales, C. R., Merculief, A., McClelland, M. M., & Ghetti, S. (2022). The development of uncertainty monitoring during kindergarten: Change and longitudinal relations with executive function and vocabulary in children from low-income backgrounds. *Child Development*, *93*, 524–539. https://doi.org/10.1111/cdev.13714

Goupil, L., Romand-Monnier, M., & Kouider, S. (2016). Infants ask for help when they know they don't know. *Proceedings of the National Academy of Sciences of the United States of America*, *113*, 3492–3496. https://doi.org/10.1073/pnas.1515129113

Greif, M. L., Nelson, D. G. K., Keil, F. C., & Gutierrez, F. (2005). What do children want to know about animals and artifacts? *Psychological Science*, *17*, 455–459. https://doi.org/10.1111/j.1467-9280.2006.01727.x

Guerrero, S., Cascado, C., Sausa, M., & Enesco, I. (2017). My teacher is wrong: Preschoolers' opposition to non-conventional statements. *Early Child Research Quarterly*, *39*, 1–13.

Guerrero, S., Elenbaas, L., Enesco, I., & Killen, M. (2017). Preschoolers' trust in social consensus varies by context: Conventional vs. moral domains. *Annals of Psychology*, *33*, 142–151.

Harris, P. L., & Corriveau, K. H. (2011). Young children's selective trust in informants. *Philosophical Transactions of the Royal Society of London Series B, Biological Sciences*, *366*, 1179–1187. https://doi.org/10.1098/rstb.2010.0321

Harris, P. L., Koenig, M. A., Corriveau, K. H., & Jaswal, V. K. (2017). Cognitive foundations of learning from testimony. *Annual Review of Psychology*, *69*, 251–273. https://doi.org/10.1146/annurev-psych-122216-011710

Haun, D. B. M., & Tomasello, M. (2011). Conformity to peer pressure in preschool children. *Child Development*, *82*, 1759–1767. https://doi.org/10.1111/j.1467-8624.2011.01666.x

Hembacher, E., & Ghetti, S. (2013). How to bet on a memory: Developmental linkages between subjective recollection and decision making. *Journal of Experimental Child Psychology*, *115*, 436–452. https://doi.org/10.1016/j.jecp.2013.03.010

Hembacher, E., & Ghetti, S. (2014). Don't look at my answer: Subjective uncertainty underlies Preschoolers' exclusion of their least accurate memories. *Psychological Science*, *25*, 1768–1776. https://doi.org/10.1177/0956797614542273

Juteau, A. L., Cossette, I., Millette, M. P., & Brosseau-Liard, P. (2019). Individual differences in children's preference to learn from a confident informant. *Frontiers in Psychology*, *10*, 2006.

Karabenick, S. A., & Berger, J.-L. (2013). Help seeking as a self-regulated learning strategy. In H. Bembenutty, A. Kitsantas, & T. J. Cleary (Eds.), *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman* (pp. 237–261). IAP.

Koenig, M. A., & Harris, P. L. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development*, *76*, 1261–1277. https://doi.org/10.1111/j.1467-8624.2005.00849.x

McCrimmon, A. W., & Smith, A. D. (2013). Review of the Wechsler Abbreviated Scale of Intelligence, second edition (WASI-II). *Journal of Psychoeducational Assessment*, *31*, 337–341. https://doi.org/10.1177/0734282912467756

Metcalfe, J., & Finn, B. (2013). Metacognition and control of study choice in children. *Metacognition and Learning*, *8*, 19–46. https://doi.org/10.1007/s11409-013-9094-7

Mills, C. M., Legare, C. H., Grant, M. G., & Landrum, A. R. (2011). Determining who to question, what to ask, and how much information to ask for: The development of inquiry in young children. *Journal of Experimental Child Psychology*, *110*, 539–560. https://doi.org/10.1016/j.jecp.2011.06.003

Morgan, T. J. H., Laland, K. N., & Harris, P. L. (2015). The development of adaptive conformity in young children: Effects of uncertainty and consensus. *Developmental Science*, *18*, 511–524. https://doi.org/10.1111/desc.12231

Moses-Payne, M. E., Habicht, J., Bowler, A., Steinbeis, N., & Hauser, T. U. (2021). I know better! Emerging metacognition allows adolescents to ignore false advice. *Developmental Science*, *24*, e13101. https://doi.org/10.1111/desc.13101

Nelson, L. J., & Fyfe, E. R. (2019). Metacognitive monitoring and help-seeking decisions on mathematical equivalence problems. *Metacognition and Learning*, *14*, 167–187. https://doi.org/10.1007/s11409-019-09203-w

Newman, R. S. (2000). Social influences on the development of children's adaptive help seeking: The role of parents, teachers, and peers. *Developmental Review*, *20*, 350–404. https://doi.org/10.1006/drev.1999.0502

Newman, R. S., & Goldin, L. (1990). Children's reluctance to seek help with schoolwork. *Journal of Educational Psychology*, *82*, 92–100. https://doi.org/10.1037/0022-0663.82.1.92

Newman, R. S., & Schwager, M. T. (1995). Students' help seeking during problem solving: Effects of grade, goal, and prior achievement. *American Educational Research Journal*, *32*, 352–376. https://doi.org/10.3102/00028312032002352

Pasquini, E. S., Corriveau, K. H., Koenig, M., & Harris, P. L. (2007). Preschoolers monitor the relative accuracy of informants. *Developmental Psychology*, *43*, 1216–1226. https://doi.org/10.1037/0012-1649.43.5.1216

Poole, D. A., & White, L. T. (1995). Tell me again and again: Stability and change in the repeated testimonies of children and adults. In M. S. Zaragoza, J. R. Graham, G. C. N. Hall, R. Hirschman, & Y. S. Ben-Porath (Eds.), *Memory and testimony in the child witness* (pp. 24–43). Sage Publications, Inc.

Ronfard, S., Zambrana, I. M., Hermansen, T. K., & Kelemen, D. (2018). Question-asking in childhood: A review of the literature and a framework for understanding its development. *Developmental Review*, *49*, 101–120. https://doi.org/10.1016/j.dr.2018.05.002

Ruggeri, A., & Lombrozo, T. (2015). Children adapt their questions to achieve efficient search. *Cognition*, *143*, 203–216. https://doi.org/10.1016/j.cognition.2015.07.004

Ruggeri, A., Markant, D. B., Gureckis, T. M., Bretzke, M., & Xu, F. (2019). Memory enhancements from active control of learning emerge across development. *Cognition*, *186*, 82–94. https://doi.org/10.1016/j.cognition.2019.01.010

Ruggeri, A., Sim, Z. L., & Xu, F. (2017). "Why is Toma late to school again?" preschoolers identify the most informative questions. *Developmental Psychology*, *53*, 1620–1632. https://doi.org/10.1037/dev0000340

Ryan, A. M., & Shin, H. (2011). Help-seeking tendencies during early adolescence: An examination of motivational correlates and consequences for achievement. *Learning and Instruction*, *21*, 247–256. https://doi.org/10.1016/j.learninstruc.2010.07.003

Schneider, W., & Lockl, K. (2008). Procedural metacognition in children: Evidence for developmental trends. *Handbook of Metamemory and Memory*, *14*, 391–409.

Selmeczy, D., & Ghetti, S. (2019). Here is a hint! How children integrate reliable recommendations in their memory decisions. *Journal of Experimental Child Psychology*, *177*, 222–239. https://doi.org/10.1016/j.jecp.2018.08.004

Selmeczy, D., Ghetti, S., Zheng, L. R., Porter, T., & Trzesniewski, K. (2021). Help me understand: Adaptive information-seeking predicts academic achievement in school-aged children. *Cognitive Development*, *59*, 101062. https://doi.org/10.1016/j.cogdev.2021.101062

Selmeczy, D., Kazemi, A., & Ghetti, S. (2021). Developmental differences in subjective recollection and its role in decision making. *Child Development*, *92*, e1308–e1325. https://doi.org/10.1111/cdev.13611

van Loon, M. H., & Roebers, C. M. (2020). Using feedback to improve monitoring judgment accuracy in kindergarten children. *Early Childhood Research Quarterly*, *53*, 301–313. https://doi.org/10.1016/j.ecresq.2020.05.007

Voss, J. L., Gonsalves, B. D., Federmeier, K. D., Tranel, D., & Cohen, N. J. (2011). Hippocampal brain-network coordination during volitional exploratory behavior enhances learning. *Nature Neuroscience*, *14*, 115–120. https://doi.org/10.1038/nn.2693

Vredenburgh, C., & Kushnir, T. (2016). Young Children's help-seeking as active information gathering. *Cognitive Science*, *40*, 697–722. https://doi.org/10.1111/cogs.12245

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, *82*, 51–59. https://doi.org/10.1037/0022-0663.82.1.51

Zuur, F. A., Ieno, E. N., Walker, N. J., Saveliev, A. A., & Smith, G. M. (2009). *Mixed effects models and extensions in ecology with R* (M. Gail, K Krickeberg, J M Samet, A Tsiatis, & W. Wong, Eds.). Springer.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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