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Individual differences in preschoolers' emotion content memory: The role of emotion knowledge

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Abstract

This study examined the relation between preschool children's emotion knowledge and their ability to recall emotionally salient information. In total, 42 participants (ages 35–65 months) viewed a brief video in which a child played with different toys and expressed one of four basic emotions (happy, sad, angry, or afraid) or a neutral expression in each of 10 vignettes. Children were tested on memory accuracy from the vignettes, and their emotion knowledge was also measured. Results indicated that preschoolers' emotion knowledge was significantly related to memory accuracy for emotion information above and beyond the effect of age or receptive language skills. Tests of a mediation model revealed that emotion knowledge fully mediated the effect of age (or general developmental level) on memory accuracy.

Keywords

Memory; Emotion; Preschoolers; Individual differences; Memory Development; Emotion Knowledge

Introduction

Explanations for why preschoolers perform worse on memory tasks than older children and adults include the development of memory processes such as encoding, storage, and retrieval (Bauer, 2006, 2008; Fivush, 1993; Schneider & Pressley, 1989), strategy use (Saywitz, 2002), and factors broadly related to prior knowledge and experience such as schemas, personal relevance, and caregiver narratives (Alexander & O'Hara, 2009). However, there is considerable variability among preschoolers' ability to recall information (Ornstein & Myers, 1996). Sometimes younger children outperform older children on memory recall tasks (Recht & Leslie, 1988; Schneider, Körkel, & Weinert, 1989). Explanations of this phenomenon focus on the effects of prior knowledge about a topic such that individuals with more knowledge in a given domain typically display greater recall accuracy than those without prior knowledge. In these cases, prior knowledge is a better predictor of recall than age. The hypothesis that increases in conceptual knowledge explain (in part) memory improvements in young children has been limited to content that most

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preschoolers do not typically learn at an early age (e.g., baseball: Recht & Leslie, 1988; soccer: Schneider et al., 1989). This theory would be strengthened if it could be shown that prior knowledge plays a role in memory for a content domain in which children typically gain expertise over time.

Emotion knowledge includes many developing skills such as the ability to understand differences in emotional states, represent those states symbolically with words, recognize emotional states in others, and understand which feelings typically correspond with different events (Denham, 1998; Izard et al., 2011; Morgan, Izard, & King, 2010), and it is an ideal candidate for extending research in this way. First, children's emotion knowledge develops rapidly across the preschool years, the same period in which memory also improves dramatically. Second, although some exceptions exist, there is a substantial body of evidence indicating that emotionally salient content is associated with more vivid (Levine & Pizarro, 2004) and accurate (Canli, Zhao, Brewer, Gabrieli, & Cahill, 2000) memories. Evidence from autobiographical memory, laboratory, and brain imaging studies show that under certain circumstances, emotional events are recalled better than nonemotional ones (Canli et al., 2000; Levine & Edelstein, 2009; Murty, Ritchey, Adcock, & LaBar, 2010; Thompson, Skowronski, Larsen, & Betz, 1996). Third, the rate at which emotion knowledge develops varies among preschoolers so that children of the same age show differing levels of knowledge (Denham, 1998; Denham & Couchoud, 1990; Gross & Ballif, 1991). Consequently, although we would expect that memory for emotional information would improve with age, content knowledge about emotions should also predict memory for emotional information, possibly beyond the effects of age. Thus, in this study, the link between emotion knowledge and preschoolers' memory for emotion events was investigated.

Memory and content knowledge in children

In general, the more experience or knowledge one has about a particular subject, the more effectively one recalls information involving that subject matter (Bjorklund, 1987; Chi, 1978; Recht & Leslie, 1988; Schneider et al., 1989; Stein & Liwag, 1997). However, if new information is inconsistent with previous experiences and expectations, the encoded information may be altered (erroneously) to better fit existing schemas (Alexander & O'Hara, 2009; Ceci & Bruck, 1995). Although knowledge and experience typically increase with age, prior knowledge can also affect memory accuracy independent of age. In one such demonstration, Schneider and colleagues (1989) found that children across three different age groups (third to seventh grades) with greater knowledge about soccer were better able to recall information about a soccer story than peers with little knowledge of soccer. Indeed, when measures of "supported recall" were used, there were no age-related differences, only differences related to expertise in soccer. Importantly, measures of general aptitude (Schneider et al., 1989) and reading ability (Recht & Leslie, 1988) were not significant predictors of memory recall when prior knowledge was considered. However, when researchers have tried to create child experts through training, the expected link between content knowledge and memory is sometimes not upheld. For instance, DeMarie-Dreblow (1991) found that both children and adults who were explicitly taught new information did *not* score better on the memory task than those who were not taught the new information.

These findings support the need to examine the acquisition of content knowledge that develops naturally in children.

Emotional memory content

Most studies focusing on children's emotion memory have investigated memory for medical procedures (Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994; Peterson, Sales, Rees, & Fivush, 2007). In these studies, 3- and 4-year-olds typically recall less than older children, and the level of emotional reaction can have an independent positive effect on recall accuracy (Goodman et al., 1994). However, recall of emotional events under such extreme duress is sometimes reduced (Reisberg & Heuer, 2004), perhaps because high levels of stress can impede the encoding of event details (see Alexander & O'Hara, 2009; Levine & Edelstein, 2009). It has been theorized that emotional valence also plays a role in memory accuracy, with information surrounding negative events typically remembered better than positive ones (Kensinger, 2009). However, the explanation behind such theories involves neural mechanisms activated during the experience elicited by negative stimuli. Far less is known about memories for less intense emotional events that are witnessed and not directly experienced, warranting such exploration for both negative and positive emotions.

There is also a paucity of studies examining how individual differences such as emotion knowledge may affect recall for emotion information. Two studies that explored this reported a significant relation between autobiographical memories and emotion knowledge in preschool children (Wang, 2008) beyond effects of age or language ability (Wang, Hutt, Kulkofsky, McDermott, & Wei, 2006). However, no known studies have linked emotion knowledge and memory for emotion information that is not autobiographical. This study extends current research by focusing on witnessed emotional events.

Overview of this research

We examined the relation between individual differences in preschoolers' emotion knowledge and memory for emotional content. Preschoolers watched videotaped vignettes of a child playing with various toys and displaying different emotion facial expressions. In some vignettes the protagonist's expressions were consistent with the event, whereas in others she displayed emotions that were inconsistent with the event. Based on the literature reviewed above regarding prior knowledge and content memory, we expected that children with more developed emotion knowledge would show better memory for the emotional events. Furthermore, if prior knowledge or expectations about emotion information affect children's memory accuracy, then children should show higher accuracy scores for consistent events than for inconsistent ones. Language skills and age were also taken into account because they are often related to performance on both emotion and memory tasks.

Method

Participants

Parents of 44 English-speaking preschool children attending a university-supported day care center were given letters explaining the study, and 42 returned consent forms agreeing to

participate. Among the 42 participants, 1 child refused to complete the memory task and 2 children were excluded due to possible cognitive delays ($IQs < 75$). Thus, 39 participants (64% Caucasian American, 16% African American, 12% Asian American, and 8% “other”) constituted the final sample. Children’s ages ranged from 35 to 65 months ($M = 49.32$, $SD = 8.44$), and 57% of the children were male. A small portion of data was missing from 4 children due to school transfers or schedule changes that ended their participation.

Procedure

Parents completed the How My Child Feels Questionnaire indicating how their children would likely feel in certain scenarios. This information was used in the administration of the Emotion Puppet Interview as described below. With parental consent and child assent, an examiner interviewed each child in a private room across two or three sessions, depending on the needs of each child. Children received stickers after each session. Measures were administered in the order listed below, and each measure was completed during the same session in which its administration began.

Stimulus

A brief video (2 min 7 s), *Lucy’s Play Day*, was developed for this study. In the video, a trained child actress played with different toys in 10 vignettes. In each vignette, an event occurred (e.g., a toy train broke) as the actress narrated it and expressed one of four emotions (happy, sad, angry, or afraid), or neutral emotion, using facial expressions. Each expression was represented twice in the video (Appendix A). Modeled after Denham and Couchoud’s (1990) Emotion Puppet Interview, the emotion expressions either matched what would be expected from the event (e.g., sad after breaking the train) or conflicted with what would be expected from the event (e.g., sad after opening a birthday present). Thus, 5 vignettes included emotion expressions that were consistent with social norms and 5 included emotion expressions that were inconsistent with social norms. In pilot testing, adults (“experts”) identified the expressions as well as the emotions depicted by the vignettes with greater than 95% accuracy.

Measures

Photo Emotion Recognition—Originally used by Barth and Archibald (2003), a photo album containing 30 pictures of children expressing emotions (happy, sad, angry, and afraid/surprised) and neutral expressions measured children’s ability to identify emotions from static facial expressions. The experimenter pointed to each picture and asked the child to choose from a list of emotions presented orally. The order of picture presentation was counterbalanced across participants. Neutral expressions were excluded in analyses. Fear was considered as a correct response for surprise because adult respondents labeled these expressions as either emotion. Scores were percentages of emotions identified correctly. Previously, an adult sample accurately identified each expression 90% of the time (Barth & Archibald, 2003).

Emotion Puppet Interview—This measure of emotion knowledge assesses preschoolers’ ability to identify emotions using situational cues. Prior to the child interviews, parents completed the How My Child Feels Questionnaire by indicating whether their children

would feel happy, sad, angry, or afraid in 12 scenarios (e.g., seeing a big but friendly dog). Responses were used to customize the emotions expressed in these scenarios for each child as described below.

First, a female experimenter presented four schematic faces (happy, sad, angry, and afraid), and the child verbally labeled each emotion. Then, the experimenter named each emotion, and the child pointed to the face corresponding to the emotion. One point was awarded for each correct response.

Next, the experimenter used a faceless puppet matching the gender of the child to act out 14 vignettes. In each vignette, the experimenter narrated a brief scenario with the puppet (e.g., getting an ice cream cone) using her own facial expressions and voice to convey the puppet's emotion. The experimenter was trained according to discrete emotions theory (Izard, 1971), as suggested by Denham and Couchoud's (1990) detailed descriptions of expressions for the Emotion Puppet Interview. The experimenter always sat facing a mirror that was directly behind the participant to ensure accuracy and consistency to ensure accuracy and consistency of each facial expression. In addition, for consistency, the same experimenter administered the Emotion Puppet Interview to all participants. After each vignette, the child named the puppet's emotion and attached a schematic face (the faces from the labeling task above) to the puppet. In the first 8 vignettes, the puppet expressed an emotion that, according to Denham and Couchoud (1990), is reliably experienced by children in that situation (e.g., happy for getting ice cream). In the next 6 vignettes, the puppet expressed an emotion conflicting with the emotion that the parent reported the child would feel in that situation in the HowMyChild Feels Questionnaire (e.g., afraid when meeting a big but friendly dog if the parents indicated their child would be happy). One point was awarded for stating the correct emotion, and one point was awarded for attaching the correct expression. Scores for the Emotion Puppet Interview were percentages of the 36 total points possible.

Emotion Memory Interview—Each child watched the *Lucy's Play Day* video on a laptop computer in a quiet room with the experimenter sitting behind the child. The only instructions were to watch the video and not talk to the experimenter. Immediately following, the experimenter administered the Emotion Memory Interview, which lasted approximately 10 min.

In the Free Recall portion of the interview, the experimenter asked the child to tell her anything he or she could remember from the video. Each event or emotion recalled was scored for a total of 20 possible correct. Scores were calculated as the proportion of correct items.

In the Structured Interview portion of the interview (Appendix B), the experimenter asked the child 20 specific questions about the video. For each vignette, one question was about the event (e.g., "What did Lucy do with the box?") and one was about the emotion expression (e.g., "How did she feel?"). Questions were presented in a fixed random order. Responses were open-ended. For the event-related questions, two points were given for a correct complete response (e.g., "She opened it and pulled out a bunny rabbit") and one

point was awarded for a correct partial response (e.g., “She opened it”). For more easily comparable raw scores, two points were also given for each correct response to the emotion-related questions. These responses could not be easily parsed for partial credit, so they were only scored as correct or incorrect. Common emotion word substitutions (e.g., *mad* for angry, *scared* for afraid) were counted as correct; more ambiguous responses (e.g., *silly*, *funny*, *grumpy*) were scored as incorrect. Consistent with the Photo Emotion Recognition measure, surprise was accepted as a correct response for fear. Scores were the proportion of points out of 40 possible. In addition, separate proportion correct scores were calculated for the consistent and inconsistent vignettes.

Peabody Picture Vocabulary Test—The Peabody Picture Vocabulary Test—Third Edition (PPVT-III; Dunn & Dunn, 1997) measures verbal ability, specifically receptive vocabulary. Each child viewed a series of black-and-white illustrations and selected the picture that best represented a word presented orally by the examiner. The PPVT-III has an internal consistency reliability of $\alpha = .92$ to $.98$, and test–retest reliability is reported to be $.91$ to $.94$. Raw scores were calculated by subtracting the number of errors from each child’s ceiling score. Standard scores were calculated from the publisher’s norms.

Results

Descriptive statistics

See Table 1 for mean scores. In the Emotion Memory Interview, children generally scored low on the Free Recall portion, with most children producing no information. Therefore, Free Recall was not used in analyses. For the Structured Interview portion, neutral trials were excluded from analyses because almost none of the children was able to associate a “feeling” with the neutral expression and nearly all of the emotion scores for these items were zero.

Children’s overall memory accuracy on the Structured Interview was poor (49%). However, the expected pattern emerged. Children showed greater memory accuracy for emotional events that were consistent with expectations (54%) than were inconsistent with expectations (44%), $t(38) = 3.68$, $p = .001$.

Relation between emotion memory scores and emotion knowledge

To examine the relation between children’s emotion knowledge and memory for emotional content, correlations were calculated between scores on the two emotion knowledge measures (Photo Emotion Recognition and Emotion Puppet Interview) and the Structured Interview portion of the Emotion Memory Interview. Children’s memory for emotional content was significantly correlated with both emotion knowledge measures, $r(37) = .61$, $p < .001$ (Photo), and $r(35) = .63$, $p < .001$ (Puppet). Memory accuracy was also significantly correlated with language ability (PPVT-III raw scores), $r(34) = .48$, $p = .003$, and age, $r(36) = .46$, $p = .004$.

Because memory accuracy was associated with both emotion knowledge and developmental level (age and language ability), it was important to determine whether the general developmental level of the child could account for the relation between emotion knowledge

and memory. Thus, regression analyses predicting emotion memory (consistent and inconsistent memory scores) were conducted, with age entered in Step 1 and emotion knowledge entered in Step 2. R -squared change (R^2) for Step 2 indicated the degree to which emotion knowledge accounted for the memory scores beyond that explained by developmental level. Reversing the order of the first two steps in the regression analysis allowed us to explore a possible mediational role for emotion knowledge (Baron & Kenny, 1986). We chose age to represent developmental level instead of language ability because age accounts for more general maturational factors (e.g., experience) and there was a high correlation between age and PPVT-III raw scores, $r(34) = .76, p < .001$. Although Photo Emotion Recognition and the Emotion Puppet Interview examined different aspects of emotion knowledge, they were highly correlated, $r(35) = .75, p < .001$. Thus, a composite was created by averaging the standardized Z scores for both measures. Employing only one developmental level measure and the composite emotion knowledge measure also avoided problems with multicollinearity.

The first regression model examined the effect of emotion knowledge on memory for *consistent* events. Controlling for age in Step 1, emotion knowledge was significant, accounting for 12% of the variance, F -change(1, 33) = 5.87, $p = .02$, with the full model accounting for 33%, $F(2, 33) = 8.04, p = .001$ (Table 2). A second regression reversing the order of entry of emotion knowledge (now entered in Step 1) and age (now entered in Step 2) found that age failed to significantly increase the variance explained, F -change(1, 33) = 0.63, $p = .43$ (Table 2).

The next regression model repeated the analyses described above for memory for the *inconsistent* vignettes. Controlling for age, emotion knowledge was significant, accounting for 12% of the variance, F -change(1, 33) = 4.83, $p = .04$, and the full model accounted for 16%, $F(2, 33) = 3.17, p = .06$ (Table 2). Interestingly, when entered in Step 1, age did not account for a significant amount of variance, $F(1, 34) = 1.36, p = .25$, so not surprisingly, age was not a significant predictor of memory when it was entered second into the regression, F -change(1, 33) = 0.28, $p = .60$ (Table 2).

In both models, emotion knowledge explained a significant amount of variance in emotion memory beyond the effect of age, and the effect of age was reduced below significance when emotion knowledge was entered in Step 1 and age was entered in Step 2. This pattern of results is consistent with the hypothesis that emotion knowledge could play an explanatory role in the relation between age and emotion memory, and it suggests the possibility of statistical mediation, with emotion knowledge mediating the effect of age on emotion memory.

Mediation model

To test this hypothesis, simple mediation analyses were conducted using the bootstrapping method (Preacher & Hayes, 2008). This method of testing mediation was chosen because it is sensitive to small sample sizes. The bootstrapping method randomly samples cases from the data set and computes an estimated mediated effect. It repeats this random sampling 5000 times, producing 5000 mediated effects, and then averages those effects across the

sample and gives a point estimate. It also provides a 95% confidence interval (*CI*) for this point estimate; if the confidence interval does not cross zero, the effect is significant.

Using bootstrapping, emotion knowledge significantly mediated the effect of age on memory for *consistent* emotion information (point estimate = .007, 95% *CI* [.002, .017]). Furthermore, this was full mediation because, with the entry of emotion knowledge into the model, the direct effect of age no longer accounted for significant variance ($p = .43$).

Similarly, emotion knowledge significantly mediated the effect of age on memory for *inconsistent* information (point estimate = .004; 95% *CI* [.001, .008]). Again, this was full mediation because, not surprisingly, the direct effect of age did not account for significant variance ($p = .60$).

Discussion

This study examined the role of preschoolers' emotion knowledge in memory for emotion information. The most important finding was that emotion knowledge contributed unique variance in explaining memory accuracy beyond the effects of developmental level (i.e., age). It was also shown that children's emotion knowledge *fully* mediated the effect of age on memory scores. This suggests that the relation between emotion knowledge and memory is not simply explained by maturational factors that covary with age; individual differences in experiences contributing to emotion knowledge also play a significant role.

It makes sense that individual differences in emotion knowledge explain (in part) children's memory for emotion information because children with greater expertise in this topic area would more easily encode the emotion information into existing schemas (Bjorklund, 1987; Chi, 1978; Davies & Robertson, 1993; Recht & Leslie, 1988; Schneider et al., 1989; Stein & Liwag, 1997). This also explains why children's memory accuracy was higher for consistent emotion information than for inconsistent emotion information. This study is unique in that young children had varying levels of expertise on a topic for which expertise develops naturally in most children. Consequently, these findings lend support to theories proposing that improvements in memory over the preschool years are in part due to changes in children's knowledge of different content domains (e.g., Davies & Robertson, 1993).

Children showed greater memory accuracy for emotion information (events and subsequent facial expressions) that was consistent with prior expectations than information that was inconsistent with prior expectations. It is interesting that even with this accuracy difference, emotion knowledge explained the same amount of unique variance in memory (12%) for each vignette type. This implies that the same skill plays a role in children's memory for both types of emotion information, which is counter to our earlier theorizing and inconsistent with previous research. It is possible that the inconsistent emotions were salient because they violated existing schemas, thereby requiring more processing than the consistent expressions. However, this would lead us to expect that inconsistent emotion vignettes would be recalled better than consistent ones (or at least at the same level), but this was not the case. Alternatively, children who have better emotion knowledge may attend to facial expressions more than children with less emotion knowledge, resulting in better recall

in part because they spend more time looking at the facial expressions. Such a benefit of the allocation of attentional resources may be limited by children's ability to fit new information within existing schemas. It could be that children with better emotion knowledge were able to develop hypotheses to explain the inconsistencies between the emotions expressed in the video and their own experiences (e.g., Lucy was sad after opening the birthday present because she did not like it). This fits with Denham and Couchoud's (1990) idea that emotion knowledge includes the ability to make inferences about other people's emotional experiences. However, additional research in which participants are asked directly to explain their responses is necessary to clarify these results.

These findings are exciting because they identify a factor that can explain differences in memory accuracy for emotion information in preschoolers. Although mediation cannot conclude causation, a causal link is plausible given the theoretical backing that expertise in a content domain increases memory accuracy for that content. Longitudinal studies are needed to more firmly establish this causal relation. Other potential factors, such as the social environment (e.g., parental "meta-emotion": Gottman, Katz, & Hooven, 1997; parental socialization of emotion: Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; maternal narrative style: Doan & Wang, 2010), should also be explored because we know that such caregiver variables contribute to children's development of expertise in emotions.

One limitation to this study is that recall was immediate rather than delayed over several hours or days. Delayed recall would have created a more realistic experience, but the logistics of conducting a tightly controlled experiment in a day care center were prohibitive. In addition, replicating the study with live (vs. videotaped) events would increase validity of our findings. It is also worth noting that the emotional events in this study were limited to those witnessed but not personally experienced. Thus, these findings are more applicable to events that children witness and are less applicable to autobiographical information. Finally, children were not forewarned about the memory test. It is possible that recall would have been greater if children were given advanced notice or instructed to pay special attention to the protagonist's feelings. However, this would further compromise ecological validity. Future research should replicate and extend this study to focus on emotional valence or discrete emotions. If these findings are upheld, knowing children's level of emotion knowledge may allow us to more effectively predict the accuracy of their emotional event memory.

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Appendix A

A.1. Lucy's Play Day (script)

Vignette 1:	"I wonder what my present is."
	Lucy pulls a doll out of a birthday bag.
Emotion 1:	Sad
Vignette 2:	"I'm hammering a nail."
	Lucy hammers a nail to a piece of wood and hits her thumb.
Emotion 2:	Neutral
Vignette 3:	"I'm working a puzzle."
	Lucy puts the final pieces of a puzzle together and holds it up.
Emotion 3:	Happy
Vignette 4:	"I'm going to see what's in this box."
	Lucy pulls a stuffed animal out of a box.
Emotion 4:	Fear
Vignette 5:	"I'm going to build a tower."

	Lucy stacks blocks to make a block tower, and it falls over.
Emotion 5:	Anger
Vignette 6:	"I'm reading a book."
	Lucy is reading a book when the lights go out and come back on.
Emotion 6:	Fear
Vignette 7:	"I'm bouncing the ball."
	Lucy bounces a ball on a table.
Emotion 7:	Neutral
Vignette 8:	"I'm playing with the spaceship."
	Lucy is playing with a toy spaceship, and it suddenly makes a loud noise.
Emotion 8:	Anger
Vignette 9:	"Boy, I'm thirsty."
	Lucy bites a cookie and drinks a sip of water. She spills her cup of water.
Emotion 9:	Happy
Vignette 10:	"I'm playing with Duplos."
	Lucy is playing with Duplos (toy train), and it breaks apart.
Emotion 10:	Sad

Appendix B

B.1. Emotion Memory Interview: Structured Interview portion (script)

"Now I'm going to ask you some questions about that movie. I want you to think really hard and answer them the best you can. You may have already told me some of these things a minute ago, but I still have to ask you all of the questions, so I want you to answer them again. Okay?"

1. What happened to the block tower the girl was playing with?
How did she feel?
2. What happened when she was hammering the nail?
How did she feel?
3. What did she do with the box?
How did she feel?
4. After she ate the cookie, what happened with the drink?
How did she feel?
5. What happened with the toy train Duplos she was playing with?
How did that make her feel?
6. What happened with the spaceship when she was playing with it?
How did that make her feel?
7. What did she do with the ball?

How did she feel?

8. What did she do with the birthday bag?

How did she feel?

9. While she was reading the book, what happened?

How did she feel?

10. What did she do with the puzzle?

How did she feel?

Table 1

Mean proportion scores and standard deviations.

Measure	Mean	SD	<i>n</i>
Emotion Memory Interview			
Free Recall	.06	.06	39
Structured Interview			
Consistent trials	.54	.20	39
Inconsistent trials	.44	.14	39
Emotion Puppet Interview	.75	.22	37
Photo Emotion Recognition	.67	.20	39
PPVT-III standard scores	108.11	11.71	36

Note. The mean age of participants was 49.32 months ($SD = 8.44$, $n = 38$).

Table 2

Hierarchical linear regression predicting emotion memory (consistent vs. inconsistent trials) from age and emotion knowledge.

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>R</i> ²
Consistent trials					
Step 1					
Age	.01	.003	.46	2.99*	.21*
Step 2					
Age	.003	.004	.15	0.80	.12*
Emotion knowledge	.10	.04	.46	2.42*	
Step 1					
Emotion knowledge	.12	.03	.56	3.95*	.32*
Step 2					
Emotion knowledge	.10	.04	.46	2.42*	.01
Age	.003	.004	.15	0.80	
Inconsistent trials					
Step 1					
Age	.002	.002	.20	1.17	.04
Step 2					
Age	-.001	.003	-.11	-0.53	.12*
Emotion knowledge	.06	.03	.47	2.20*	
Step 1					
Emotion knowledge	.05	.02	.39	2.49*	.15*
Step 2					
Emotion knowledge	.06	.03	.47	2.20*	.01
Age	-.001	.003	-.11	-0.53	

* $p < .05$.