

Adults' memories of childhood: Affect, knowing, and remembering

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Adult questionnaire respondents reported, for each of a number of events, if they had experienced that event during childhood and, if so, if they remembered the experience or merely knew it had happened. Respondents also rated the emotion of each event and judged whether they would remember more about each reportedly experienced event if they spent more time trying to do so. Study 1 respondents were 96 undergraduates, whereas Study 2 tested 93 community members ranging widely in age. Respondents often reported no recollections of reportedly experienced events. Reportedly experienced events rated as emotional were more often recollected than those rated as neutral, and those rated as positive were more often recollected than those rated as negative. Predicted ability to remember more was related to current memory. Claims of remembering reportedly experienced events increased with age, but predicted ability to remember more about them declined with age.

The controversy regarding recovered memories of childhood sexual abuse (e.g., Loftus, 1993; Read & Lindsay, 1997) has reinvigorated psychologists' interest in adults' recollections of childhood. For example, recent years have seen the publication of numerous reports of procedures that can lead adults to report false memories of childhood events (e.g., Hyman & Billings, 1998; Hyman, Husband, & Billings, 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek, Finger, & Hodge, 1997; Porter, Yuille, & Lehman, 1999; Spanos, Burgess, Burgess, Samuels, & Blois, 1999; Wade, Garry, Read, & Lindsay, 2002) or increase adults' estimates of the likelihood that they had

experienced a particular event in childhood (e.g., Garry, Manning, Loftus, & Sherman, 1996; Heaps & Nash, 1999). There have also been several recent studies of adults' earliest memories (e.g., Crawley & Eacott, 1999; Eacott & Crawley, 1998, 1999; MacDonald, Uesiliana, & Hayne, 2000; Newcombe, Drummey, Fox, Lie, & Ottinger-Alberts, 2000; West & Bauer, 1999), and a number of longitudinal studies have assessed adults' memories of childhood abuse (e.g., Widom, 1997; Williams, 1994, 1995) or of more mundane childhood events (e.g., Henry, Moffitt, Caspi, Langley, & Silva, 1994; Offer, Kaiz, Howard, & Bennett, 2000). Relatedly, quite a few studies have exam-

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This research was supported by a research grant from the Natural Sciences and Engineering Research Council of Canada to the first author.

We thank Bem Allen for collecting the data for Study 1, and Yoshio Takane for his invaluable assistance on statistical analyses reported in this manuscript.

ined adults' reports of periods of being unable to remember particular childhood events (for contrasting reviews, see Brown, Schefflin, & Whitfield, 1999, and Read & Lindsay, 2000). There has also been considerable interest in comparisons between memory for emotionally positive versus negative life events (Schooler & Eich, 2000), and in interactions between such contrasts and individual difference measures (e.g., Bahrick, 1998; Newman & Hedberg, 1999). As a final example, several studies have explored the effects of efforts to recall childhood events on participants' judgements of the completeness of their autobiographical memories (e.g., Belli, Winkielman, Read, Schwarz, & Lynn, 1998; Read & Lindsay, 2000; Winkielman & Schwarz, 2001; Winkielman, Schwarz, & Belli, 1998).

Another topic that has captured the interest of many cognitive psychologists in recent years is the phenomenology of memory. Much of this interest has focused on a distinction between *remembering* versus *knowing* that a past event was experienced (Gardiner & Richardson-Klavehn, 2000; Tulving, 1985). "Remembering" is recognition accompanied by the phenomenology of recollecting particular episodic details of a past experience, whereas "knowing" is recognition in the absence of the experience of recalling particular details. For example, subjects sometimes report that they confidently know that a test word was on a previously studied list but that they cannot recollect anything about the episode of studying the word—they just know that they did.

Most studies of the remember/know distinction have involved pallid stimuli such as word lists, but a few researchers have explored the distinction in studies of autobiographical memory. In a study by Conway, Collins, Gathercole, and Anderson (1996), two memory researchers kept a structured diary of events and thoughts for 5 months, and were tested on diary items and foils approximately 7 months later. One interesting finding was that recognition of events (whether targets or foils) was associated with reports of recollective experience, whereas recognition of thoughts (again whether targets or foils) was associated with reports of knowing. Hyman, Gilstrap, Decker, and Wilkinson (1998) and Paddock, Terranova, Kwok, and Halpern (2000) asked participants to report "remembered" and "known" childhood events, and found that having adult participants work at visualising childhood events that were initially described as "known" led them to later rate those memories as closer to

"remembered." More recently, Bruce, Dolan, and Phillips-Grant (2000) reported that when adults are asked to report "known" and "remembered" childhood events and then date them, the "known" events tend to be dated as having occurred at an earlier age.

We report two questionnaire studies designed to explore adults' memories of childhood experiences. The studies focused on the relationship between ratings of the emotion of particular childhood events and reports of the phenomenology of memories of those events (i.e., whether the experiences were remembered or merely known). The studies also examined the relationship between these variables and participants' predictions as to whether or not they would be able to remember more about reportedly experienced events if they spent more time working at doing so. Gender and age differences were also investigated. Although false memory is not the focus of this research, each study also included a question about a particular event that respondents would probably not have experienced during childhood. Overall, in addition to their theoretical import, the results are valuable as estimates of the normative rates of various kinds of memory reports.

STUDY 1

Method

Booklets consisting of one page of instructions and a one-page questionnaire were distributed to small groups of Western Illinois University undergraduate students, who completed the questionnaire as a filler task in another experiment in the spring of 1998. The instructions asked respondents to make three kinds of judgements regarding each of 28 childhood experiences. First, they were to indicate whether they believed they had experienced the event during childhood (prior to 12 years of age) and, if so, whether they remembered the experience, by checking one of five alternatives: "No" (never experienced during childhood); "Maybe, but no memories"; "Yes, but no memories"; "Yes, and weak memories"; or "Yes, and clear memories". Second, they were to rate the emotional quality of the experience (or, if they believed they had not experienced the event, their estimate of what the emotional quality would have been like if they had) on a 5-point scale: "Very negative", "Somewhat negative", "Neutral", "Somewhat positive", or "Very positive".

Finally, respondents were asked to judge whether or not they would be able to remember more about the event if they spent more time working at it, with response alternatives of “No”, “Don’t know”, and “Yes”.

The 28 childhood experiences listed on the questionnaire ranged in base rate from events that we assumed most US undergraduates would have experienced during childhood to events that we expected only a minority would have experienced, and in emotional quality from events that most people would likely view as negative (such as being bitten by a dog) to events that most would probably view as positive (such as playing with finger paints). One event (seeing cigarette ads on TV) was selected because few if any of the respondents would have experienced that event; because false memory is not the focus of this research we defer further discussion of that item to a subsequent section. Two versions of the questionnaire were prepared, differing only in the order in which the events were listed.

Respondents were told that completing the questionnaire was optional. They were asked to report age and gender, but no other identifying information was collected. Respondents were asked to complete the questionnaire thoughtfully, making each of the three judgements regarding each childhood event in the order in which the events were listed on the questionnaire.

Results

Demographics. A total of 96 people completed and returned the questionnaire. Of these, 24 reported neither their age nor their gender, and 2 reported their gender but not their age. Of those who reported their gender, 48 (67%) were women and 24 (33%) were men. Among the 70 respondents who reported their age, the mean was 21.3 years ($SD = 3.92$ years). Reported age ranged from 18 to 46 years, with only two respondents reporting an age greater than 27 years.

Proportion of events reportedly experienced. Table 1 presents the frequency of each memory response as a function of event, ordered by the frequency of “No” (not experienced during childhood) responses. For all events except tonsillectomy, the majority of respondents indicated that they had experienced the event in question. The proportion of events reportedly experienced

did not differ between men ($M = 0.80$) and women ($M = 0.84$), $t(70) = 1.73$, $p = .09$, nor was age reliably related to the proportion of reportedly experienced events, $r = -.19$, Bartlett $\chi^2(1, N = 70) = 2.48$, $p = .12$. We speculate that some “No” (not experienced) responses may have been in error. For example, 31.58% reported that they had never “peed their pants in public” during childhood, but it seems likely that most children experience such accidents early in toilet training.

Comparisons between reportedly experienced and non-experienced events. The proportion of the events that respondents indicated they had versus had not experienced that were rated at each level of the emotion scale are depicted in Figure 1. Almost all of the events that respondents indicated they had not experienced were rated from “Neutral” to “Very Negative”, whereas the majority of events that respondents indicated they had experienced were rated from “Neutral” to “Very Positive”.

The tendency for reportedly experienced events to be rated as more emotionally positive than reportedly non-experienced events is consistent with prior research (see Bahrck, 1998, for review). As Bahrck noted, this pattern is open to multiple interpretations. Perhaps, for example, the inherently negative events on the questionnaire were less common, less recent, or otherwise less memorable childhood experiences than the positive events. To explore this issues we used random-effects regression models (deLeeuw & Kreft, 1986).¹ By treating event (e.g., “ride a pony or horse” etc.) as a fixed within-subject effect and treating event-varying predictors (such as reportedly experienced vs not experienced) as random within-subject effects, we assessed the relationship between the dependent variables of interest (e.g., rated emotion) and the event-varying predictors while controlling for potentially confounding characteristics of particular events. Effects of between-subjects (event-invariant) variables such as age and gender, and their interactions with event-varying variables, were also assessed in the analyses.

Emotion ratings were analysed using a random-effects regression model in which age and gender were between-subjects effects, event was a fixed within-subject control effect, and reportedly

¹Random-effects regression models are also known as Multilevel models, Hierarchical Linear models, and Mixed-effect regression models.

TABLE 1
Frequency of memory responses by event (Study 1)

Event	Response					Total
	No	Maybe, no memories	Yes, no memories	Yes, weak memories	Yes, clear memories	
Ride on a merry-go-round	0	2	10	25	59	96
Go on a school field trip	0	1	2	10	82	95
Play in a sand box	1	3	9	24	59	96
Ride a tricycle or "big wheel"	1	5	10	24	56	96
Toast marshmallows	3	1	8	25	59	96
Play with finger paints	4	12	14	30	34	94
Play pin the tail on the donkey	4	8	12	36	36	96
Visit Santa in a shopping mall	5	9	17	30	34	95
Have your fingernails cut by your mom (or other parent)	6	29	31	12	18	96
Ride a two-wheeler for the first time	6	1	9	17	63	96
Play with a pinata	9	9	7	31	39	95
Get checked for head lice	11	8	9	24	44	96
Ride on a pony or horse	11	4	6	25	50	96
Have chicken pox	11	3	7	17	58	96
Build something out of popsicle sticks	12	13	15	29	27	96
Play on a Slippery Banana water slide	13	6	1	22	54	96
See another child eat something weird (dirt, worms, bugs, paste)	13	12	8	28	35	96
Dress up in your parents' clothes	15	20	9	22	28	94
Go to a school dance	16	2	2	10	66	96
Laugh when drinking so that the drink came out your nose	17	14	8	18	39	96
Get baptised or confirmed (or similar religious ceremony)	20	1	26	13	36	96
Kill or torture insects for fun	27	15	9	18	27	96
Pee your pants in public	30	33	7	6	19	95
Play "doctor" (childhood game involving private body area)	31	22	9	12	21	95
Speak pig Latin	38	11	3	18	26	96
Get bitten by a dog	40	13	10	12	21	96
Have your tonsils removed	86	0	0	1	9	96

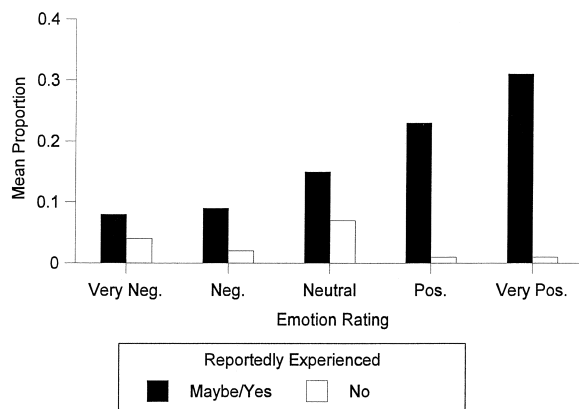


Figure 1. Proportion of events by experience and emotion (Study 1).

experienced versus not experienced was a random within-subject effect. The analysis of respondents' emotion ratings indicated that respondents tended to rate events more positively if they believed they had experienced them than if they believed they had not, even with event statistically controlled, $z = 5.628$, $p < .001$. There were no main effects of age or gender, nor were any of the interactions associated with those variables significant, all $ps > .20$.

To investigate the relationship between experience and emotional intensity, squared emotion ratings were analysed using raw emotion ratings as an additional random within-subject covariate. There was no reliable relationship between experience and emotional intensity, but there was a main effect of gender, $z = 3.40$, $p < .001$: Women rated the events as more emotionally intense than did men (see Figure 2).

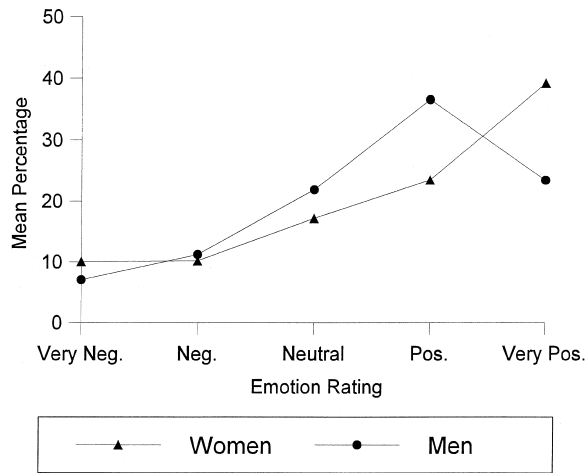


Figure 2. Emotion ratings by gender for reportedly experienced events (Study 1).

Relationship between emotion and memory phenomenology for reportedly experienced events. As shown in Table 1, respondents often reported that they had no recollections of events they had experienced—they “knew” those events had occurred but did not remember the experience. For example, of the 90 respondents who reported that they had played with finger paints, 26 (28.89%) said they had no memory of doing so. Similarly, of the 90 who reported that they had

their fingernails cut by a parent, 60 (66.67%) reported no memories of that experience.

Figure 3 depicts the relationship between rated emotion and memory phenomenology for events that respondents indicated they had experienced (i.e., responded “Maybe” or “Yes”). For each respondent, the percentage of each memory response was calculated for each level of the emotion scale (e.g., among reportedly experienced events rated as “Very negative”, the percentage to which the person responded “Maybe, but no memories”, “Yes, but no memories”, etc.). The figure depicts the means of these percentages across the 66 respondents who reported experiencing events at every level of the emotion-rating scale. The most striking pattern in the graph is that the more emotional the event the more likely it was to be remembered rather than merely known. The figure also suggests that memories of reportedly experienced events were more common for events rated as very positive than for those rated as very negative.

These data were analysed using a random-effects regression model in which memory phenomenology (no memories, weak memories, or clear memories) was the dependent variable, age and gender were between-subjects predictors, and emotional valence (raw emotion ratings) and emotional intensity (emotion rating squared)

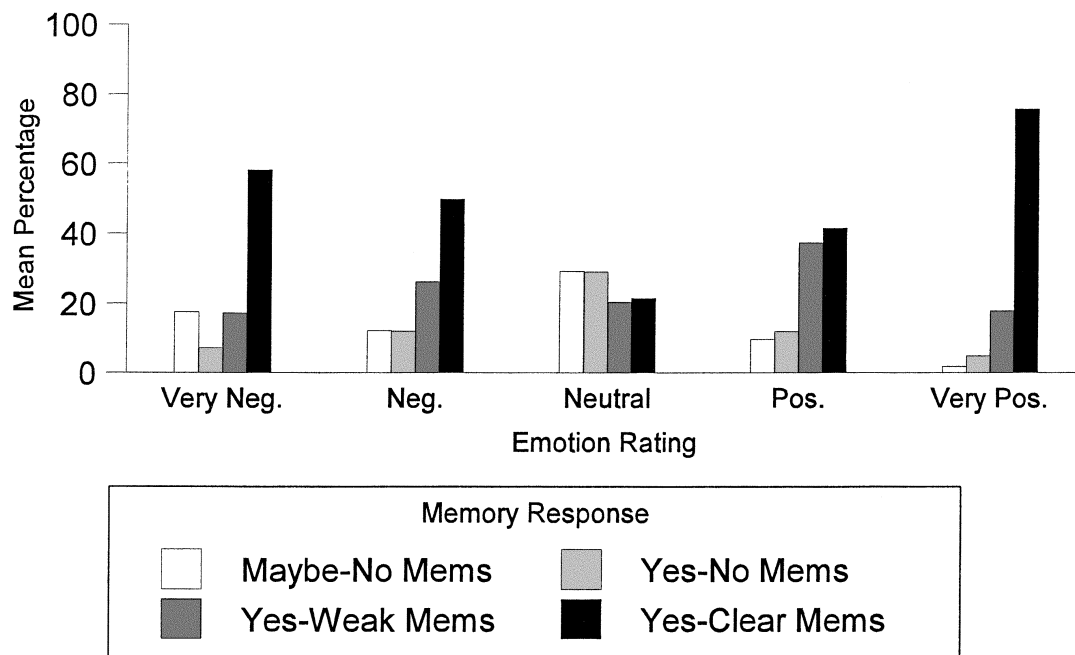


Figure 3. Memory responses by emotion for reportedly experienced events (Study 1).

were random within-subject predictors. Event was controlled by including it as a fixed within-subject predictor. Both emotional valence ($z = 3.23, p < .001$) and emotional intensity ($z = 10.44, p < .001$) were significantly related to memory reports. That is, reportedly experienced events rated as positive were more likely to be said to be recollected than those rated as negative, and those rated as emotional (either negative or positive) were more likely to be said to be recollected than those rated as neutral. There were no other significant main effects or interactions (all $ps > .20$).

The findings that reportedly experienced events rated as emotional were more likely to be said to be recollected than those rated as neutral, and that those rated as positive were more likely to be said to be recollected than those rated as negative, parallel prior research (with other measures) in the autobiographical memory literature (e.g., Thompson, Skowronski, Larsen, & Betz, 1996). Because event was statistically controlled in our analyses, our data indicate that it is the emotion associated with an event, not some general characteristic of the event itself, that accounts for this variance in memory phenomenology.

Predicted ability to remember more. Figure 4 depicts the mean percentage of reportedly experienced events at each level of the emotion scale for which respondents indicated that they could remember more about the event if they spent more additional working at doing so. Remember-more judgements were analysed in a

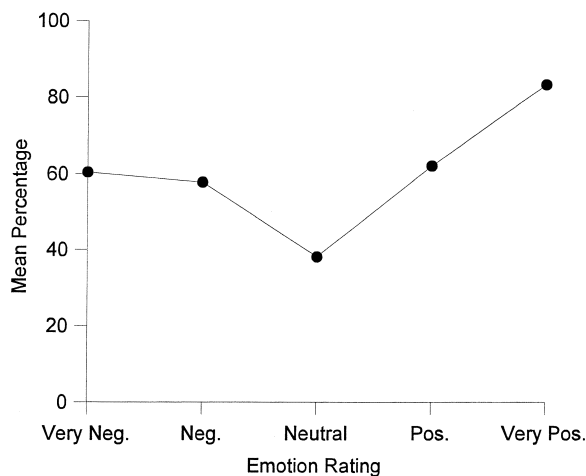


Figure 4. Percentage of events rated at each level of emotion for which respondents predicted they could remember more (Study 1).

random-effects regression analysis with event controlled as a fixed within-subject variable, emotional valence and emotional intensity as random within-subject variables, and respondents' age and gender as fixed between-subjects variables. That analysis revealed significant effects for age ($z = -3.30, p < .001$), with younger subjects more often indicating that they could remember more about the events, and emotional intensity ($z = 3.23, p < .001$), with respondents more often indicating that they could remember more about emotional events than neutral events. However, a significant Gender \times Intensity interaction ($z = -2.69, p < .007$) showed that the relationship between emotional intensity and predicted ability to remember more was reliable for men ($z = 3.06, p < .002$) but not for women ($z = 1.03, p < .35$).

The pattern of remember-more judgements across emotion ratings resembles that for current memory reports. To examine the relationship between those measures, remember-more judgements were analysed in a random-effects regression model with memory response as a random within-subject factor. Age and gender were controlled as fixed between-subjects factors, and event was controlled as a fixed within-subject factor. The relationship between remember-more and memory phenomenology fell short of reliability, $z = 1.99, p = .233$.

Summary

Respondents tended to rate reportedly experienced events as more emotionally positive (or less negative) than not-experienced events. They also often indicated that they had experienced a childhood event but that they did not remember the experience. Reports of no memories of reportedly experienced events were more common for events rated as neutral than for those rated as emotional, and (more interestingly) more common for events rated as negative than for those rated as positive. Predicted ability to remember more about reportedly experienced events appeared to be related to current memory, but that relationship was not statistically reliable when event was statistically controlled. Men and women responded similarly on most measures, a notable exception being that women more often used the extremes of the emotion rating scale. We defer interpretation of these findings to the General Discussion.

Replication of Study 1 with additional control variables

We replicated Study 1 with a new sample of 92 people from the same source and two additional control measures. In addition to the other measures, respondents were asked to indicate, for each reportedly experienced event, the number of times they had experienced that event and the oldest childhood age at which they had experienced it. Adding these measures (along with event) to the random-effects regression models used to analyse the data increases confidence that relationships between rated emotion and memory responses are not attributable to confounding differences between events given various emotion ratings. It is possible, for example, that when a given event (e.g., riding a pony or horse) is rated as negative it tends to have occurred earlier or less frequently in childhood than when it is rated as positive, giving rise to a spurious relationship between emotion and memory responses (e.g., events rated as very negative having occurred earlier in childhood). Adding measures of oldest age and frequency of childhood occurrence to the analyses may also improve our ability to detect relationships between other variables of interest (e.g., current memory response and predicted ability to remember more). In the interest of space, we do not provide a full report of the replication study here, but rather merely summarise its findings (a complete report is available from the first author).

As would be expected, reportedly experienced events were more often said to be remembered (as opposed to merely known) when they occurred later or more frequently in childhood. Predicted ability to remember more about reportedly experienced events also increased with reported age of oldest occurrence, but the analogous effect of number of times experienced fell short of statistical significance.

The rest of the results mirrored those of Study 1 in all important respects. As in Study 1, respondents tended to rate experienced events more positively than not-experienced events—although unlike Study 1 there was a near-significant ($p = .06$) tendency for older respondents to give more intense emotion ratings for not-experienced than experienced events. Just as in Study 1, women more often used the extreme values of the emotion rating scale. Also replicating Study 1, respondents often reported that they had experienced a particular event in childhood but that they

did not remember the experience, and they more often reported no memories of neutral than emotional experiences and more often reported no memories of events rated as negative than of events rated as positive. (In the replication, but not in Study 1, there was also an Age \times Gender interaction, with reports of memories increasing with age for women and decreasing with age for men.) As in Study 1, predicted ability to remember more about reportedly experienced events increased with rated emotional intensity. Here too there was an Age \times Gender interaction, in that among women predictions of being able to remember more increased with age (whereas there was no effect of age on this measure among men).² Finally, predicted ability to remember more was positively related to current memory; in Study 1 that relationship was not statistically reliable when event was statistically controlled, but the tendency for predicted ability to remember more to covary with current memory was reliable in the replication even with event, age of oldest childhood occurrence, and frequency of occurrence controlled.

This replication demonstrates the robustness of the relationships between emotion ratings and memory reports obtained in Study 1. It also increases confidence that those effects cannot be attributed to confounding differences between events given various emotion ratings.

STUDY 2

One interesting finding in Study 1 (and the replication briefly summarised earlier) was the paucity of reliable effects of age. Of course, age range was severely restricted in those two studies, with the vast majority of respondents being between the ages of 17 and 24 years. Nonetheless, we found it intriguing that variations in retention interval on the order of 7 years (and more, when the few older respondents are included) had so little effect on reports of childhood memories. To further explore this issue, in Study 2 we recruited a community sample with wide variability in age.

²Interactions involving age must be interpreted with caution due to the skewed age distribution in the replication (range 17–37 years, but only 5% of respondents older than 27 years).

Method

An advertisement in a Victoria, British Columbia, Canada, daily newspaper recruited respondents in the autumn of 1999. Individuals interested in participating telephoned the researcher, who then posted the questionnaire to them. People who returned the completed questionnaire were sent a \$5.00 payment. The questionnaire was similar to that used in Study 1, but differed from it in several ways. Some events were replaced (a) to avoid events for which large age-cohort effects seemed likely (e.g., “play on a Slippery Banana water slide”) and (b) to include more events with strongly negative connotations (e.g., “get in a fist fight” and “vomit in public”) so as to have a more balanced range of emotion ratings. Whereas in Study 1 respondents were asked about experiences between birth and age 12 years, in Study 2 they were asked about experiences between age 3 and 12 years (because reports of not remembering reportedly experienced events are more interesting for events beyond age 2 years). The “Maybe–No Memories” response alternative was dropped, such that for each reportedly experienced event respondents were to indicate whether they had no memories, weak memories, or clear memories. Also, response alternatives to the question regarding predicted ability to remember more about reportedly experienced events were limited to “yes” and “no” (whereas in Study 1 “don’t know” was included as a response option). Finally, as in the replication study, respondents were asked to indicate for each reportedly experienced event the number of times they had experienced that event and the oldest childhood age at which they had experienced it.

Results

Demographics. Data from 93 respondents were analysed. Of these, two did not report age or gender, and two reported age but not gender. Of the 91 who reported age, the mean was 48.14 years (range 21–93 years, $SD = 15.71$). Of the 89 who reported their gender, 69 (78%) were women.

Proportion of events reportedly experienced. Table 2 presents the frequency of each memory response as a function of event, listed by the frequency of “No” (not experienced) responses. Reports of not having experienced

events were substantially higher than in Study 1 and its replication. This may partly be due to differences across studies in the particular events queried, but the pattern often held for events used in both studies (as can be seen by comparing Tables 1 and 2). For example, 90% of respondents in Study 1 indicated that they had chickenpox during childhood, whereas only 78% of respondents in Study 2 did so.

It is possible that the true base rate of some or all of the events was lower for the British Columbian respondents of Study 2 than for the Illinoisan respondents of the earlier studies, but for many of the events this seems unlikely. The other major difference between studies was that Study 2 included many older respondents, and childhood events may be forgotten with age (Cohen, 1998). Consistent with this possibility, in Study 2 reports of having experienced the childhood events tended to decline with age, $r = -.45$, Bartlett $\chi^2(1, N = 91) = 20.11, p < .001$. This relationship is further explored later.

We set out to avoid events for which cohort effects were likely, but in retrospect we judged some of the items (e.g., Have your teeth drilled by a dentist; Ride a two-wheeler) may have increased in base rate over the decades studied. To assess this possibility, we compared the average ages of respondents who reported experiencing versus not experiencing events for which cohort effects seemed particularly unlikely. Of the 29 events, we judged that cohort effects were unlikely for the 22 events listed in Table 3. For 20 of those events mean age was directionally greater for respondents who reported not experiencing the event; 8 of these differences were significant at the .05 level, and 2 met the Bonferonni adjusted alpha level of .002. Across the 22 events in Table 3, the correlation between respondents’ age and proportion reportedly experienced was $r = -.51, p < .001$.

Taken together, these results suggest a tendency to forget childhood experiences across the 72-year-age range tested in this study. Of course, our intuitions about base rates may be mistaken, and processes other than forgetting (e.g., response criterion) could contribute to the age-related decline in the proportion of events reportedly experienced. In any case, as shown in Figure 5, the within-age-group variation in the proportion of childhood events reportedly experienced was more dramatic than the tendency for reports to decline with age.

As in Study 1, the proportion of events reportedly experienced did not reliably differ

TABLE 2
Frequency of memory responses, mean times experienced, and mean age at oldest occurrence by event (Study 2)

Event	Response				Total	Times experienced	Age at oldest
	No	Yes, no memories	Yes, weak memories	Yes, clear memories			
Break a bone in your body	76	0	6	11	93	0.37	9.75
Break a window	68	2	14	9	93	0.57	7.86
Kill or torture insects for fun	66	2	13	12	93	11.80	9.29
Receive a rectal enema	66	4	14	9	93	0.51	7.44
Get bitten by a dog	63	3	9	18	93	0.66	7.87
Vomit in public	57	6	9	20	92	1.18	8.56
Pee your pants in public	55	7	8	23	93	2.98	6.74
Get sutures (stitches)	54	2	9	28	93	0.92	8.40
See child eat something weird	53	5	23	12	93	1.83	7.55
Get in a fist fight	52	1	15	24	92	1.27	9.63
Get checked for head lice	51	7	21	14	93	1.71	8.67
Get baptised or confirmed	46	11	8	27	92	0.69	9.44
Steal something from a store	46	1	13	33	93	4.12	9.38
Become lost alone and scared	40	7	16	30	93	1.10	7.06
Play "doctor"	38	6	18	28	90	2.37	8.35
Laugh when drinking so that the drink came out your nose	37	13	30	13	93	2.58	9.51
Dress up in parents' clothes	33	9	22	29	93	8.85	8.33
Speak pig Latin	27	13	25	25	90	12.55	10.66
Sit on Santa's lap	26	17	34	16	93	4.22	8.36
Go on a school field trip	24	5	23	40	92	4.31	11.05
Play in a sand box	23	11	31	27	92	20.65	7.37
Have chicken pox	20	21	15	36	92	0.91	6.81
Have teeth drilled by a dentist	18	6	20	49	93	4.68	10.88
Win a prize	16	7	18	52	93	2.60	9.93
Perform in a stage play/musical	16	5	28	44	93	2.92	9.88
Compete in track-and-field	13	4	27	48	92	5.31	11.32
Play pin the tail on the donkey	12	10	52	19	93	3.44	8.76
Ride on a merry-go-round	9	6	37	40	92	13.36	9.90
Ride a two-wheeler first time	9	17	29	38	93	16.92	8.17

between women ($M = 0.57$) and men ($M = 0.61$), $t(87) = 1.13$, $p = .26$.

Comparisons between reportedly experienced and not-experienced events. Consistent with the prior studies, Figure 6 indicates that participants more often reported that they had experienced an event than that they had not, and more often rated events as positive than as negative. Also consistent with the prior studies, respondents rated the emotional quality of childhood events they reported having experienced as more positive ($M = 0.13$) than events they reported not having experienced ($M = -0.98$).

We performed a random-effects regression analysis of the relationship between experienced/not-experienced and emotional valence, with event as a fixed within-subject control factor and age and gender as fixed between-subjects factors. As in the prior studies, reportedly experienced

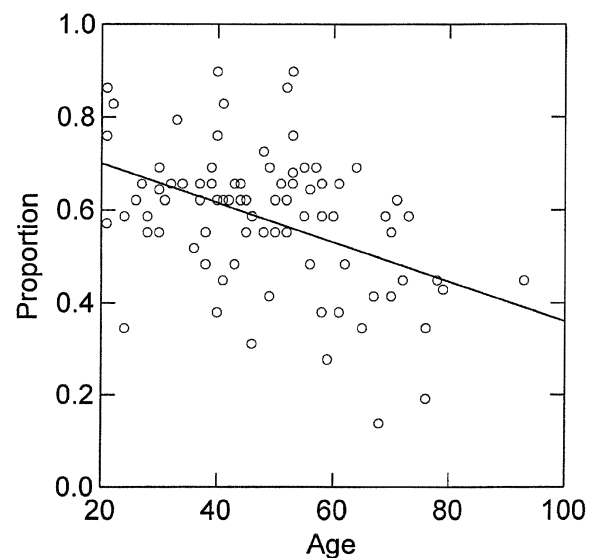


Figure 5. Scatter plot of relationship between respondent's age and proportion of events reportedly experienced during childhood (Study 2).

TABLE 3
Mean age of respondents who reported they had vs had not experienced particular events for which cohort effects in base rate seemed unlikely (Study 2)

Event	Not experienced (N)	Experienced	t	p
Become lost alone/scared	53.24 (40)	44.16 (51)	2.84	.006*
Get bitten by a dog	48.07 (61)	48.30 (30)	-.07	.947
Dress up in parents' clothes	48.84 (32)	47.76 (59)	.31	.756
Get sutures (stitches)	50.00 (53)	45.55 (38)	1.34	.185
Break a window	49.41 (68)	44.39 (23)	1.33	.187
Perform in stage play/musical	53.38 (16)	47.03 (75)	1.48	.143
Ride a two-wheeler, first time	56.22 (9)	47.26 (82)	1.65	.105
Sit on Santa's lap	58.58 (26)	43.97 (65)	4.40	.000**
Play pin the tail on the donkey	51.58 (12)	47.62 (79)	.812	.419
Go on a school field trip	62.83 (24)	42.38 (66)	6.79	.000**
Compete in a track-and-field	59.77 (13)	45.82 (77)	3.14	.002*
Have chicken pox	42.50 (20)	49.36 (70)	-1.76	.081
Break a bone in your body	49.57 (74)	41.84 (17)	1.83	.071
Laugh when drinking/out nose	53.68 (37)	44.35 (54)	2.89	.005*
Vomit in public	49.42 (57)	45.09 (33)	1.28	.204
Kill or torture insects for fun	51.16 (64)	41.00 (27)	2.93	.004*
Play "doctor"	48.95 (37)	46.77 (51)	.64	.522
Pee your pants in public	50.28 (54)	45.03 (37)	1.58	.118
Get in a fist fight	50.47 (51)	45.80 (39)	1.42	.158
See child eat something weird	50.89 (53)	44.32 (38)	2.00	.049*
Win a prize	51.81 (16)	47.36 (75)	1.03	.306
Play in a sand box	55.91 (23)	45.06 (67)	3.02	.003*

*Reliable at the unadjusted .05 level. **Reliable at the Bonferroni-adjusted $.05/22 = .002$ level.

events were rated more positively than not-experienced events, $z = 5.00$, $p < .001$. Unlike the prior studies, there was also a reliable effect of gender on ratings of emotional valence, with men rating events more positively overall, $z = 2.71$, $p = .007$. None of the other main effects or interactions was reliable, all $ps > .10$.

An analogous analysis of the relationship between experienced/not-experienced and emotional intensity revealed that reportedly experienced events were rated as less emotionally intense than not-experienced events (i.e., a larger proportion of reportedly experienced events were rated as neutral), $z = 3.29$, $p = .001$. This effect was qualified by an Experience \times Age interaction, $z = 2.72$, $p = .007$: The tendency for not-experienced events to be rated as more intense than experienced events increased with age (recall that in the replication of Study 1 the data fitted this same pattern but the interaction fell short of reliability). Also echoing the previous studies, women rated the events as more emotionally intense than did men, $z = 3.98$, $p = .002$, although here the effect was carried entirely by greater use of the negative

ratings by women (see Figure 7). There was a non-reliable tendency for emotion intensity to decline with age, $z = 1.61$, $p = .107$. No other effect or interaction approached statistical reliability, all $ps > .44$.

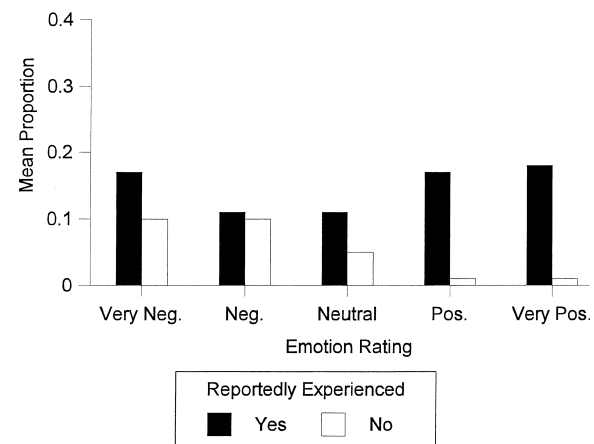


Figure 6. Proportion of events by experience and emotion (Study 2).

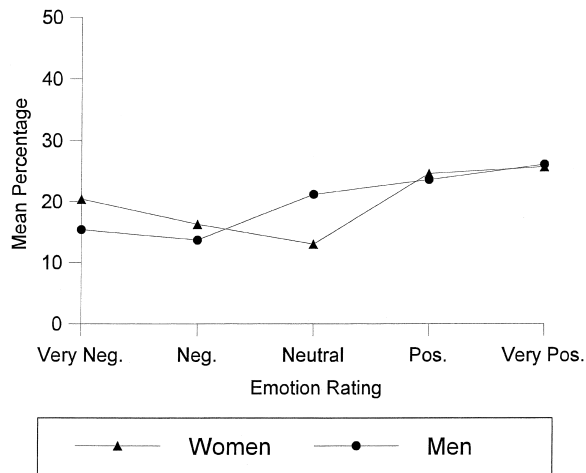


Figure 7. Emotion by gender for reportedly experienced events (Study 2).

Relationship between emotion and memory phenomenology for reportedly experienced events. As in the previous studies, respondents frequently indicated that they had experienced an event but did not remember the experience itself. For

example, between 24% and 29% of the time respondents who indicated that they had had chicken pox, sat on Santa’s lap, or been baptised or confirmed during childhood reported no memories of those experiences.

For each respondent, the percentages of each memory response for reportedly experienced events were calculated for each level of the emotion scale. Figure 8 depicts the mean percentages across the 64 respondents who reported experiencing one or more events rated at each level of the emotion-rating scale. As in Study 1 and its replication, events rated as emotionally neutral were least likely to be said to be remembered. Also consistent with the prior findings, the figure also suggests an advantage for events rated as highly positive over those rated as highly negative.

We conducted a random-effects regression analysis of memory responses, with emotional valence and intensity as random within-subject variables, age and gender as fixed between-subjects variables, and event, age at oldest occurrence, and number of times experienced

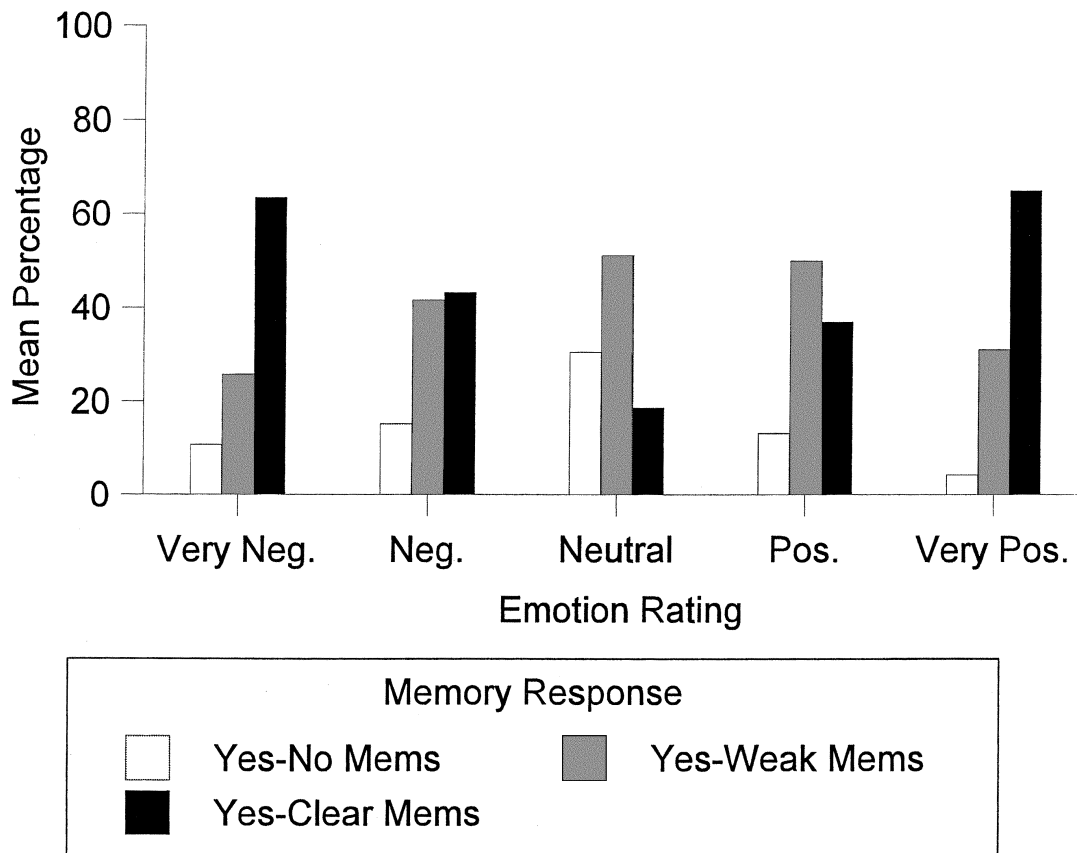


Figure 8. Memory responses by emotion for reportedly experienced events (Study 2).

controlled by treating them as fixed within-subject variables. The key findings are that, once again, emotional valence ($z = 2.36, p = .018$) and emotional intensity ($z = 8.48, p < .001$) were reliably related to memory phenomenology. Age of oldest occurrence was also again reliably related to memory phenomenology, $z = 8.42, p < .001$, but the number of times experienced was not, $z < 1$. The effect of respondents' age was also reliable, $z = 2.96, p = .003$: older respondents *more* often reporting memories of reportedly experienced events. This effect was qualified by an Age \times Gender interaction, $z = 2.15, p = .032$: The tendency for the rate of memory reports to increase with age was reliable among women ($z = 3.86, p < .001$) but not among men ($z = 0.14, p = .89$). Finally, there was a significant Sex \times Emotional Valence interaction, $z = 2.59, p = .010$: The tendency for memory reports to be greater for positive than negative events was reliable for men ($z = 2.78, p = .005$) but not for women ($z = 1.23, p = .219$). None of the other effects or interactions was reliable (all $ps > .20$).

Predicted ability to remember more. As in the prior studies, the pattern of respondents' predictions as to whether they could remember more about reportedly experienced events if they spent more time working at it (shown in Figure 9 as a function of emotion ratings) resembled the pattern of their memory responses. A random-effects regression analysis was performed on remember-more judgements, with emotional valence and emotional intensity as random within-subject variables, age and gender as fixed between-subjects factors, and event, age at oldest occurrence,

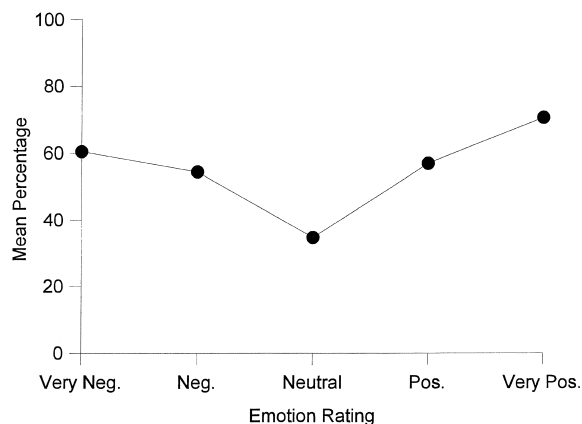


Figure 9. Mean percentage of each emotion for which respondents predicted they could remember more (Study 2).

and number of times experienced as fixed within-subject control variables. The most important finding is that emotional intensity was reliably related to remember-more judgements, $z = 4.86, p < .001$. Emotional valence also fitted the expected pattern, but here the effect was not reliable, $z = 1.63, p = .103$. As in the replication of Study 1, respondents more often judged that they could remember more about events that happened later in childhood ($z = 6.22, p = .024$) or that had happened more often in childhood ($z = 2.66, p = .024$). The new finding is that older respondents were less likely than younger ones to judge that they could remember more about reportedly experienced events, $z = 3.50, p < .001$. There was no gender effect, nor any reliable interactions (all $ps > .20$).

The relationship between predicted ability to remember more about reportedly experienced events and memory phenomenology for those events was analysed in a random-effects regression model with remember-more judgements as the dependent variable and memory response as a random within-subject factor. Age and gender were controlled as fixed between-subjects factors, and event, age at oldest occurrence, and number of times experienced were controlled as fixed within-subject control factors. Like the preceding analysis, older respondents were less likely to predict that they could remember more about reportedly experienced events than were younger ones, $z = 4.12, p < .001$. Replicating the prior studies, respondents more often predicted that they could remember more about remembered events than about known-but-not-remembered events, $z = 4.20, p < .001$. No other effects or interactions were reliable, all $ps > .30$.

Summary

The number of events reportedly experienced decreased with age, suggesting forgetting of childhood events (although cohort effects and age-related changes in response criterion cannot be ruled out). Reportedly experienced events were rated as more positive than reportedly not-experienced events. Compared to men, women rated fewer of their reportedly experienced events as neutral and more of them as negative or very negative (and, unlike the prior studies, men tended to give more positive ratings overall). Reportedly experienced events were rated as less emotionally intense than not-experienced events (especially by

older respondents). Respondents fairly often reported no memories of reportedly experienced events, with no-memory reports more common for events rated as neutral than for those rated as positive and (at least among men) more common for events rated as negative than for those rated as positive. No-memory reports were also more common for events said to have occurred earlier in childhood and, more interestingly, were more often given by younger than older respondents (at least among women). Predicted ability to remember more about reportedly experienced events was positively related to current-memory reports, and increased with intensity and valence. Respondents more often predicted that they could remember more about events that occurred more frequently or later in childhood. Finally, predicted ability to remember more decreased with age. We return to the theoretical implications of these findings in the General Discussion.

FALSE MEMORY RESPONSES

The questionnaire in each study included an event that few if any of the younger respondents would have experienced: "As a young child, did you ever see a cigarette ad on TV?" The US stopped television advertising of cigarettes in 1971, and Canadian broadcasters followed suit in 1972. We assumed that few respondents born after such ads stopped in their country would have seen such ads, and consequently that most if not all claims of having seen such ads constitute a false-memory phenomenon. False memory is not the focus of the current manuscript, but we briefly summarise those results here.

Collapsing across the three data sets, 162 respondents were born after TV stopped broadcasting cigarette ads in their country of residence. Of these, 127 (78.40%) reported that they had seen cigarette ads on television during childhood. Further, 31.7% reported that they actually remembered seeing such ads (with 12.35% reporting "clear memories"). There were no gender effects. In Study 1 and its replication, there were no reliable relationships between responses to the cigarette-ad question and age. In Study 2, 20- to 29-year-olds (who probably never saw cigarette ads on TV) were just as likely to claim to have seen such ads (and have memories of them) as were 30- to 39-year-olds (who may well have seen such ads early in childhood).

Some of our young respondents may have seen cigarette advertisements on television while on

childhood stays in other countries, but it is likely that the majority of these reports were in error. Exposure to cigarette ads in magazines and newspapers, to television ads for other products, and to TV shows and movies depicting smoking characters likely lays a fertile ground for the creation of pseudomemories of viewing cigarette ads on TV. That is, we speculate that these past experiences provide a rich source of thoughts and images that come to mind when respondents ask themselves if they saw cigarette ads on television during childhood, and respondents often mistake those thoughts and images as evidence that they had seen such ads (see Jacoby, Kelley, & Dywan, 1989; Johnson, Hashtroudi, & Johnson, 1993; Whittlesea, 2002).

GENERAL DISCUSSION

Rated emotion of reportedly experienced events tended to be positive, whereas rated emotion of reportedly not-experienced events tended to be negative. This finding converges with other evidence indicating better autobiographical memory for positive than negative life experiences (e.g., Bahrick, 1998; Thompson et al., 1996). We found that this pattern held even when statistically controlling for event. This finding admits of at least three interpretations. Perhaps the most straightforward of these is that respondents chose to do things they liked (and avoid things they didn't like) in childhood. We believe that account is inadequate, because the relationship held for events that people do not choose to do, but that simply happen to them (e.g., have your tonsils removed; get checked for head lice; become lost alone and scared; laugh when drinking so that the drink came out your nose; break a bone in your body.). Another possibility is that people have a bias to assume that childhood events are less positive than they really are; hence, they give not-experienced events less positive ratings. Alternatively, it could be that people have a bias to remember their own experiences as being more positive than they really were (what one might term "retrospective Pollyannaism"). These three mechanisms are not mutually exclusive.

For some of the childhood events in our questionnaires, rates of saying "Not experienced" seemed suspiciously high, suggesting that some respondents may have forgotten that they had those experiences. Moreover, respondents often indicated that they had experienced childhood events but did not remember the events. Reports

of knowing in the absence of remembering are more interesting for some events than for others. For example, respondents might reasonably infer that they had their fingernails cut by a parent, even without remembering any such experience, because they know that it is normative for parents to cut their children's nails. Other events lend themselves less well to this interpretation. For example, across the three studies, 22 of the 147 respondents (15%) indicated that they were bitten by a dog during childhood reported that they had no memories of the incident. Similarly, 24 of the 162 respondents (15%) who said they had killed or tortured insects for fun indicated that they had no memories of doing so. Thus even for discrete events with a fairly low base rate of occurrence, some respondents reported autobiographical "knowing" in the absence of recollections.

For reportedly experienced events, there were substantial relationships between reported memory phenomenology and rated emotion. Events rated as emotional were more often said to be remembered (as opposed to merely known) than events rated as neutral. This result converges with Hyman et al.'s (1998) finding that when participants were explicitly instructed to generate one remembered childhood event and one known childhood event, the former was rated as more emotional. Our random-effects regression analyses showed that emotional intensity (i.e., squared emotion rating) was significantly related to memory phenomenology even when controlling for event (and, in the replication of Study 1 and in Study 2, when also controlling for reported age of oldest occurrence and reported number of times experienced). This constitutes powerful evidence that events viewed as emotional are more likely than those viewed as neutral to be remembered as opposed to merely known in adulthood.

Perhaps our most exciting finding is that reportedly experienced events rated as positive were more often said to be remembered (as opposed to merely known) than those rated as negative. Our findings indicate that this relationship was not an artifact of potential confounding differences between inherently negative versus positive events on our questionnaires, because this pattern was observed even with event and (in the replication and Study 2) reported age of oldest occurrence and reported number of times experienced statistically controlled. This finding might reflect enhanced recollection of positive events (e.g., due to greater rehearsal of such

events) and/or impaired recollection of negative events (e.g., due to poorer encoding of negative events or the operation of an inhibitory or "repression" mechanism).

Predicted ability to remember more about a reportedly experienced event paralleled reported current memory (although the relationship between these two variables with event statistically controlled was reliable only in the replication and in Study 2). That is, the better respondents' memories of an event, the more likely they were to indicate that they would be able to remember more about it if they spent additional time working at doing so.

Men and women responded similarly on most measures on our questionnaires. The one consistent exception was that in all three studies women rated events as more emotionally intense than did men. The replication found interactions between Gender and Age on two measures, but given the very restricted age range in that study those effects should be viewed with caution. In Study 2, men tended to rate events (experienced or not) more positively than women. Also, in that study the effect of emotional valence on memory reports for experienced events was greater among men than women, and the age-related increase in memory reports for experienced events was greater among women than men. Men and women were otherwise comparable in their reported memory phenomenology and in their predictions as to their ability to remember more about reportedly experienced events.

Some previous studies have found better autobiographical memory among women than men (e.g., Davis, 1999; Ross & Holmberg, 1990; Seidlitz & Diener, 1998), whereas others have found no gender differences (Davis, 1999; Rubin, Schulkind, & Rahhal, 1999). Most of the studies in which women outperformed men used methods in which recall was much less constrained than in the current studies (e.g., asking participants to write brief descriptions of as many positive life experiences as they could in a brief interval). It may be that the relatively specific cues and constrained response options used in the current studies attenuated any gender differences in memory for childhood. Relatedly, it may be that findings of better performance by women than men were due to gender differences in verbal fluency rather than to memory *per se*.

In Study 1 and its replication, in which most respondents were between 17 and 24 years old, age was unrelated to the proportion of events

reportedly experienced. Respondents in Study 2 ranged in age from 21 to 93 years, and that study did yield evidence of age-related forgetting of childhood experiences. It is possible that age-related changes in response criterion or cohort effects in the true base rates of occurrence contributed to that effect, and in any case age accounted for relatively little of the variability in the proportion of events that respondents indicated they had experienced as children. As per Bahrick's (2000) "permastore" construct, it may be that a pre-teen event that is remembered at age 17 is likely to be remembered at age 70.

In the first two studies, age was unrelated to memory phenomenology for reportedly experienced events (excepting an Age \times Gender interaction in the replication of Study 1, which we view with scepticism due to the small number of older respondents in that study). In Study 2, reports of memories of reportedly experienced events *increased* across the 72-year age range tested. No previously published study has asked a wide age-range of respondents to make remember/know judgements for childhood events, but other studies have examined age trends in other sorts of autobiographical memory reports (e.g., number and speed recalled; degree of specificity and detail; self-ratings of vividness). In a brief review of such studies, Cohen (1998) suggested that when the test puts little constraint on what memories are reported, older respondents tend to report frequently rehearsed (and hence highly vivid) recollections (see also Anderson, Cohen, & Taylor, 2000), but when the test constrains the memories to be reported (e.g., by asking for memories of a particular event) older respondents evidence losses in specificity, clarity, and detail. In the current studies, the cues were quite specific, but nonetheless memories of reportedly experienced events increased with age (especially among women). It may be that older respondents set a higher response criterion for reporting that they experienced a childhood event, such that they rarely do so unless they can recollect the event. This account is also consistent with the decline with age in the proportion of events reportedly experienced.

In Study 1 there was a reliable relationship between age and predicted ability to remember more about reportedly experienced events, but that relationship was carried entirely by the two eldest participants and was not obtained in the replication. The relationship re-emerged, however, in Study 2: compared to younger respon-

dents, older respondents were less likely to judge that they could remember more about reportedly experienced events (even though, as noted earlier, they were *more* likely than younger participants to report memories of reportedly experienced events). This pattern of findings suggests the operation of a metamemorial bias. It would be interesting to conduct a follow-up study in which participants of different ages were given the opportunity to work at remembering more about childhood events, to determine whether or not the age difference in predicted ability is born out by data on actual ability to report additional recollections with increased time working at doing so.

Our data do not enable us to make definitive conclusions, but they suggest a number of interesting phenomena, which we briefly recapitulate here. In line with recent studies using more elaborate suggestive procedures, responses to our cigarette ad question indicate that people can come to believe that they experienced childhood events that did not really happen. It also appears that people have a bias to view their childhood experiences as positive (compared to childhood events that they believe they did not experience). Additionally, respondents fairly often reported that they had experienced a particular event in childhood but that they had no memories of the experience itself. Moreover, consistent with psychodynamic views, our results suggest that people are more likely to recollect details of positive events than of negative ones (although it is impossible to say to what extent this is due to mechanisms that enhance remembering of the positive versus mechanisms that suppress remembering of the negative). Respondents' predictions as to their ability to remember more about reportedly experienced events appeared to be based partly on how much they currently remembered. Men and women responded similarly on our questionnaires, the one consistent exception being that women rated events as more emotional. Regarding age effects, older participants more often indicated they had not experienced particular events; this may be due to age-related forgetting of childhood experiences, but it is difficult to rule out the possibility that it is instead an artifact of age-related differences in response criterion or cohort effects in the base-rates of the events listed on our questionnaire, and in any case age accounted for relatively little variance in the proportion of events that respondents reported they had experienced. Finally, the

likelihood of recollecting reportedly experienced events increased with age, but respondents' predictions as to their ability to remember more about such events declined with age, suggesting the operation of a bias to believe (perhaps based on experience) that memories of childhood events become less accessible with time.

Manuscript received 1 May 2002
 Manuscript accepted 13 June 2002
 PrEview proof published online 25 July 2003

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