

Research Article

True Photographs and False Memories

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ABSTRACT—Some trauma-memory-oriented psychotherapists advise clients to review old family photo albums to cue suspected “repressed” memories of childhood sexual abuse. Old photos might cue long-forgotten memories, but when combined with other suggestive influences they might also contribute to false memories. We asked 45 undergraduates to work at remembering three school-related childhood events (two true events provided by parents and one pseudoevent). By random assignment, 23 subjects were also given their school classes’ group photos from the years of the to-be-recalled events as memory cues. As predicted, the rate of false-memory reports was dramatically higher in the photo condition than in the no-photo condition. Indeed, the rate of false-memory reports in the photo condition was substantially higher than the rate in any previously published study.

Psychologists have long been interested in memory illusions and distortions, because such errors can inform theories of how memory works (e.g., Bartlett, 1932; Schacter, 2001). In the 1990s, controversy regarding trauma-memory-oriented psychotherapies sharpened that interest in false memories, and led cognitive psychologists to test the hypothesis that suggestive influences can lead adults to “remember” childhood pseudoevents. Loftus and Pickrell (1995) introduced a procedure in which adult research subjects are given brief narrative descriptions of childhood events and asked to work on remembering those events. Subjects are told that all of the narratives were provided by their family members, but one of the narratives describes a pseudoevent that familial informants report subjects did not experience during childhood.

Across eight studies (published in six refereed journal articles) that used variants of this familial-informant false-narrative procedure, 116 of 374 subjects (31%) were scored as having false memories, with rates in individual conditions ranging from 0% to 56% (Hyman & Billings, 1998; Hyman, Husband, & Billings, 1995; Hyman & Pentland, 1996; Loftus & Pickrell, 1995; Pezdek, Finger, & Hodge, 1997; Porter, Yuille, & Lehman, 1999). Some of these studies differentiated

between “partial” and “complete” false memories: Although the operationalizations of these categories (and the terms used to label them) varied across studies, the gist of the distinction is that subjects classified as having complete false memories provided more evidence that they genuinely believed they were remembering the pseudoevent, as opposed to merely accepting that it occurred or speculating about it. Across studies making this distinction, 36 of 208 subjects (17%) were classified as having partial false memories and 41 (20%) were classified as having complete false memories. The highest rate of complete false memories in an individual study was 26% (Porter et al.).

In a previous study (Wade, Garry, Read, & Lindsay, 2002), we developed a new procedure in which subjects are given photographs of themselves as children and asked to remember the event depicted in each photo (see Koutstaal, Schacter, Johnson, & Galluccio, 1999, and Schacter, Koutstaal, Johnson, Gross, & Angell, 1997, for studies of the effects of interpolated photos on memory for staged events). Most of the photos (obtained from familial informants) were of events subjects experienced during childhood, but one photo was created by digitally inserting a childhood image of the subject into the basket of a hot-air balloon (an event that familial informants indicated subjects had not experienced). Of 20 subjects, 10 (50%) were classified as reporting memories of the hot-air balloon ride (30% partial, 20% complete).

It is not altogether surprising that doctored photographs like those we used are powerfully suggestive. After all, people perceive photographs as compelling evidence that the depicted events really occurred, and photos provide a rich source of information regarding the perceptual details of suggested events. These characteristics make the false-photo procedure a very useful method for studying false-memory phenomena.

Despite these strengths, the false-photo procedure suffers an obvious limitation in ecological validity and generalizability: People rarely encounter doctored photos of themselves doing things they have never really done. People do, however, sometimes review old family photo albums. Moreover, some trauma-memory-oriented psychotherapists and self-help books have recommended that adults who think they may have been abused in childhood but do not recall such abuse should review family photo albums (e.g., Dolan, 1991; cf. Poole, Lindsay, Memon, & Bull, 1995). The idea is that viewing photos of oneself and others in the childhood environment may cue long-forgotten memories of trauma. That may sometimes occur, but (when

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combined with other suggestive influences) reviewing childhood photos could also contribute to the formation of false memories. That is, if a person believes that certain kinds of events occurred in his or her childhood, and is motivated to recall such events, childhood photos constitute a source of detailed and vivid perceptual images that may be combined with products of imagination to yield compelling pseudomemories. The current research tested this hypothesis.

METHOD

Subjects

The subjects were 45 undergraduates (36 women and 9 men) who volunteered to participate and were rewarded with optional bonus points in an introductory psychology course.

Procedure

Each subjects' parents provided brief narratives describing two unique, school-related events experienced by their child, one event experienced in Grade 5 or 6 and the other in Grade 3 or 4. Parents were asked to avoid events that were oft-told family stories in favor of events that they thought their child might have some difficulty remembering. All parents reported that their child never experienced our target pseudoevent (putting Slime, a brightly colored gelatinous compound manufactured by Mattel as a toy, in the teacher's desk in Grade 1 or 2). Parents also provided their child's class photo (see Fig. 1) for each of the school years corresponding to target events, and the name and gender of their child's Grade 1 or 2 teacher.

In an initial one-on-one interview, the experimenter read each narrative aloud and asked the subject to recall it, starting with the Grade 5 or 6 event and working back in time to the Grade 1 or 2 pseudoevent. By random assignment, 23 of the subjects (18 women and 5 men) were given a photocopy of their school class's group photo for each year before the corresponding narrative was read to them (the photo and its copy were in color for all but 1 subject). The interviewer encouraged each subject to recall as much as possible about each event, using mental context reinstatement and guided-imagery exercises. The subject then rated (a) the extent to which the memory experience resembled reliving the event (from 1, *not at all*, to 7, *as clearly as if it were happening right now*), (b) the extent to which the subject felt he or she was remembering the event (same scale as for the reliving question), and (c) his or her confidence that the event had occurred as described in the narrative (from 1, *0% confident*, to 7, *100% confident*). The pseudoevent narrative was customized to use the subject's name and his or her teacher's name, as in the following example:

I remember when Jane was in Grade 1, and like all kids back then, Jane had one of those revolting Slime toys that kids used to play with. I remember her telling me one day that she had taken the Slime to school and slid it into the teacher's desk before she arrived. Jane claimed it wasn't her idea and that her friend decided they should do it. I think the teacher, Mrs. Smollett, wasn't very happy and made Jane and the friend sit with their arms folded and legs crossed, facing a wall for the next half hour.



Fig. 1. Example of the sort of school-class group photos used in the experiment. Note that this example, being the photo of the first author's Grade 2 class, is of somewhat older vintage than those used in the experiment, and that the original of the example and the photos used in the study were in color.

At the end of Session 1, subjects were told that for the rest of the experiment they were to focus their efforts on recalling the oldest of the events (i.e., the pseudoevent). They were asked to spend some time each day over the next week working at remembering more about that event, and were given a printed copy of the narrative (and, for subjects in the photo condition, a copy of the class photo) to use as a memory cue. Subjects were asked not to talk to others about the event. Four days later, the interviewer telephoned each subject to check on progress and encourage additional effort, again reading the narrative of the pseudoevent and fostering “recall” with mental context reinstatement and guided imagery. One week after the initial interview, subjects returned to the lab and were again encouraged to remember as much as possible about the pseudoevent, after which they rated their memories of it on the same scales used in Session 1. Subjects’ spoken memory reports were tape-recorded during both sessions.

Two trained judges (blind to the photo/no-photo manipulation) independently reviewed typed transcripts of subjects’ spoken reports of their memories of the pseudoevent and judged whether each subject experienced (a) no images or memories, (b) images but not memories, or (c) memories of putting Slime in the teacher’s desk. The images-but-no-memories category corresponded to what other researchers have termed partial false memories, and applied to cases in which the subject described images associated with the suggested event but did not appear to experience those images as memories of the event per se. Judges were to classify a report as memories only if the subject appeared to believe that he or she was remembering the suggested event. For the Session 1 reports, judges agreed in their categorizations for 42 (93%) of the subjects, and for Session 2 they concurred for 44 (98%) of the subjects. Disagreements were settled by discussion. Judges rated their mean confidence in each categorization, on a scale ranging from 1 (*low*) to 3 (*high*); for Session 1 the mean was 2.83 ($SD = 0.38$), and for Session 2 the mean was 2.80 ($SD = 0.27$).

RESULTS

Means of subjects’ Session 1 memory ratings of the true events from Grades 5 or 6 and 3 or 4 are shown in Table 1. A mixed-model analysis of variance (ANOVA) of the effects of condition (photo vs. no photo) and event (Grade 5–6 vs. 3–4) on these measures indicated a non-reliable tendency for ratings to be slightly higher for the more recent event, $F(1, 43) = 3.57$, $MSE = 6.64$, $p = .07$, $\eta^2 = .08$. In five of the six comparisons, the mean rating was directionally higher in the photo than the no-photo condition, but this effect did not approach significance ($F < 1$). There were no interactions (all F s < 1).

Figure 2 depicts judges’ categorizations of subjects’ memory reports regarding the pseudoevent. The no-photo condition of our experiment

is analogous to the familial-informant false-narrative paradigm, and the results in this condition are consistent with those of studies using that paradigm: In Session 1, 13.6% of the subjects in the no-photo condition were judged to have memories of the pseudoevent, and an additional 31.8% were classified as having images but no memories. The results were also consistent with prior research in that these values increased somewhat in Session 2, with 22.7% of the subjects in the no-photo condition judged as having memories of the pseudoevent, and an additional 22.7% classified as having images but not memories. Most prior publications have collapsed results across partial and complete false memories. By that standard, 45.5% of the subjects in our no-photo condition would be said to have developed false memories of the Slime event by Session 2.

We hypothesized that false reports would be even more common in the photo condition. The data pattern from Session 1 fit that prediction, but the tendency for Session 1 false-memory reports to be more common in the photo than no-photo condition did not approach statistical significance, $\chi^2(1, N = 45) = 1.84$, Fisher’s exact $p = .28$, $\phi = .20$, when measured with the relatively strict memories criterion, and $\chi^2(1, N = 45) = 1.78$, $p = .18$, $\phi = .20$, when either memories or images were classified as false memories. In Session 2, however, 65.2% of the subjects in the photo condition were judged to have memories of the pseudoevent, and an additional 13% were scored as having images but not memories, for a total of 78.2%. False reports in Session 2 were significantly more common in the photo than the no-photo condition, both when measured with the relatively strict memories criterion, $\chi^2(1, N = 45) = 6.50$, $p < .02$, $\phi = .38$, and when measured with the less strict criterion combining reports classified as memories and as images but not memories, $\chi^2(1, N = 45) = 5.15$, $p < .03$, $\phi = .34$.

Subjects rated their memories of the suggested event using the same scales with which they rated their memories of the true events (see Table 2). The key finding is that ratings were significantly higher in the photo than the no-photo condition, $F(1, 43) = 5.31$, $MSE = 8.97$, $p = .03$, $\eta^2 = .11$. Also, ratings increased across sessions, $F(1, 43) = 19.83$, $MSE = 1.99$, $p < .001$, $\eta^2 = .30$, and there was a nonsignificant tendency for that increase to be slightly greater in the photo than the no-photo condition, $F(1, 43) = 2.65$, $p = .11$, $\eta^2 = .04$.

Even in the photo condition, Session 2 ratings for the suggested event were lower than Session 2 ratings for the true events (especially the Grade 5 or 6 event). Of course, one would expect memory ratings of a *true* Grade 1 or 2 event to tend to be lower than memory ratings of events in later grades. Moreover, the means in Table 2 were calculated using the ratings of all subjects, whether they were or were not judged to have false memories of the suggested event. Figure 3 depicts subjects’ mean memory ratings as a function of judges’ categorization

TABLE 1

Subjects’ Mean Ratings of Their Memory Experiences for the True Events as a Function of Condition

Measure	Grade 5 or 6		Grade 3 or 4	
	No photo	Photo	No photo	Photo
Reliving	4.14 (1.64)	4.26 (0.96)	3.55 (1.90)	3.70 (1.55)
Remembering	4.86 (1.58)	4.91 (1.41)	4.23 (1.59)	4.17 (1.59)
Confidence	6.00 (1.63)	6.35 (0.98)	5.46 (1.82)	5.87 (1.79)

Note. Standard deviations are in parentheses. Rating scales ranged from 1 (low) to 7 (high).

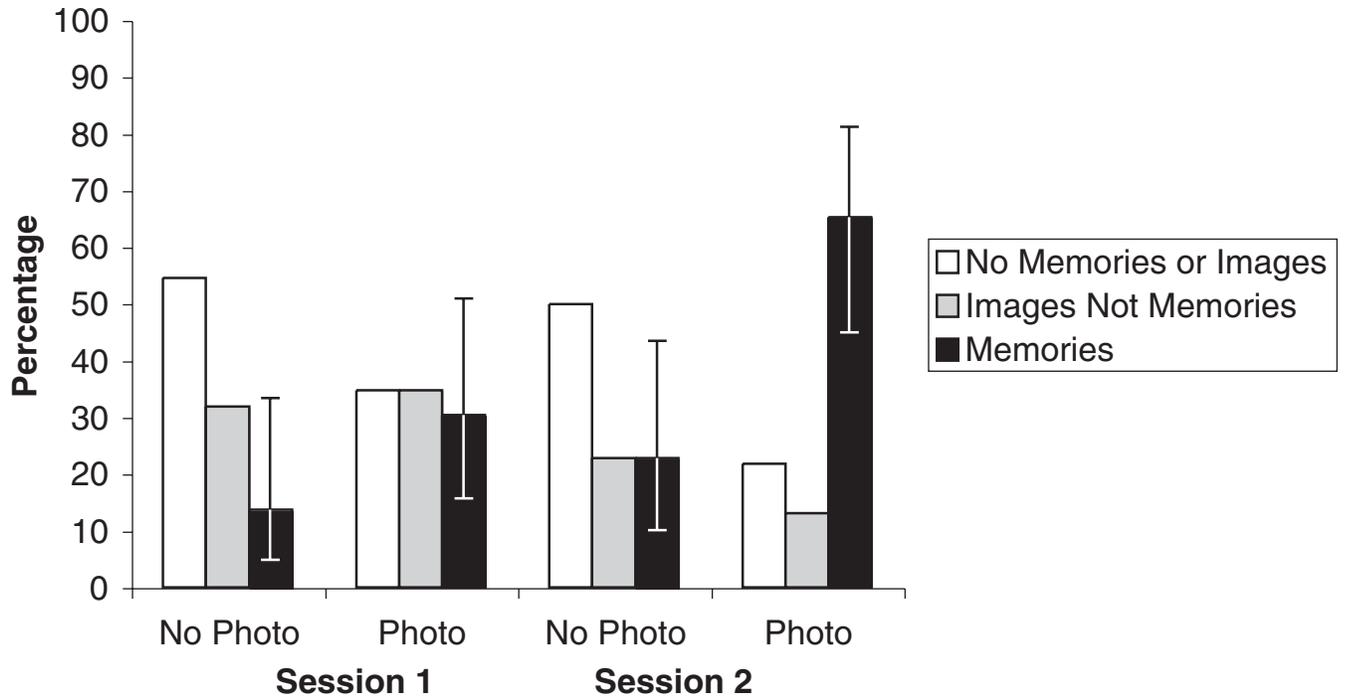


Fig. 2. Percentage of subjects classified as having no memories or images, images but not memories, and memories of the pseudoevent, as a function of experimental condition and session. The error bars represent 95% confidence intervals around the proportion of subjects classified as having memories of the suggested event, calculated using VassarStats (Lowry, 2003).

of subjects' reports, collapsed across the photo and no-photo conditions. Three things are worth emphasizing about these data. First, there was strong convergence between the judges' categorizations and subjects' self-ratings (e.g., subjects who were judged to have neither images nor memories indeed selected ratings near the bottom of the scale on each measure). Second, ratings of memories of the pseudoevent by subjects categorized as having false memories were equivalent to (and sometimes directionally greater than) ratings of memories of the true events. This indicates that these subjects' false memories were as compelling as memories of the true events, at least on these dimensions. Third, ratings of subjects classified as reporting images but not memories were more similar to ratings of subjects classified as having neither memories nor images than they were to ratings of subjects classified as having memories. This suggests that the images-but-no-memories category should not be considered tantamount to false memories.

During debriefing, subjects were informed that one of the three events they had been asked to remember in the experiment was a made-up false event, and asked which event they thought was the false one. All but 3 subjects (1 in the photo condition and 2 in the no-photo condition) correctly identified the Grade 1 or 2 event as the pseudoevent. When subjects were informed that one of the events was false, it may have been obvious to them that this was the Grade 1 or 2 event because most of the experiment had focused on that event and they typically had to work at "remembering" anything about it. That these sorts of analytic bases may have contributed to selection of the Grade 1 or 2 event as the false event is supported by several subjects' spontaneous expressions of surprise during debriefing. That is, even subjects who chose the Slime event as the false event often expressed surprise when the experimenter confirmed that it had not really occurred (e.g., "I had no idea"; "I can't believe that . . . I can remember parts of it"; "You mean that didn't happen to me?" "Oh,

TABLE 2
Subjects' Mean Ratings of Their Memory Experiences for the Suggested Event as a Function of Session and Condition

Measure	Session 1		Session 2	
	No photo	Photo	No photo	Photo
Reliving	1.41 _a (0.73)	2.09 _b (1.35)	2.00 _b (1.31)	3.22 _c (1.54)
Remembering	1.50 _a (1.01)	1.96 _a (1.26)	1.91 _{ab} (1.48)	2.83 _b (1.61)
Confidence	1.91 _a (1.19)	2.46 _a (1.51)	2.36 _a (1.81)	3.59 _b (1.99)

Note. Standard deviations are in parentheses. Rating scales ranged from 1 (low) to 7 (high). Means in the same row that do not share subscripts differ at the $p < .05$ level.

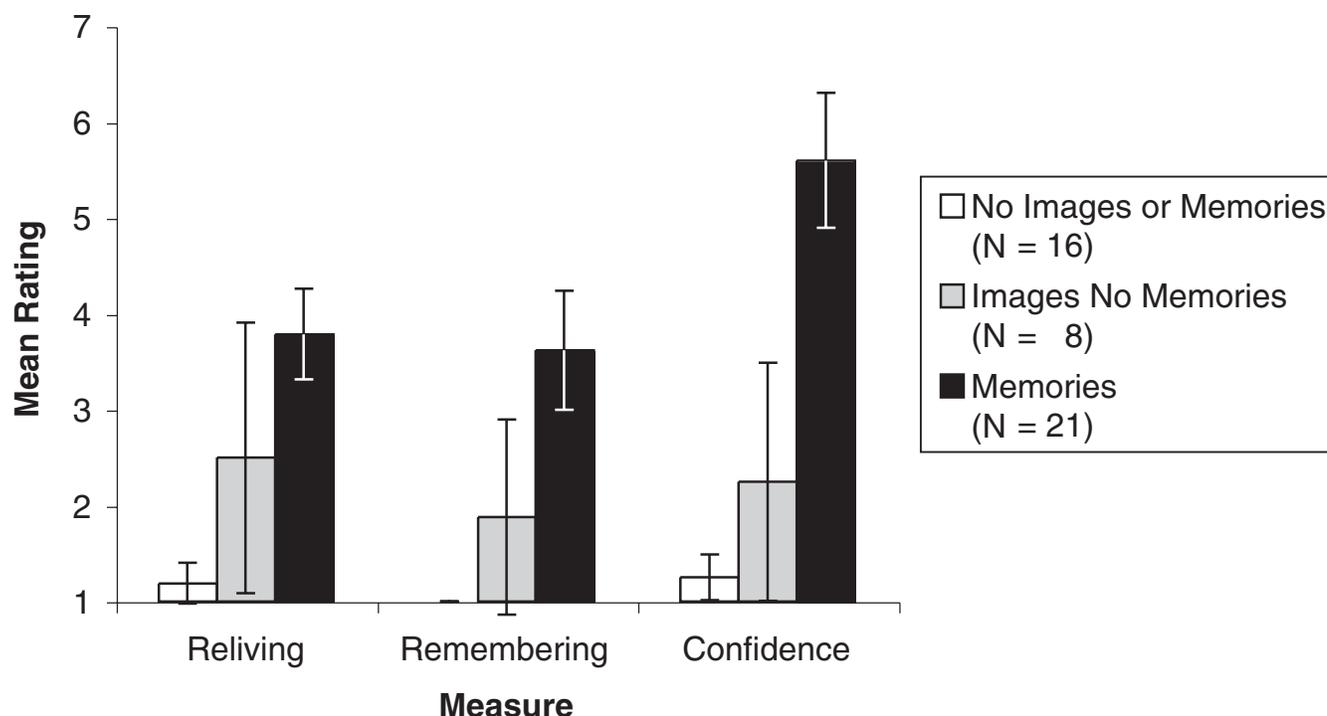


Fig. 3. Subjects' mean ratings as a function of judges' categorization of subjects' memory reports of the pseudoevent. The error bars show 95% confidence intervals, which were calculated around the individual cell means and so are not specific to particular comparisons.

really? Holy!" "No way! I remember it! That is so weird!" "It was? Oh, really?" "If you didn't tell me it was a false event, I would have left here thinking I did this.").

DISCUSSION

The results from our no-photo condition converge with prior evidence that combining a plausible narrative attributed to a family member with social pressure, demand characteristics, and sustained memory-recovery techniques can lead a substantial percentage of undergraduate subjects to report memories of a childhood pseudoevent. Additional research is needed to assess the relative contributions of the various components of these suggestive influences in fostering false-memory reports.

Our central finding is that supplementing the other suggestive influences with a photo associated with (but not depicting) the suggested pseudoevent doubled the rate of false-memory reports, yielding a substantially higher rate of false-memory reports than any prior study. Even when we used a relatively strict criterion for judging whether subjects experienced memories of the suggested event, two thirds of the subjects in the photo condition were classified as having developed false memories (more than twice the previous high, reported by Porter et al., 1999, of 26%). These findings are particularly dramatic in that subjects judged as having false memories gave quite high ratings of the extent to which they felt they were remembering the event, of the extent to which remembering the event was like reliving it, and of their confidence that the event had actually occurred. Indeed, these subjects' ratings of their memories of the pseudoevent were comparable to their ratings of memories of the later-childhood true events. Of course, this finding does not mean that our subjects' false memories were in all ways

indistinguishable from accurate autobiographical recollections, but it does suggest that the pseudomemories were often experienced as quite compelling.

What explains the dramatic effect of the true-photo manipulation? One possibility (suggested by M.K. Johnson, personal communication, July 19, 2002) is that having the photos encouraged subjects in the photo condition to spend more time at the remembering task between Sessions 1 and 2 (e.g., because seeing the photo around one's residence might act as a prompt to work on the task or because having the photo might make the task more engaging). At the end of Session 2, subjects were asked how many times they had worked on the remembering task between Sessions 1 and 2. The photo ($M = 6.00$, $SD = 3.58$) and no-photo ($M = 5.68$, $SD = 2.59$) conditions did not differ on this measure, $F < 1$. This self-report measure is of unknown validity, but these findings do not support the idea that subjects in the photo condition spent more time working at remembering the pseudoevent.

We speculate that three different mechanisms may have contributed to the dramatic effect of the photo. First, it may be that the photo added to the authoritativeness of the suggestive narrative. That is, even though the photo did not depict the Slime prank, its presentation may have added to subjects' confidence that the suggested event really happened (cf. Paddock & Terranova, 2001). Second, the photo may have enabled subjects to speculate about details of the pseudoevent (e.g., "Who would my collaborator in the Slime prank have been?"). Hyman and Billings (1998) reported that subjects who freely speculated about a suggested pseudoevent during an initial interview were more likely than other subjects to later be scored as reporting false memories. Subjects in our no-photo condition may have had difficulty entering into such speculations because of inability to recall relevant details, such as the appearances of their classmates and teacher in

Grade 1 or 2. Finally, memories of perceptual details from the photo (e.g., the teacher's appearance) may have subsequently been blended with products of imagination to produce vivid images of the pseudoevent, thereby contributing to subjectively compelling false memories (as per the source-monitoring framework of Johnson and her coauthors, e.g., Johnson, Hashtroudi, & Lindsay, 1993).

Articles reporting false-memory-induction studies (and citations of such studies in secondary sources) sometimes collapse across partial and complete false-memory reports, either by not distinguishing the two categories at all or by emphasizing the sum of both when summarizing the false-memory rate. Our findings suggest that this may not be appropriate, because the self-ratings of subjects classified as having images but not memories (analogous to what others have termed partial false memories) more closely resembled the self-ratings of subjects judged to have neither memories nor images than they resembled the ratings of subjects judged to have false memories. Casual inspection of the transcripts reveals that subjects categorized as experiencing images but not memories often appeared to be speculating about, rather than remembering, the suggested event (e.g., they said things along the lines of, "Well, it probably would have been . . ." or "I probably would have felt . . ."). Such speculations may be an important step toward developing pseudomemories (as per Hyman & Billings, 1998), but given the low ratings such subjects reported on measures of remembering, reliving, and confidence, mere images do not appear to warrant being called false memories.

The pseudoevent in our study was designed to be a distinctive, memorable, one-off event with a modicum of emotional "zing," and to be neither entirely implausible nor likely actually to have occurred. Extant research indicates that the likelihood of false memories is moderated by numerous variables, including the nature of the suggested event (see Lindsay & Read, 2001). Our Slime event differs dramatically and in numerous ways from childhood sexual abuse, so the absolute rate of false memories in our study cannot be used to predict the probability of false memories of childhood sexual abuse. Indeed, it cannot even be assumed that the true-photo effect obtained with the particular event and photos used in this study will generalize to other relatively innocuous childhood pseudoevents. Nonetheless, there is little reason to doubt that the mechanisms involved in our effect can contribute to other sorts of false memories, and therefore our results warrant concern about the riskiness of encouraging clients to review old photo albums during attempts to "recover" suspected but nonremembered histories of childhood sexual abuse.

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