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# The Influence of an Early Interview on Long-Term Recall: A Comparative Analysis

TRACY TIZZARD-DROVER and CAROLE PETERSON*

*Memorial University of Newfoundland and Labrador, Canada*

SUMMARY

Because of burgeoning participation by children in forensic situations there is significant concern about children's memory for stressful events. Influence of timing of the first interview and interview frequency on long-term recall were evaluated by comparing three groups of 3- to 9-year-olds 1 year after an injury requiring emergency room treatment. One group had one interview, a year after injury; another group had two interviews, immediately and a year later; the third group had three interviews, immediately, 6 months and a year after injury. The type of event and timing of the initial interview influenced completeness and accuracy of recall after 1 year. All children showed extensive recall but having an immediate interview was associated with greater completeness and accuracy for 3–4-year-olds but not older children. This suggests a social influence: a highly structured and organized early interview may have beneficial effects on memory for preschoolers. Implications for questioning and testimony are discussed. Copyright © 2004 John Wiley & Sons, Ltd.

In recent years there has been a great deal of emphasis on children's long-term memory. This topic is forensically relevant since children's participation in the judicial system is significantly increasing and it is important to understand the level of accuracy of their recollections over the long-term as it bears directly on whether they will be considered credible witnesses. The legal profession believes that with the passage of time children's memories become especially vulnerable and that the younger the child the more deleterious the effect (Flin, Boon, Knox, & Bull, 1992). Because many children are not interviewed for the first time until considerable time has passed it is imperative to understand how the delay between event occurrence and testimony can affect children's memory. Many studies document children's accurate recall of stressful events over the short-term (e.g. Peterson & Bell, 1996; Rudy & Goodman, 1991), but because delays in the judicial system are typical, researchers are increasingly directing their attention to young children's *long-term* recollections of personally experienced, stressful events (Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001; Peterson & Whalen, 2001; Quas et al., 1999).

*Correspondence to: C. Peterson, Psychology Department, Memorial University of Newfoundland and Labrador, St John's, Newfoundland, Canada A1B 3X9. E-mail: carole@mun.ca

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There are studies that have assessed children's long-term recall over delays of 5 or more years (Hudson & Fivush, 1991; Peterson & Whalen, 2001; Pillemer, Picariello, & Pruett, 1994; Quas et al., 1999). Although the amount recalled in these studies was often quite sparse, albeit reasonably accurate (Hudson & Fivush, 1991; Pillemer et al., 1994), they *do* indicate that young children could recall details of personal events many years later. Although the child personally experienced these events, the events may not necessarily be sufficiently salient or personally relevant to the child to influence how much and what is remembered. Rudy and Goodman (1991) suggested that personally relevant, real-life experience heightens recollection and Quas et al. (1999) suggest that the nature of the events being recalled may play a key role in long-term recall, such that emotional events may be retained in memory much better and for longer periods of time than non-emotional events. Indeed, it seems that target events that are both personally experienced and personally striking may be better retained over long delays.

Peterson (1996, 1999; Peterson & Bell, 1996; Peterson & Whalen, 2001; Peterson, Moores, & White, 2001) investigated the recall of personally relevant memories of young children over significant delays (6 months to 5 years). Following an injury requiring emergency room (ER) treatment investigators would initially interview the parent and child within a week of the injury. Follow-up interviews occurred at 6 months (Peterson, 1996; Peterson & Bell, 1996), 1 year (Peterson et al., 2001), 2 years (Peterson, 1999; Peterson et al., 2001), or 5 years (Peterson & Whalen, 2001). These investigators examined memory of children aged 2–13 years and found little difference between 5- and 13- year-olds, and while 3–4 year-olds had less recall than older children, 2-year-olds remembered still less. They concluded that although very young preschoolers would pose the most difficulty for forensic interviews, 3-year-olds could accurately recall significant amounts of detail about highly salient events (Peterson, 1999; Peterson & Bell, 1996).

The Peterson studies involve a key methodological component that needs further examination. All studies had at least one interview prior to the delayed interview with most occurring shortly after the target event, usually within several days. In Poole and White's (1993) 2-year follow-up, all of the children, even the 'delayed interviewing' group from the initial study (1991) had a prior interview within 1 week of the event. Follow-up interviews may be delayed anywhere from 6 months (Peterson & Bell, 1996), 1 or 2 years (Burgwyn-Bailes et al., 2001) to 5 years (Peterson & Whalen, 2001; Quas et al., 1999) after the target event. By interviewing children shortly after the target event using a highly structured format, it may be possible that interviewers are providing a well-organized template which systematically enhances children's memory. Yet in the absence of initial questioning directly following the event, recalled memories are often treated as suspect. Therefore it is important to identify and assess the dynamics of early interviews. Namely, it is unknown what role a structured interview may have played in the initial consolidation of these apparent long-term memories such that a structured interview shortly following the event might serve to genuinely 'inoculate' children from forgetting.

Theoretical reasons and supportive evidence outline the possible dynamics of the influence of an early interview. First, an interview conducted shortly after the target event could essentially have a consolidating effect on the memory that will serve to buffer or 'inoculate' against forgetting (Brainerd & Ornstein, 1991; Brainerd, Reyna, Howe, & Kingma, 1990; Fivush & Hamond, 1990). The initial interview can serve as a partial re-exposure to, or reinstatement of, the original event (Brainerd & Ornstein, 1991; Fivush & Schwarzmueller, 1995) thereby increasing the accessibility of the original memory for subsequent retrieval (Howe, Courage, & Bryant-Brown, 1993). Secondly, organized,

 

systematic questioning of events, timing, players, and places may also serve to organize details in memory and, therefore, attenuate forgetting and facilitate subsequent recall (Fivush & Schwarzmueller, 1995).

The idea that early initial questioning may facilitate the consolidation of the memory has important theoretical implications, but pragmatically forensic interviews often occur following significant delays. It is therefore important to understand the dynamics of recall accuracy when formal questioning of a stressful event is delayed. Initially it was thought that early interviews would result in more accurate recall regardless of delay (Hudson, 1990). However, Baker-Ward, Gordon, Ornstein, Larus, and Clubb (1993) demonstrated that early questioning does not always facilitate later recall, especially when there is a lengthy interval before the second interview. Fivush and Schwarzmueller (1995) furthered suggested that initial recall need not be immediate to facilitate later memory. Pipe, Sutherland, Webster, Jones, and LaRooy (in press) found that an initial interview *could* have significant positive effects on the amount and accuracy of long-term recall, but the effect of the initial interview depended on the timing of that interview. More specifically, when the initial interview is delayed 6 months there is a positive long-term effect on the amount and accuracy of children's reports over 2 years, whereas an early interview resulted in greater consistency in information across interviews. They re-interviewed 66 children who had participated in an earlier Jones and Pipe (2002) study at 1 and 2 years. These children were 5–6 years of age when they participated in a non-stressful, structured event, and they had been initially interviewed immediately or after 1 day, 1 week, 1 month, or 6 months. Pipe et al.'s (in press) findings are consistent with predictions that memories re-activated after a long delay will have great facilitative effect on retention as retrieval is more effortful and the weakened memory must be re-activated (Rovee-Collier, 1995). What is unclear is whether there would be similar results if initial questioning was delayed longer than 6 months and especially if the target event was stressful and highly salient.

The goal of the present study was to investigate the influence of an initial interview on long-term memory of stressful events and is an adoption of Peterson and Bell's (1996) methodology. Specifically, the memory retention of children who were interviewed shortly after a stressful event will be compared with that of children who were initially interviewed a year following the event. In addition, the memory of a subset of these two groups of children will be compared with that of other children who were interviewed twice before their 1-year interview, namely after a few days and again at 6 months. The interview was highly structured, asking children specific questions about location, actors, timing and emotional aspects of injury and treatment, using mostly open-ended questions. For purposes of analysis, information was separated into two categories: injury and hospital information, and it was predicted that subsequent recall amounts and accuracy of relevant details would be similar to that of previous studies using this methodology. It was therefore hypothesized that these stressful events would be remembered regardless of an early initial interview.

## METHOD

### Participants

Three age groups as well as three different cohorts were used in the present research. The choice in age groups (3–4-year olds, 5–7-year olds and 8–9-year olds) reflects previous findings that these ages captured developmental changes in amount and accuracy of recall

 

(Peterson, 1999; Peterson & Bell, 1996). The cohorts represent children recruited for the present study plus two comparison groups taken from previously collected data. The children most recently recruited had their initial interview 1 year after the injury; one comparison group contained children who were interviewed twice, once immediately after the injury and again 1 year later (Peterson & Rees, 2003). The final group of children had three interviews, one immediately after, one at six months, and the third at 1 year post-injury (see Peterson, 1999, and Peterson & Bell, 1996). These two comparison groups allowed us to analyse the effect of having a yearlong delay for the initial interview on recall amount and accuracy.

For the present study 62 preschool and school-aged children were recruited from the ER of a children's hospital, the only facility treating children (birth to age 16) in a metropolitan area in Canada. The sample was of mixed socio-economic status (SES), mostly white, and resided in nearby cities or surrounding communities. The children had experienced what were considered by the ER staff to be trauma injuries that necessitated a visit to the ER, including broken bones, lacerations requiring sutures, dog bites, and burns. All children received outpatient care and were then sent home. These children were, at the time of the injury, aged 3–9 years. Of these, 53 were available 1 year later. Five of the parents could not be reached, one moved to another province, two of the children did not wish to participate and one of the tape recordings was incomplete. The final sample included 18 3–4-year-olds (mean age: 3 years 8 months), 17 5–7-year-olds (mean age: 6 years 4 months) and 18 8–9-year-olds (mean age: 9 years 1 month).

A total of 88 interviews from previous samples were used in comparisons. There were two comparison groups: one had an initial interview and another one a year after the injury (0 and 12 months); the other group had an initial, a 6-month and a 1-year follow-up interview (0, 6 and 12 months). Comparisons were made to evaluate children's long-term memory for those who had only one interview (12 months) versus those that had two (0 and 12 months) and three interviews (0, 6 and 12 months). Children from extant data sets were chosen to match the age groups of the present study, and to facilitate analyses; the same numbers of participants were randomly selected to match each age group.

For the 0 and 12 months group, 8–9-year-olds were not recruited. For analyses involving this comparison group, only two age groups were used: 18 3–4-year-olds (mean age: 3 years 9 months) and 17 5–7-year-olds (mean age: 5 years 8 months). The 0, 6 and 12 months group included all three age groups: 18 3–4-year-olds (mean age: 3 years 9 months), 17 5–7-year-olds (mean age: 5 years 9 months), and 18 8–9-year-olds (mean age: 8 years 8 months). See Table 1 for details. The total numbers of subjects for the 0 and 12 months group and the 0, 6 and 12 months group were 35 and 53 respectively.

Recruitment for all three groups spanned 6 years. The authors acknowledge that differential recruitment presents confounds such as children injured in different years, variation in treatment personnel at hospital, different recruitment personnel, and different people scoring data. However, it was judged that such confounds did not pose a significant threat to the reliability and validity of results since interviewers were rigorously trained by the same person (Peterson) with the interview protocol remaining unchanged. The supervisor of recruitment and interviewing has been the same throughout the collection of data and periodic and consistent testing of interviewers is a requirement of the interviewing process. In addition, the person who reads all the transcripts and trains people in scoring data has also remained the same across the entire collection of children, and routinely compared earlier and later transcripts for scoring consistency. Furthermore, the ER is a training facility through which a large number of residents and physicians

 

Table 1. Sample size, mean age and age range for each interview group

| Interview(s) | Age groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3–4 | | | 5–7 | | | 8–9 | | |
| | *N* | *M* age (years; months) | Age range (years; months) | *N* | *M* age (years; months) | Age range (years; months) | *N* | *M* age (years; months) | Age range (years; months) |
| 12 months (present study) | 18 | 3;8 | 2;11–4;11 | 17 | 6;4 | 5;2–7;11 | 18 | 9;1 | 8;2–9;9 |
| 0 and 12 months* | 18 | 3;9 | 2;6–4;11 | 17 | 5;8 | 5;2–6;10 | N/A | N/A | N/A |
| 0, 6 and 12 months* | 18 | 3;9 | 3;2–4;9 | 17 | 5;9 | 5;4–6;11 | 18 | 8;8 | 8;0–9;11 |

*Comparison group.

regularly rotate, and all of whom were trained and supervised by the same supervisory staff. Finally, there have been no major changes across cohorts. The selection of children treated at the hospital as well as the catchment area of the hospital have remained the same throughout recruitment for all three groups. SES and racial composition of sample were not deemed significant problems since according to the 2001 census information provided by Statistics Canada the area from which the sample was chosen is approximately 99% Caucasian and the hospital used in the research is the only tertiary level care facility in the province and is publicly funded such that all children go there for this service.

## Procedure

At the time of initial recruitment, families of injured children were approached in the ER and asked to be part of a long-term study of children's memory of stressful events. The study was briefly described, informed consent forms were signed and permission for telephoning was established. The majority of families agreed to participate (81%).

The first visit for the 12 months group entailed only an interview with the parent. The interview format was the same as for child interviews (see below). It took place either in the homes of the children or at a location that was comfortable for the parent, within a couple of weeks of the injury (median delay (days) = 12, range (days) = 2–58) and lasted approximately 20 min. For some injuries, a parent was not a witness and thus relevant other witnesses were interviewed, with parental permission. These included daycare workers, cousins, and siblings. However, a parent was always a witness to hospital treatment and therefore always interviewed. The information obtained from witnesses in the initial interviews provided a baseline from which to evaluate the completeness and accuracy of child interviews. Although it is possible that children may report more reliable information than adults, when multiple witnesses were interviewed there was no disagreement. Thus, for practical purposes the authors assumed that since interviews were conducted shortly after the event, adults' recall was accurate. The children were

 

interviewed approximately 1 year from the date of their injury (median delay = 12 months, 11 days; range = 11 months, 4 days–13 months, 22 days).

For the comparison groups the initial interview included an interview with both child and parent and, if necessary, other relevant witnesses. The interviews usually took place within a week or so of the injury (0 and 12 months group: median delay = 7 days; range (days) = 2–42; 0, 6 and 12 months group: median delay = 6 days; range (days) = 1–22). The follow-up interview for the 0 and 12 months group took place a year later (median delay = 12 months, 12 days; range (days) = 9–27). The 0, 6 and 12 month interview group had their follow-up interviews 6 months (median delay = 6 months, 0 days; range (days) = 14) and 1 year after injury data (mean delay = 12 months, 11 days; range (days) = 24).

For 1-year follow-up visits, only the child was interviewed, using the same interviewing format as before. When contacted, parents were asked not to discuss or rehearse the incident with the child prior to the visit. Rapport was first established between interviewer and child and then the interview was conducted. The interview was extensive and organized, asking children to recall events surrounding the injury, subsequent treatment and pre- and post-ER events. The interview began with free recall ('Tell me about your injury.' 'Tell me about what happened at the Janeway Hospital.') followed by probed recall using wh-questions ('What happened? Where were you when it happened? What did you do when you first got hurt? Who was there?'). In all interviews yes/no questions were avoided as much as possible. Because relatively few yes/no questions were asked and the responses are considered problematic for preschoolers (Peterson & Biggs, 1997; Peterson & Grant, 2001; Peterson, Dowden, & Tobin, 1999), responses to these questions were not analysed further. See Peterson and Bell (1996) for a detailed interview protocol.

If children provided information about a specific element in free recall, they were not also asked about it in probed recall. This questioning procedure was chosen in light of concerns raised about the effects of repeated questioning to elicit the same content (Fivush & Schwarzmueller, 1995). Interviews were audio-recorded and transcribed verbatim with all scoring done from transcripts. In situations in which the child responded non-verbally (e.g. 'What did you hurt?' and the child pointed to the part of their body that was injured, the interviewer stated the child's action for the tape recorder (e.g. 'You are pointing to your left wrist'), and these responses would be counted as the child providing a content response. The average duration of a child interview was 30 min. Consent by both the parent (written) and child (oral) was required for all interviews. The Human Research Ethics Committee and the Human Investigation Committee of Memorial University approved all aspects of the study.

### Scoring of recall data

Even though all children experienced a personally unique injury and hospital treatment, they all resemble a prototypical pattern that included various components from both injury and hospital treatment. Many prototypic items included in the scoring were applicable to all children (e.g. place where injury occurred, who brought them to the hospital), while others applied only to a subset of children (e.g. getting a cast, having a needle). The prototypic items that applied to each child were determined from inspecting the parent transcripts. For examples of questions used in scoring items see Peterson and Bell (1996). Previous research shows that children vary substantially in their completeness and accuracy of recall with respect to the injury and its treatment (Peterson, 1999; Peterson

 

& Bell, 1996). Consequently, the present analyses also divided all prototypic items into injury or hospital treatment. Recall items were counted only once and designated as free or probed recall. Free recall was analysed separately but probed recall was not since information provided in free recall was not asked again. Rather, total recall (the sum of free plus probed recall) was analysed. Because there was variation in how many prototypic elements applied to individual situations, different children had different numbers of 'scorable' items that were relevant to them and thus could potentially be present in their recall of each of the two events (i.e. injury and hospital treatment). However, we have found that children typically have 19 relevant injury elements and 24 relevant hospital elements that could be potentially recalled. Of the total items that could potentially be recalled children, on average, remembered 16/19 (84%) relevant injury details and 13/24 (53%) relevant hospital details.

After determining which components of the prototype applied to each child, the child's transcripts were searched to determine, first, whether the child supplied information relevant to each prototypic component in each interview. If such information was provided, it was then compared with the information provided by adult witnesses in order to assess accuracy. The coding of 'accurate' was not only given for complete agreement between child and adult responses, but also for close approximations. For greater detail about scoring recall data see Peterson and Bell (1996). To establish reliability, two raters scored 15% of the transcripts, and agreement on recall completeness and accuracy averaged 95%.

The evaluation of the child's completeness of recall (Completeness of memory) was directed towards answering the question 'How much of what happened does the child accurately remember?' The completeness of a child's recall of each category was calculated by dividing the number of component items correctly recalled by the number of component items that were relevant for that child according to the witness report and thus could potentially have been recalled. This proportion of recalled relevant components was presented separately for the injury and hospital treatment events. Proportions were calculated for both total recall scores and free recall scores.

The accuracy (Accuracy of memory) of the children's recall was determined by dividing the number of correct prototypic components by the number of all relevant components the child provided including errors. This analysis was directed at answering the question 'How much of what they do say is accurate?' Thus, instead of using the *possible* components that children potentially could have recalled as the denominator (as in the analysis of completeness of memory), the actual components that the child *did* remember were used. In this analysis, only commission errors were counted, that is, instances in which a child stated information that was explicitly contradicted by the adult witness's report. The number of commission errors about prototypic components was counted for each episode of injury and hospital treatment separately and the proportion correct of the actual prototypic components that had been provided by the child was calculated.

## RESULTS

The analyses were performed in two ways. First, a comparison of all three age groups was conducted using a mixed ANOVA with age (three levels), and number and timing of interviews (1 vs. 3) as the between participants variable and event (injury vs. hospital) as the within participants variable. Second, another comparison of the two younger age

 

groups (3–4-year-olds and 5–7-year-olds) over all three interview levels was done, using a mixed ANOVA with age (two levels), and number and timing of interviews (three levels) as the between participants variable and event (injury vs. hospital) as the within participants variable. Preliminary overall analyses were completed including gender, but no significant effects were found. Gender was, therefore, excluded from further analyses.

## Total recall scores

*Completeness of memory*

To examine the effects of frequency and timing of interviews on the completeness of children's long-term recall, the memory performance of the three interview groups in their 1-year interviews was compared. Table 2 includes the mean percentages and standard deviations of children's completeness of memory for total recall. Children in all interview groups showed extensive recollection of the event at their 1-year follow-up interview. When all three age groups were compared across the two levels of interviews (12 months and 0, 6 and 12 months) it was found that children recalled a greater percentage of relevant detail about the injury ($M = 73.5\%$) than the hospital treatment ($M = 54.9\%$) $F(1, 100) = 125.77$, $p < 0.001$. There was a significant main effect of age, $F(2, 100) = 26.34$, $p < 0.001$. Planned comparisons revealed differences between the youngest children ($M = 53.8\%$) and both of the older two groups ($M$s $= 68.2\%$ and $70.1\%$ respectively), which in turn did not differ from each other. There was an Age X Interview interaction, $F(2, 100) = 5.13$, $p = 0.008$, shown in Figure 1. Follow-up analyses were done on each age group separately to assess whether the number and timing of interviews affected memory completeness. The number and timing of interviews were significant for the youngest children, suggesting that having an initial and 6-month interview can make a notable difference in how much relevant information is recalled by 3–4-year-olds. For the older two groups, completeness of recall was equivalent, regardless of the number and timing of interviews. Thus, the frequency and timing of interviews influenced the youngest, but not the older children.

The above analysis compared all three age groups but only two levels of interview were included. In the next analysis 3–4-year olds and 5–7-year-olds only were compared across

Table 2. Mean percentages of completeness of memory scores by age and number of interviews for total recall

| Interview(s) | Age group | Event type | | | |
|---|---|---|---|---|---|
| | | Injury | | Hospital | |
| | | *M* | *SD* | *M* | *SD* |
| 12 months | 3–4 | 60.3 | 14.1 | 36.3 | 15.2 |
| | 5–7 | 75.7 | 15.0 | 55.8 | 14.7 |
| | 8–9 | 82.5 | 10.3 | 62.4 | 15.7 |
| 0 and 12 months | 3–4 | 68.5 | 17.7 | 46.2 | 19.2 |
| | 5–7 | 68.4 | 20.3 | 51.4 | 20.6 |
| | 8–9 | N/A | N/A | N/A | N/A |
| 0, 6 and 12 months | 3–4 | 68.4 | 13.2 | 50.0 | 14.5 |
| | 5–7 | 78.1 | 10.5 | 63.3 | 11.5 |
| | 8–9 | 75.7 | 12.0 | 59.8 | 14.4 |

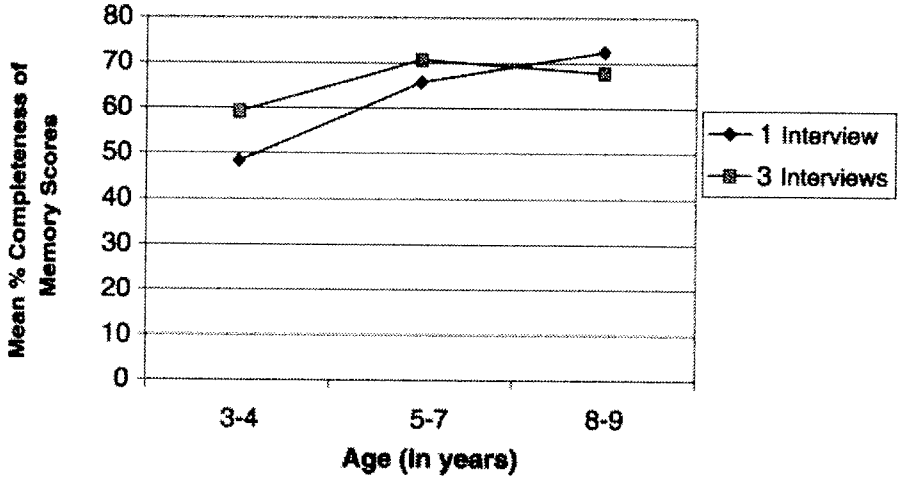


Figure 1. Age × Interview interaction for total recall completeness of memory scores comparing all three age groups

all three levels of interviews. Three main effects were obtained: (a) Similar to the above analysis children recalled more about the injury ($M = 69.9\%$) than the hospital treatment event ($M = 50.5\%$), $F(1, 99) = 120.73$, $p > 0.001$. (b) Children recalled more as they got older, $F(1, 99) = 17.06$, $p < 0.001$. The older children recalled more ($M = 65.5\%$) than the younger children ($M = 55.0\%$). (c) Children remembered more the more interviews they had, $F(2, 99) = 3.61$, $p = 0.031$. Means equalled 57.1%, 58.6% and 64.9% for the 12 months, 0 and 12 months, and 0, 6, and 12 months groups respectively. By using planned comparisons it was found that recall differences as a function of frequency and timing of interviews were significant ($p = 0.002$) only between the 12 months group and the 0, 6 and 12 months group, with the 0 and 12 months group intermediate and not differing significantly from either other group. This is suggestive of a developmental progression with children remembering more with more interviews. An Age X Interview interaction failed to reach significance, $F(2, 99) = 2.89$, $p = 0.061$, but followed a similar pattern as displayed in Figure 1. Follow-up analysis for each age group separately showed a significant effect of interview only for the youngest children.

*Accuracy of memory*

The proportion of information recalled accurately by children was analysed using the same comparisons as in the above analyses. Children in all interview groups were quite accurate in their recollection of the event at their 1-year interview. Table 3 presents the mean percentages and standard deviations for accuracy of total recall. Using the same analysis as with completeness of memory, a comparison of all three age groups over only two levels of interviews was used to evaluate the accuracy for total recall. Two significant main effects were found: (a) Children were more accurate when recalling injury events ($M = 87.9\%$) versus hospital treatment details ($M = 82.1\%$), $F(1, 100) = 18.12$, $p < 0.001$. (b) Children were more accurate as they got older, $F(2, 100) = 11.10$, $p < 0.001$. Mean per cent correct recall was 81.5%, 86.3% and 89.9% for ages 3–4-, 5–7-, and 8–9-year-olds respectively. Planned comparisons revealed a significant difference between the youngest group and the two older ones, which in turn did not differ from each other. There was no

Table 3. Mean percentages of accuracy scores by age and number of interviews for total recall

| Interview(s) | Age group | Event type | | | |
|---|---|---|---|---|---|
| | | Injury | | Hospital | |
| | | *M* | *SD* | *M* | *SD* |
| 12 months | 3–4 | 81.7 | 11.8 | 69.8 | 15.3 |
| | 5–7 | 86.0 | 17.5 | 81.0 | 12.8 |
| | 8–9 | 93.7 | 5.8 | 87.3 | 13.2 |
| 0 and 12 months | 3–4 | 78.8 | 17.9 | 74.0 | 25.8 |
| | 5–7 | 83.7 | 9.6 | 74.1 | 19.6 |
| | 8–9 | N/A | N/A | N/A | N/A |
| 0, 6 and 12 months | 3–4 | 86.0 | 11.4 | 77.3 | 18.0 |
| | 5–7 | 89.7 | 7.4 | 88.6 | 11.6 |
| | 8–9 | 90.3 | 8.0 | 88.4 | 10.9 |

significant effect of the number and timing of interviews on children's accuracy either as a main effect or in interaction with age.

Parallel to the second analysis performed on the completeness data, a second analysis was made of the accuracy scores. Only two age groups were compared (3–4-year-olds and 5–7-year-olds) over all three interview levels. In this analysis, the number and timing of interviews did have a significant effect, $F(2, 99) = 3.33$, $p = 0.040$. Using planned comparisons, it was shown that accuracy was equivalent for children who had one (12 months) and two interviews (0 and 12 months) ($M$s = 79.6% and 77.6% for one and two interviews, respectively) and children in both groups were less accurate than children with three interviews (0, 6, and 12 months) ($M = 85.4\%$). These results appeared inconsistent from those found in the completeness of memory analysis and thus need to be put in context. First, the mean accuracy was relatively high for all interview levels. Secondly, the non-significant effect of interview with only two levels included (12 months, and 0, 6 and 12 months) compared with the significant effect of interviews with three levels of interviews included (12 months, 0 and 12 months and 0, 6 and 12 months) indicates a skewing effect caused by the 8–9-year-old age group which is omitted when the analysis includes all three interview levels. It appeared that this group, being so accurate, had raised the average and essentially influenced a non-significant result when only two levels of interview were used versus when all three levels were included. There were two other main effects in this analysis. Older children ($M = 83.3\%$) were more accurate than younger children ($M = 77.9\%$), $F(1, 99) = 5.43$, $p = 0.022$. As well, children were more accurate when recalling the injury ($M = 85.8\%$) than the hospital event ($M = 79.2\%$), $F(1, 99) = 15.7$, $p < 0.001$. There were no interactions.

## Free recall scores

*Completeness of memory*

To analyse possible patterns of rehearsal effects free recall scores were considered separately. (Note that the *df*'s in the total recall analyses are lower than in previous analyses because of the failure of some children to provide any information in free recall.) Children were less complete in their recall using only free recall data, as can be seen in Table 4. When using all three age groups across only two levels of interview there were three main effects: (a) Children remembered more about the injury ($M = 34.4\%$) than the

 

Table 4. Mean percentages of completeness of memory scores by age and number of interviews for free recall

| Interview(s) | Age group | Event type | | | |
|---|---|---|---|---|---|
| | | Injury | | Hospital | |
| | | *M* | *SD* | *M* | *SD* |
| 12 months | 3–4 | 20.7 | 10.4 | 10.3 | 5.7 |
| | 5–7 | 28.6 | 12.5 | 16.8 | 10.1 |
| | 8–9 | 46.1 | 19.3 | 25.2 | 22.3 |
| 0 and 12 months | 3–4 | 25.3 | 13.3 | 10.2 | 4.8 |
| | 5–7 | 31.1 | 23.0 | 13.7 | 6.9 |
| | 8–9 | N/A | N/A | N/A | N/A |
| 0, 6 and 12 months | 3–4 | 25.8 | 17.1 | 16.4 | 8.9 |
| | 5–7 | 39.0 | 17.0 | 22.2 | 12.7 |
| | 8–9 | 46.0 | 17.3 | 31.5 | 12.2 |

hospital treatment ($M = 20.4\%$), $F(1, 88) = 68.88$, $p < 0.001$. (b) The older the child the better the recall of relevant details $F(2, 88) = 17.37$, $p < 0.001$. Planned comparisons indicated a consistent progression with 3–4-year-olds ($M = 18.3\%$) recounting less in free recall than 5–7-year-olds ($M = 26.7\%$) who in turn recalled less that 8–9-year-olds ($M = 37.2\%$). (c) The more interviews the more complete the free recall, $F(1, 88) = 4.35$, $p = 0.04$. Mean per cent recall for one and three interviews was 24.6% and 30.2% respectively. There were no significant interactions.

For the analysis that included all interview levels but only the two youngest age groups a similar pattern emerged. Children spontaneously recalled more about the injury ($M = 28.8\%$) than the hospital treatment ($M = 15.0\%$), $F(1, 76) = 59.99$, $p < 0.001$. An age effect was found, $F(1, 76) = 10.99$, $p < 0.001$, with the 3–4-year-olds ($M = 17.9\%$) recalling less that the 5–7-years-olds ($M = 25.2\%$). There was also an Interview effect, $F(2, 76) = 3.37$, $p = 0.040$. Planned comparisons revealed a significant difference in free recall between one (12 months) and three (0, 6 and 12 months) interviews while the 0 and 12 months interview group was intermediate and did not differ significantly from either other group (*M*s = 19.1%, 21.0% and 25.9% for the one (12 months), two (0 and 12 months) and three (0, 6 and 12 months) interview groups, respectively). There were no significant interactions.

*Accuracy of memory*

Accuracy scores in free recall for all age groups over all levels of interview were high as can be seen in Table 5. For all three age groups, compared over two interview levels, children recalled both the injury ($M = 97.6\%$) and hospital treatment ($M = 95.0\%$) with similar accuracy, $F(1, 88) = 1.93$, $p = 0.17$. In addition, there was no effect of age, $F(2, 88) = 0.45$, $p = 0.64$, or interview, $F(1, 88) = 1.14$, $p = 0.29$ on free recall accuracy using all three age groups.

When analysing only the 3–4-year-olds and the 5–7-year-olds across all three interview levels the results were similar. Both groups displayed similar accuracy when recalling injury and hospital treatment details, $F(1, 76) = 2.88$, $p = 0.09$. Also, neither group differed significantly from one another on age, $F(1, 76) = 0.01$, $p = 0.92$ or interview, $F(2, 76) = 0.47$, $p = 0.63$. Although free recall was less complete than total recall, it did

Table 5. Mean percentages of accuracy scores by age and number of interviews for free recall

| Interview(s) | Age group | Event type | | | |
|---|---|---|---|---|---|
| | | Injury | | Hospital | |
| | | *M* | *SD* | *M* | *SD* |
| 12 months | 3–4 | 98.6 | 5.4 | 86.4 | 32.3 |
| | 5–7 | 95.9 | 12.8 | 96.9 | 12.5 |
| | 8–9 | 96.9 | 5.6 | 96.9 | 8.5 |
| 0 and 12 months | 3–4 | 97.1 | 8.8 | 96.7 | 10.5 |
| | 5–7 | 89.1 | 26.9 | 92.9 | 18.2 |
| | 8–9 | N/A | N/A | N/A | N/A |
| 0, 6 and 12 months | 3–4 | 98.7 | 3.8 | 97.0 | 8.9 |
| | 5–7 | 99.6 | 1.5 | 93.1 | 24.3 |
| | 8–9 | 95.9 | 7.6 | 99.3 | 3.0 |

not matter how old the child was or whether they had been interviewed one, two, or three times for their free recall accuracy; they all did exceptionally well.

To summarize, these findings indicate that children were less complete in their spontaneous recollection of event details than in their recall when spontaneous and probed recall are combined. This trend followed a developmental pattern whereby the youngest children recalled less than the older children. As well free recall scores increased significantly at 1 year post-injury when the child had had three interviews versus only one. Accuracy of recall whether free or total was high, increasing with age and influenced by type of information recalled. Injury details were recalled more accurately than hospital treatment for all ages. The interesting finding was the significant difference in the completeness of memory depending on the timing of initial interview and the fact that this interacted with age. The younger preschool children significantly increased their recall when they had an early initial interview versus a delayed initial interview (i.e. 1 year later).

## DISCUSSION

One of the benefits of the upsurge in public concern about child witnesses, especially in child sexual abuse cases, is a renaissance in research about the reliability of children's memories. Children involved in the justice system may have to recall details of events long after they have occurred; thus, the influence of timing of those interviews has great practical as well as theoretical significance. This inquiry reflects the procedural reality of the criminal justice system since it investigates the influence of early interviewing, or lack thereof, on long-term recall of stressful events.

It appears that the timing of the initial interview is important, but only for the preschool group. For school-aged children, having an early interview did not lead to a positive or negative shift in the amount or accuracy of recall. The result of the school-aged children's recall agrees with Fivush and Schwarzmueller's (1995) view that the initial interview need not be immediately after the target event for benefits to occur. However, the 3–4-year-olds did not follow this pattern. More specifically, there was a significant interaction between age and number of interviews such that the 3–4-year-olds' completeness of recall, as

 

opposed to the 5–9-year-olds' recall, was positively affected by the early structured interview. Our results contrast with those of Pipe et al. (in press). In fact, they found that with these older children, a delayed initial interview led to improved recall. However, they did not include preschoolers in their sample. Rather, their sample consisted of children who were similar in age to those in our two older age groups, for whom an early structured interview made no difference. Further research should include longer follow-ups (i.e. 2 years after the event) to analyse the influence of early versus delayed initial interviews on recall.

These findings may be interpreted in light of studies that propose the possibility of adult guidance in the structuring and enhancement of young children's recall and subsequent memory (Fivush & Hamond, 1990; Fivush & Schwarzmueller, 1995). They insist that children do not rely on adults to provide the content of those recounts, but rather assist in their organization. This one-time 'scaffolding' or monitored guidance supports Vygotsky's (1934/1986) notion that adults have an important role in fostering skill development, including in the formation of narrative accounts of autobiographical events (McCabe & Peterson, 1991; Peterson & McCabe, 1992; Peterson, Jesso, & McCabe, 1999). While the social aspect of adult-influenced memory development is a recent concept, current research has documented the positive relationship between prior parental-child language interaction and subsequent child memory (Boland, Haden, & Ornstein, 2003; Leichtman, Pillemer, Wand, Koreishi, & Han, 2000).

A study that implicates the interplay between social interaction and memory is that of Leichtman et al. (2000). They investigated the memory of 4–5-year-olds who had experienced a surprise event in their classroom—a visit from their former teacher and her new baby. The children's mothers, who had not been present and were naive to the details, interviewed their children the same day about the event. Mothers were not trained to question them in any particular way, but it was discovered that those mothers who were more elaborative in their questioning influenced the amount of information provided by the child 3 weeks later. The authors suggest that such elaborative parent-child memory talk can boost children's long-term memory reports even when parents do not share in the event or have no knowledge of its details. Similarly in the present study, the fact that 3–4-year olds, who were interviewed early, retained and subsequently recalled significantly more factual details 1 year after the injury may reflect the highly structured, elaborative interview process that may have similarly served to buffer those memories against forgetting a whole year later.

In another recent study, mothers were actually trained in elaborative conversational style. The researchers hypothesized that such a style would enhance a child's understanding and memory of an event (Boland, Haden, & Ornstein, 2003), and indeed, those preschoolers whose mothers received elaborative conversational style training recalled more about a target event than children of mothers who did not receive such training. If these studies suggest there is a link between social factors and memory then why, in the present study, were the older children not affected?

A possible reason may be found in Peterson and McCabe's (1983) study of preschoolers and school-aged children's narratives. They identified several narrative styles and studied children's narrative changes from 4 to 9 years of age. Substantial developmental changes were found in the organization of narratives between ages 3 and 5. Memories of autobiographical events of course are essentially narratives. Across the ages children eventually learn how to organize causal and temporal relationships, how to provide orientation of actors and to sequence events so as to construct a meaningful representation

 

of an event; these developments in turn may well support and enhance memory. The older, school-age children, in most cases, have already learned more adult-like narrative structure. The lack of significant interview effects for the older groups of children is consistent with this possibility. The assistance with memory organization and structure seems to have its biggest impact when children are just learning these skills, that is, around 3 and 4 years of age. Of course, other explanations including frequency of parent-child discussion of the event during the delay for different ages as well as differences in samples may play a role in the present findings, although it is not apparent why parents of preschoolers might talk about the event more than parents of older children.

With respect to accuracy of total recall, an early initial interview did not have a significant effect on the school-age children's accuracy, but did significantly influence 3–4-year-olds' accuracy. This result occurred only when the data from the 3–4-year olds and 5–7-year-olds were analysed across one, two, and three interviews. However, when all three age groups receiving either one or three interviews were examined, the superior recollection of the older children (8–9-year-olds) seemed to skew the data leading to only a borderline effect. Notwithstanding, there is a difference between statistically significant and socially relevant. Although there is a significant effect of interview on the youngest children's total recall, those children with no previous interviews were still 81.7% accurate on injury and 69.8% accurate on hospital details. Furthermore, two earlier interviews for the youngest children only increased injury accuracy by 0.5% and hospital accuracy by 1.2%. This result becomes forensically relevant when considering the frequent occurrence of delayed questioning within the criminal justice system and provides new evidence against the traditional view of terming the recall of young witnesses as non-credible if they were not interviewed soon after an incident.

Several studies cast doubt on the credibility of children's information when it is provided for the first time after a year (Peterson et al., 2001; Salmon & Pipe, 1997, 2000). The results in the present study, however, show that for free recall those children who only had one interview and thus would be recalling the information for the first time 1 year after the event, had exceptional accuracy regardless of age (90+ %). When analysing total recall the results were also high, regardless of age (85+ %). The different results are probably due to methodological differences. In the Salmon and Pipe and Peterson et al. studies, children had the opportunity to recall at earlier times and what was inaccurate was only information that was not provided earlier, but added later. Thus, taking everything children recalled at 1 or 2 years into consideration, accuracy rates were also quite high in these studies. Presumably, if the children in the present study had been interviewed earlier they would have provided almost all of their information earlier. Thus, the low accuracy for the Salmon and Pipe and Peterson et al. studies occur when children have multiple opportunities for recall and some detail that is not recalled during those earlier interviews pops up later. Indeed, Fivush and her colleagues (Fivush & Hamond, 1990; Fivush & Shukat, 1995) have also found that when children are only interviewed after a considerable lapse of time, parents assess most of the information children provide as accurate.

The idea of external adult assistance via a structured interviewing process helping children's long-term recall is also evident when analysing the child's completeness of free recall. What is provided in free recall may be less of an indication of memory than of what a child thinks the interviewer wants to hear, a purely social assessment. Although the amount of information mentioned in free recall was somewhat sparse compared to total recall, albeit accurate, it was influenced by the frequency of interviews. Thus, highly

 

structured interviews following the event may not only assist young children in the organization of memory but may also allow them to learn what is expected from them in future interviews. Therefore, those children who had more interviews might have become more adept at the 'rules of recall' and have incorporated the sequence of questioning and expectation of answers to guide their recall in subsequent interviews.

Finally the results reported here indicate that, overall, children had extensive recollection of details concerning the target events. All children had comprehensive recall of details but, as predicted, this was a function of age. The youngest children in the study (3–4-year-olds) provided a lot of accurate detail, at least about the injury event, but that was eclipsed by the significant effect of age, which revealed the superior memory of the older groups. Most of the detail remembered by the younger children was elicited through probed recall; however these young children still recalled the central points of the incident with accuracy. Whether the information was provided in free or probed recall, children recalled more details about the injury event versus the hospital treatment. These results are consistent with other studies of children's recall of personally salient events (e.g. Baker-Ward, Burgwyn, Ornstein, & Gordon, 1995; Peterson, 1996, 1999; Peterson & Bell, 1996).

The results from this study suggest that an early initial interview may play a significant role in memory but only for preschool children. More specifically, preschool children's long-term recall may be helped by means of the structure and organization provided by formal, carefully planned questioning. That is, with early initial interviewing the interviewer can scaffold and systematically guide the organization of details that may structure memories, thereby facilitating subsequent recall. Preschoolers' memory may therefore have a social aspect that may be influenced by adult interaction. Older children, in contrast, may have already developed these more organized memory strategies. Like other investigators we agree that very young children can recall stressful events impressively well for a long time (see review in Peterson, 2002). From a forensic perspective, these results suggest that a delayed initial interview should have little effect on the credibility of child witness report; however they also suggest that at least for preschoolers their memory over long delays can be augmented through formal, highly structured early interviewing.

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