The weapon focus effect in child eyewitnesses

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Abstract
The present study investigated whether children would exhibit the weapon focus effect that has been demonstrated with adult eyewitnesses. Participants (4- and 5-year-olds, 7- and 8-year-olds, and adults) watched a videotape in which a target individual portraying one of two schema roles and holding either a weapon or a neutral object steals some money. Witnesses of all ages described the target’s physical appearance less accurately if the target held an object that was inconsistent rather than consistent with his schema role. Additionally, there were age effects for both accuracy and amount of information reported. The results indicate that the weapon focus effect generalizes to child witnesses and that it probably occurs because weapons are inconsistent with an activated schema.

Keywords: Eyewitness memory, weapon focus effect, child witnesses

Introduction
In the eyewitness memory literature, the “weapon focus” effect is that the presence of a visible weapon in the hands of a perpetrator impairs witnesses’ ability to remember accurate information about the perpetrator’s appearance, including his or her physical features and clothing. Several studies (e.g. Cutler, Penrod, & Martens, 1987; Kramer, Buckhout, & Eugenio, 1990; Loftus, Loftus, & Messo, 1987; Maass & Köhnken, 1989; Mitchell, Livosky, & Mather, 1998; O’Rourke, Penrod, Cutler, & Stuve, 1989; Pickel, 1998, 1999; Tooley, Brigham, Maass, & Bothwell, 1987) have illustrated the effect using lineup identification and/or memory for descriptive information as dependent measures. It appears that the effect occurs because witnesses direct their visual attention towards the weapon at the expense of other details. In support of this hypothesis, Loftus et al. (1987) found that witnesses who viewed a slide sequence depicting customers in a fast-food restaurant looked longer and more frequently at an object held by the target individual if it was a gun rather than a personal check. The former witnesses also remembered the target less accurately than did the latter.

All of the studies cited above used adult participants; to our knowledge, there is no published research that examines whether the weapon focus effect occurs in child witnesses. Considering that a significant number of children, particularly those living in urban areas,
have observed incidents of community violence (often crimes committed with weapons) by the time they reach elementary school (Guerra, Huesmann, & Spindler, 2003; Richters & Martinez, 1993), it is important to determine whether young witnesses react as adults do to the presence of a weapon. A prediction regarding this issue can be generated by referring to the cognitive processes underlying the weapon focus effect.

Early research on the effect often invoked Easterbrook’s (1959) cue-utilization hypothesis as a theoretical explanation. This explanation says that, because weapons are threatening and can cause harm to the witness or to other bystanders, a weapon’s presence increases the witness’s anxiety or arousal so that it is above an optimal level. As a result, attentional capacity diminishes so that the witness must reduce processing of peripheral information (such as the perpetrator’s clothing) in order to maintain processing of central information (such as the weapon). Because it is easy to imagine that witnesses confronted by armed perpetrators would feel frightened, this account seems reasonable. However, existing data have failed to support it. For example, Kramer et al. (1990) showed that the weapon focus effect can occur even if witnesses’ self-reported arousal is low. In addition, Maass and Köhnken (1989) had a confederate threaten witnesses in one condition, leading them to believe they would receive a potentially painful injection as part of the experiment, but these witnesses remembered the confederate as well as the controls did. In other studies, descriptions of a perpetrator were equally accurate regardless of whether he carried an object that had been rated as threatening or one that was non-threatening (Pickel, 1998) or whether or not he behaved menacingly toward another person (Pickel, 1999).

A more empirically supported explanation for the weapon focus effect, which builds upon previous data showing that viewers tend to fixate on unusual objects in visual scenes (Henderson, Weeks, & Hollingworth, 1999; Loftus & Mackworth, 1978), is that weapons attract attention because they seem unusual within many schematic contexts. For example, a customer entering a fast-food restaurant expects to see objects such as cash registers and menus, but a gun is out of place in that environment. Suggested by Loftus et al. (1987) and Kramer et al. (1990), this hypothesis has fared well in experiments that have pitted it against the Easterbrook explanation. In two such studies, for example, witnesses remembered a target individual less accurately if he carried an unusual object (Mitchell et al., 1998; Pickel, 1998), but their performance was not influenced by variables related to arousal or threat. Whether or not witnesses consider a weapon unusual may depend on contextual factors. For instance, Pickel (1999) showed witnesses videotaped stories in which a male target carrying either a gun or a neutral object interacted with a woman. The type of object had no effect if the story’s setting was one in which guns are expected (i.e. a shooting range) but impaired memory performance if it was one in which guns are unusual (i.e. a baseball field). Similarly, in a second experiment there was no weapon focus effect when the target individual was a police officer, but when he was a Catholic priest, witnesses who saw a gun performed worse than those who saw a neutral object. The latter results can be explained according to the unusualness hypothesis by arguing that, upon noticing the target’s occupation as revealed by his clothing, witnesses activated the relevant person schema, which then guided their interpretation of the story. Because a gun is commonly carried by members of the police force, witnesses who saw the officer did not consider the gun unusual and did not fixate on it, and their accuracy was the same whether they saw the weapon or a neutral object. In contrast, witnesses who saw the priest with a gun recognized that weapon as schema-inconsistent and therefore focused their attention on it more than control witnesses focused on the neutral object. As a result, the former witnesses described the target less accurately than did controls.
Given that unusualness is probably the correct causal explanation, will child witnesses demonstrate the weapon focus effect? The answer depends on whether they possess the relevant schemas (as adults do) and whether their schemas are sufficiently detailed so that the children can recognize particular objects as being schema-consistent or -inconsistent. In order to arrive at a specific prediction, we must first review previous research on schema development. Much of this research has concentrated on scripts, which are temporally and causally organized event schemas (Bjorklund, 2005), although developmental patterns should be similar for any type of schema, including person schemas, which are prototypical representations of specific individuals or types of individuals (Green, Lightfoot, Bandy, & Buchanan, 1985). Previous studies indicate that children as young as 3 years of age possess scripts for familiar events, and they can acquire a rudimentary script after only one exposure to the target event (Fivush, 1997; Myles-Worsley, Cromer, & Dodd, 1986). At this time the script is relatively simple and lacks some important components, but it is qualitatively similar to that of an older child or adult (Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993). For example, young children’s scripts capture the correct temporal order of component actions; they can report that, when you go to McDonald’s, you order the food first, then pay, and then eat the food (Fivush, 1997).

Once a script is acquired, young children can readily activate it in response to relevant cues in the environment, and they rely heavily on it to guide their recall (Ceci & Bruck, 1993; Fivush, 1997; Hudson, 1990). When asked about an experience, they tend to relate routine, typical details while omitting script deviations that adults might consider the most interesting aspects of the story. In fact, they often recite script information rather than recalling individual episodes (Ceci & Bruck, 1993).

As children get older and gain more experience with a target event, their scripts become more elaborate. The scripts eventually include more components, as well as more conditional actions (e.g. if you go to the drive-through window, you order from your car), optional activities (e.g. sometimes you get dessert at McDonald’s), and alternatives (e.g. you can order a hamburger instead of a cheeseburger) (Fivush, 1997). As the scripts increase in complexity, children become more adept at correctly rejecting implausible elements when asked about events they experienced. For example, 5- and 7-year-olds were more likely than 3-year-olds to deny that the doctor had licked their knee during a routine pediatric examination (Baker-Ward et al., 1993). At the same time, however, older children also become more susceptible to script-consistent intrusions (Ceci & Bruck, 1993; Hudson, 1990; Lindberg, 1991). For example, children who have more extensive experience with kindergarten or preschool programs might be more likely than other children to report that they sang “Old MacDonald” yesterday at school even if they did not, because singing that song is a typical activity (Hudson, 1990).

In sum, existing research suggests that even young (preschool) children should possess basic schemas for familiar experiences (and persons). Moreover, they should activate such schemas upon observing relevant cues. Although young children’s schemas may lack complexity compared to older children’s and adults’, they should recognize that an obviously unusual object is schema-inconsistent. As a result, they should focus on that object and fail to encode and remember other details within the visual scene as accurately as they would have if the unusual object had been absent.

In the present study, we explored whether the weapon focus effect would occur in child witnesses. Our participants were two groups of children (4- and 5-year-olds and 7- and 8-year-olds) and a comparison group of adults. Our reasons for choosing the children’s age groups were that: (a) we wanted to include preschoolers, because even children that young
sometimes testify in court (e.g. Ceci & Bruck, 1993); and (b) we wished to compare the preschoolers with children who have received formal schooling, because the latter are more cognitively advanced and may have more accurate and/or more detailed memory reports due to, for example, the acquisition of certain mnemonic strategies (Siegler, 1998).

All participants watched a videotape depicting a mother preparing for her daughter's birthday party. In the video, which was conceptually similar to Pickel's (1999, Experiment 2), the mother interacts with a male target who arrives at her house and eventually steals some cash from her. In different conditions, the target is either a mail carrier or a chef, and he carries either a neutral object (which is consistent with both person schemas) or a chef's knife (which is consistent with the chef schema but not the mail carrier schema). After watching the video, the witnesses were interviewed about their memory for the physical appearance of the target.

We hypothesized that all age groups should exhibit a weapon focus effect, meaning that the chef should be remembered equally well regardless of which object he carries, but the mail carrier should be remembered less accurately if he holds the unusual object (the knife) rather than the neutral object. This prediction is based on prior research implying that even our youngest cohort should be able to activate the relevant person schema upon seeing the target (assuming that they have a basic familiarity with the concepts chef and mail carrier) and to determine whether the objects he holds are schema-consistent or -inconsistent.

We also examined whether there would be age differences in accuracy or in the amount of information provided. The conclusions of previous eyewitness research regarding these variables have not been completely consistent, probably due in part to methodological variations such as the type of questions asked (e.g. free recall versus cued recall questions) and the type of information requested (e.g. memory for an experienced event versus the description of a person). Some researchers have found that even children as young as 5 or 6 years can give reports that are as accurate as adults' if interviewed in a non-suggestive manner (e.g. Cassel & Bjorklund, 1995; Goodman & Reed, 1986; Marin, Holmes, Guth, & Kovac, 1979; Poole & White, 1995). However, other authors have found that preschoolers and children just starting elementary school are less accurate (Leippe, Romanczyk, & Manion, 1991), partly because of such problems as failing to report some of the information they retrieve and misunderstanding some questions but neglecting to inform the interviewer (Gordon, Baker-Ward, & Ornstein, 2001). Davies (1996) concluded that witnesses under 8 years of age have trouble remembering physical descriptions of individuals, but adults are only slightly more accurate than children aged 8 and older. Additionally, it appears that children's reports will usually contain more errors if cued recall questions (as opposed to free recall) are used (Bjorklund, 2005). Because (a) the present study involved memory for the target's physical appearance, (b) our youngest witnesses were 4 and 5 years old, and (c) we used cued recall items in our interview, we tentatively predicted that the youngest cohort would be less accurate than the other two. However, we were unsure how the older children would compare to adults, as previous research does not support a clear prediction about the accuracy of witnesses who are just reaching the age that marks the beginning of adult-like competency, according to Davies (1996).

Regarding the amount of information provided, research indicates that preschoolers' reports are less complete than adults' (e.g. Baker-Ward et al., 1993; Goodman & Reed, 1986). However, children report increasingly more details with age (Baker-Ward et al., 1993; Bjorklund, 2005). Therefore, we expected that our youngest witnesses would report less information than adults and the older children. We made no specific prediction, though, about how the older children would compare with adults.
Method

Test stimuli and design

The stimulus was a videotape (running time 1 min 45 s) depicting a mother preparing for her daughter’s birthday party. In different versions, the male target individual is dressed as either a chef or a mail carrier who brings a delivery to the mother’s house, and he carries with him either an object that can be used as a weapon (a chef’s knife) or a neutral object (a plastic water bottle). His schema role is revealed by two articles of clothing: his hat (which is either a white, puffy chef’s hat or a blue baseball cap with the US Postal Service logo on the front) and either a short gray apron tied around his waist or a mail bag slung over his shoulder. The target’s other articles of clothing, such as his shirt and trousers, are the same in each version and are equally associated with each schema role.

Near the beginning of the videotape, the mother is heard discussing with a friend on the telephone the expected arrival of either the chef with her daughter’s birthday cake or the mail carrier with birthday cards and packages. After the target enters the house, he can be seen holding either the knife or the water bottle. Although viewers can also see the birthday cake or mail in some scenes, the target is never shown actually carrying them. When the mother leaves the room for a moment, the target opens her purse, which she had left on a table, and removes a $100 bill. She returns and confronts him, but he gestures towards her with the object in his hand, insists that he is taking the cash, and departs.

We used pilot testing to identify a non-weapon that children would see as appropriate in the hands of either a chef or a mail carrier and to assure that children were aware that a chef’s knife is consistent with a chef schema but not a mail carrier schema. (In both the pilot test and the main study, interviewers used the word “mailman” rather than “mail carrier,” as some children might be unfamiliar with the latter term.) Eighteen 3-, 4-, and 5-year-old children completed two tasks during pilot testing. During the first task, participants were shown photographs of a chef and a mail carrier, along with photos of various non-weapons, and asked whether the chef and the mail carrier could plausibly possess each object while on the job. Sixteen out of 18 children agreed that both the chef and the mail carrier could plausibly possess the water bottle. During the second task, participants were read a brief scenario about a child’s birthday party, shown photos of a chef and a mail carrier, and informed of each character’s role in the birthday party (i.e. the chef would deliver the cake and the mail carrier would bring the birthday mail). The participants viewed photos of various objects, including the chef’s knife, and indicated whether the characters would need each object to complete their role. Again, 16 of 18 participants stated that the chef would use the knife (to cut the cake), but the mail carrier would not. In summary, pilot testing indicated that children as young as 3 years old possess basic chef and mail carrier schemas, as evidenced by their responses that either character could possess a water bottle and that a chef, but not a mail carrier, should possess a knife.

The main experiment employed a 2 (schema role of target individual: chef vs. mail carrier) × 2 (weapon present vs. weapon absent) × 3 (age of participant: 4- or 5-years old vs. 7- or 8-years old vs. adults) factorial design. All factors were between-subject variables.

Participants

Two hundred and sixty-one individuals participated in this study: 75 4- and 5-year-old children (age range = 48–71 months; $M = 58.68$, $SD = 6.56$), 87 7- and 8-year-old children (age range = 87–107 months; $M = 98.90$, $SD = 4.79$), and 99 college undergraduates (age range = 18–45 years; $M = 20.02$, $SD = 5.34$). Of the younger children, 70 (93%)
were White and 37 (49%) were girls. Of the older children, 86 (99%) were White, and 49 (56%) were girls. Of the college students, 90 (91%) were White, and 72 (73%) were women. Parental informed consent and verbal assent from participants were obtained for children, and informed consent was obtained from all adult participants. The child participants were recruited from preschools, child care centers, and elementary schools in or near Muncie, Indiana. Adult participants were recruited from introductory psychology classes at Ball State University. The adults received course credit in return for participation.

**Procedure**

The participants, who acted as witnesses, viewed one of the four versions of the video, selected at random. Children watched the video in pairs but then were separated and simultaneously interviewed individually. Undergraduates viewed the video and were interviewed individually.

After watching the videotaped segment, the witnesses immediately responded to questions assessing their memory for the target. Trained interviewers asked questions to both children and adults, and their responses were audiotaped for later transcription. The interview questions were closely modeled on the ones used by Pickel (1999). They included items about the target’s appearance, including both his physical characteristics (race, height, weight, age, facial hair, tattoos, and hair color and length) and his clothing (shirt, pants, eyeglasses, hat, shoes, and jewelry). Many questions were open-ended. For example, witnesses who said the target was wearing pants (as opposed to shorts) were asked, “What color were his pants?” For some questions, however, witnesses were presented with alternatives. For example, those who said the man wore glasses were asked, “Were they sunglasses or regular eyeglasses?”.

Because children may have a difficult time verbalizing particular characteristics such as race and age, photo lineups were used with two interview items. To ask about the target’s age, four photographs of women of different ages were presented simultaneously. One woman appeared to be in her late teens or early twenties, one was in her mid thirties or early forties, one was in her mid or late fifties, and one was in her seventies or eighties. Witnesses were asked to point to the photo of the woman who was about the same age as the target. Because the target individual was male, pictures of women were used so the witnesses would not wrongly infer that the photos were supposed to represent the target. This procedure was modified from Tobey and Goodman’s (1992) age lineup procedure. To ask about the target individual’s race, one photograph depicting two young girls, one African-American and the other Caucasian, was presented. Witnesses were asked to point to the individual in the photo who had the same skin color as the target. As with the question about age, female exemplars were used in the race photo so that witnesses would not conclude that the male target might be depicted. Witnesses in all three age groups responded to these two lineup questions.

In addition to questions concerning the target’s physical appearance, witnesses were asked questions about his apparent occupation (“What kind of job does the man have?”), his actions while in the home (“What did the man do while he was in the house?”), and what object, if any, he was carrying (“Was the man holding anything in his hand when he came into the room?”). Each interview took approximately 15 min to complete. Afterwards, participants were debriefed and thanked.
Results

Two independent judges evaluated each participant’s report by examining written transcripts that were generated from the audiotaped interviews. Using a scoring key developed by the authors, the judges tabulated the number of correct details and the number of incorrect details provided about the target individual. Inter-rater reliability for a sample of 50 participants’ responses was $r = 0.98$. When the judges disagreed, the evaluations of the designated “primary judge” were used. An accuracy score was calculated for each witness by dividing the number of correct details provided by the total number of details (correct plus incorrect). Additionally, judges determined whether participants correctly reported the man’s occupation (either a chef or a mail carrier) and what he held in his hand (either a knife or a water bottle) (for both measures, Cohen’s $K = 1$). The judges also evaluated whether witnesses stated that the target took money during the scenario (Cohen’s $K = 1$).

Schema role manipulation check

Although the majority (89.3%) of the preschool witnesses correctly remembered the target person’s schema role, three preschoolers were incorrect about the mail carrier’s occupation and five were incorrect about the chef’s occupation. All of the second grade witnesses noticed and correctly identified the target individual’s schema role, whereas two of the adult witnesses incorrectly identified the chef’s occupation.

Accuracy of descriptions of the target person

A three-way analysis of variance indicated a main effect of the object carried by the target individual, such that accuracy was significantly lower for witnesses who observed the man carrying the knife ($M = 0.67$, SD = 0.11) compared with those who viewed the man carrying the water bottle ($M = 0.75$, SD = 0.08), $F(1,249) = 91.30$, $p < 0.001$, $\theta^2 = 0.27$. There was also a main effect of schema role ($F(1,249) = 74.94$, $p < 0.001$, $\theta^2 = 0.23$); witnesses who viewed the chef ($M = 0.75$, SD = 0.09) were more accurate than those who viewed the mail carrier ($M = 0.68$, SD = 0.11). However, these main effects were overshadowed by a Schema Role X Object interaction, $F(1,249) = 63.44$, $p < 0.001$, $\theta^2 = 0.20$ (see Table I). A simple effects analysis indicated that participants who observed the man dressed as a mail carrier and holding a knife had lower accuracy scores than did witnesses who watched the mail carrier holding the water bottle ($F(1,257) = 97.63$, $p < 0.001$, $\theta^2 = 0.24$), whereas scores for participants who observed the chef were similar whether he held a knife or a water bottle ($F(1,257) = 1.08$, $p > 0.05$, $\theta^2 = 0.003$). The three-way interaction was not significant ($p = 0.33$, $\theta^2 = 0.009$), which means that all three age groups demonstrated the same weapon focus effect.

To examine more closely the effect of the weapon’s presence within the different age groups, two-way analyses of variance were conducted separately for each age group, yielding

<p>| Table I. Mean accuracy scores (and standard deviations) as a function of condition and age. |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Age</th>
<th>Chef/Bottle</th>
<th>Chef/Knife</th>
<th>Mail/Bottle</th>
<th>Mail/Knife</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4- and 5-year-olds</td>
<td>0.67 (0.09)</td>
<td>0.67 (0.08)</td>
<td>0.69 (0.07)</td>
<td>0.52 (0.10)</td>
<td>0.64 (0.11)</td>
</tr>
<tr>
<td>7- and 8-year-olds</td>
<td>0.75 (0.06)</td>
<td>0.74 (0.06)</td>
<td>0.76 (0.05)</td>
<td>0.62 (0.06)</td>
<td>0.72 (0.08)</td>
</tr>
<tr>
<td>Adults</td>
<td>0.83 (0.05)</td>
<td>0.80 (0.07)</td>
<td>0.79 (0.05)</td>
<td>0.66 (0.06)</td>
<td>0.77 (0.09)</td>
</tr>
<tr>
<td>Total</td>
<td>0.76 (0.09)</td>
<td>0.74 (0.09)</td>
<td>0.75 (0.07)</td>
<td>0.60 (0.09)</td>
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</table>
significant Schema Role × Object interactions for the younger children \((F(1,71) = 17.23, p < 0.001, \theta^2 = 0.20)\), the older children \((F(1,83) = 29.92, p < 0.001, \theta^2 = 0.27)\), and adults \((F(1,95) = 18.86, p < 0.001, \chi^2 = 0.17)\) (see Table I). In all age groups, simple effects analyses revealed no difference between object conditions when witnesses viewed the chef \((F(1,71) = 0, p < 0.05, \theta^2 = 0.002\) for 4- and 5-year-olds; \(F(1,83) = 0.32, p < 0.05, \theta^2 = 0.002\) for 7- and 8-year-olds; \(F(1,95) = 2.50, p > 0.05, \theta^2 = 0.01\) for adults). In contrast, witnesses who saw the mail carrier performed better when he held the water bottle instead of the knife \((F(1,71) = 35.06, p < 0.05, \theta^2 = 0.30\) for 4- and 5-year-olds; \(F(1,83) = 70.10, p < 0.001, \theta^2 = 0.39\) for 7- and 8-year-olds; \(F(1,95) = 60.77, p < 0.001, \theta^2 = 0.29\) for adults).

There was also a main effect of age group, \(F(2,249) = 80.58, p < 0.001, \theta^2 = 0.39\). A Student–Newman–Keuls post hoc test indicated that 4- and 5-year-olds had lower accuracy scores than 7- and 8-year-olds, who were less accurate than adults (see Table I).

**Amount of information reported about the target person**

A three-way analysis of variance was conducted on the total number of details (correct plus incorrect) reported by witnesses. It revealed a significant main effect of age group, \(F(2,249) = 5.47, p < 0.01, \chi^2 = 0.04\). According to a Student–Newman–Keuls test, the 4- and 5-year-olds \((M = 35.65, SD = 5.45)\) provided less information than did the 7- and 8-year-olds \((M = 38.22, SD = 4.62)\) and the adults \((M = 37.39, SD = 5.18)\). The latter two groups did not differ. There were no other main effects for this dependent variable. In addition, there were no interactions.

**Memory for the object held by the target and his actions**

Only 33% of preschoolers correctly reported the object held by the target (21 failed to identify the knife and 29 did not identify the bottle). Seventy-five per cent of second grade witnesses correctly named the object (four failed to identify the knife and 18 failed to identify the bottle). Among adult witnesses, 96% correctly remembered the object (four did not identify the bottle). Ninety-three per cent of the younger children, all of the older children, and all of the adult witnesses correctly reported that the target individual took money from the mother.

**Discussion**

The results of the present experiment replicate and extend previous demonstrations of the weapon focus effect in adult witnesses (Cutler et al., 1987; Kramer et al., 1990; Loftus et al., 1987; Maass & Köhnken, 1989; Mitchell et al., 1998; O’Rourke et al., 1989; Pickel, 1998, 1999; Tooley et al., 1987). Regardless of age, our participants recalled significantly less accurate information about the mail carrier when he was holding a knife rather than a water bottle. Moreover, these results provide additional support for the hypothesis that the weapon focus effect occurs because weapons are unusual within many contexts. When the weapon was inconsistent with the target’s schema role, memory for his appearance was impaired. No such deficit occurred, however, when the weapon was held by a target who would be expected to possess it.

The explanation based on Easterbrook’s (1959) hypothesis is incompatible with the present findings. If the weapon focus effect happens because weapons are threatening, witnesses who viewed the chef should have performed more poorly when he carried a knife as opposed to a water bottle. However, witnesses who viewed the chef with the knife were equally as accurate as witnesses who viewed either character with the water bottle.
Furthermore, the reduced accuracy in the mail carrier/knife condition cannot be attributed to differences in the target’s behavior; he was equally threatening toward the victim in all four versions of the video.

The present data are the first to show that the weapon focus effect occurs in preschool and elementary school children. Logically, if the effect occurs in the participants we tested, it should also be found in children of other ages. As indicated by previous work (Fivush, 1997; Myles-Worsley et al., 1986), at an early age children have already acquired basic person schemas (such as chef and mail carrier) that include knowledge about whether specific objects would fit with these schemas. In turn, this schematic knowledge should influence the eye movements of witnesses of any age who observe a weapon. According to a model of visual scene processing described by Henderson et al. (1999), a viewer’s initial eye fixations are determined by stimulus properties, such as luminance and contrast. As the initial fixation within a region of the scene occurs, viewers attempt to recognize objects and to activate an appropriate global schema. Subsequently, however, cognitive factors increasingly affect the allocation of visual attention as viewers seek areas of semantic informativeness. As a result, their eyes begin to move towards schema-inconsistent objects. Because such objects take longer to analyze, integrate with the rest of the scene, and memorize, viewers will spend more time looking at them than at neutral objects and will be likely to return their gaze to them for additional processing. As applied to the present data, the model implies that, if a weapon is not predicted by the target individual’s schema role, witnesses will make longer and more frequent eye fixations on the weapon than they would on a neutral object. Moreover, when later asked to remember other details (such as the target’s appearance), they will find that the corresponding memory trace is less elaborate than it would have been of no unusual object had been present.

In addition to demonstrating the weapon focus effect in child witnesses, we also found that adults were more accurate in their recall of the target individual’s physical appearance than were children of either age group, and the older children outperformed the younger ones. In addition, the youngest witnesses reported less information overall than did the two older groups. There are several possible reasons for these outcomes. First, children’s language abilities are limited compared to adults’, and therefore children may have had trouble comprehending some of the interviewers’ questions and describing what they could remember (Gordon et al., 2001). Second, the children might not have reported certain remembered details because they failed to appreciate their relevance or importance. Third, the methodology in the present study required participants to adopt the role of a bystander witness. Although this situation parallels many real-world experiences, children (especially preschoolers) can better remember experiences in which they are personally involved (Gordon et al., 2001). Fourth, children’s memory abilities may simply be underdeveloped compared to adults’ (Davies, 1996; Leippe et al., 1991). Children may be unable to encode and retrieve information as accurately as adults can, and/or they may be unaware of useful mnemonic strategies.

Another potential reason for the adults’ superior performance is that the children were tested in schools or preschools, whereas adults were tested in a university lab. Although the experimenter made an effort to find a quiet space for testing, it was unavoidable that the children were exposed to more distractions than were adults. One argument against this explanation, however, is that the older children provided more accurate reports than the younger ones, even though both groups were tested in similar environments.

As predicted by previous data demonstrating that preschoolers often omit information from their memory reports (Baker-Ward et al., 1993; Goodman & Reed, 1986), we found
that our 4- and 5-year-old witnesses provided less information than the two older groups. Although the age effect was significant, the weapon’s presence did not influence this dependent variable. To understand why, one must consider that the weapon can impair accuracy (in the mail carrier/knife condition) by reducing the number of correct details reported and by increasing the number of incorrect details. Thus, the overall number of details can remain the same while accuracy decreases.

It is interesting that most of the younger children failed to identify the object carried by the target, whereas most of the older children and adults did. This pattern may reflect young children’s tendency to report prototypical, schema-consistent information more than other details (Ceci & Bruck, 1993; Fivush, 1997; Hudson, 1990). Alternatively, it may have been an artifact of our procedure. When asked what the target was holding, many of the younger children reported seeing either birthday mail or a cake (depending on the condition), although the target was never shown actually carrying those items. As noted above, the children may have been interested in these objects because they were directly related to the birthday party storyline. The same children may have also remembered seeing the critical object, but in many cases the experimenters neglected to probe further and inquire whether the witnesses remembered anything else after the initial response (i.e. birthday mail or cake) was given. Among the two older cohorts, witnesses more often failed to identify the neutral object rather than the weapon, probably because they spent less time looking at the former object. Previous studies have obtained similar findings (Pickel, 1998, 1999).

From a practical standpoint, the present results can inform individuals who work within the legal system, such as police investigators, lawyers, child advocates, and social workers, about the negative influence of a weapon on children’s memory accuracy. The presence or absence of a weapon is an estimator variable (Wells, 1978), which can be estimated but not controlled by the criminal justice system. However, investigators can choose which questions to ask when interviewing witnesses and can decide how to interpret the responses. If investigators discover that a weapon was present during the witnessed crime, they can adjust their expectations of a young witness’s ability to describe an unknown perpetrator. Furthermore, it is important that investigators do not expect children’s reports to be as accurate as adults’. However, although child witnesses may not be equivalent to adults, this does not mean that they cannot provide accurate testimony or that they are incompetent witnesses.

The experiences of participants in the present study differed in several ways from the experiences of actual witnesses. For example, compared to our participants, actual witnesses might be more motivated to help apprehend the perpetrator because of the very real consequences suffered by the victim, or they might be less inclined to help due to a fear that the perpetrator might retaliate against them. In addition, real witnesses are usually not interviewed immediately but instead are questioned following a delay and often multiple times. It is not known whether delay or repetition would interact with a weapon’s presence. Despite these limitations, our procedure using a videotaped crime allowed for the control of extraneous variables and greater confidence in the reliability of the obtained effects.

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