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Suggestibility, social support, and memory for a novel experience in young children

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Abstract

This study examined 5- and 6-year-olds' suggestibility and interviewer demeanor as joint predictors of their memory for a novel experience. Session 1 consisted of children taking part in a novel laboratory event. Session 2 took place after approximately a 1-week delay and consisted of children completing both a memory test concerning what happened during the prior event and the Video Suggestibility Scale for Children (VSSC). During the second session, the interviewer behaved either supportively or nonsupportively. Greater acquiescence on the VSSC was associated with fewer correct responses to misleading questions about the laboratory event in the supportive and nonsupportive conditions and with more errors in response to specific questions in the nonsupportive condition. Results indicate that individual differences in children's suggestibility are related to the accuracy of their memory for separate events, although some of these relations may vary depending on the context in which children are interviewed.

Keywords

Child witness; Memory; Social context; Suggestibility; Individual difference

Introduction

During the past decade, the scientific study of children's memory, suggestibility, and eyewitness abilities has moved away from simply examining whether children can be led to err in their memory reports and has turned instead toward investigating how characteristics in children and their social environment affect the accuracy and completeness of their accounts. One potentially important characteristic that has yet to receive adequate empirical investigation concerns children's general suggestibility, that is, their tendency to follow others' suggestions when recounting information. Several researchers have conceptualized suggestibility as an internal trait-like characteristic in children, arguing that if children prone to err can be identified, special precautions can be taken when questioning them in forensic settings (e.g., Pipe & Salmon, 2002; Scullin & Ceci, 2001). To test such a possibility, systematic investigations of associations between children's suggestibility and their memory for a range of personally experienced events are needed.

It is also important, however, to examine the associations between children's suggestibility and memory across different social contexts. As we outline shortly, there are a number of reasons to suspect that, although children's suggestibility may be related (negatively) to the

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accuracy of their memory for a variety of events, including those that are complex and potentially arousing emotionally, these relations may be stronger when the social context in which children are questioned is mildly stressful as opposed to supportive. The purpose of the current study was to test this possibility. Our specific goals were twofold: (a) to examine the relations between children's general suggestibility and their memory for a salient, mildly arousing personal experience and (b) to determine whether these relations vary depending on the context in which children are questioned.

Individual differences in children's suggestibility

As already mentioned, several scientists have conceptualized suggestibility as a trait-like characteristic within individuals. Variability in children's performance within and across studies reveals quite convincingly that certain children are more easily misled than are other children. What is less clear concerns the extent to which these differences reflect stable traits within children that predict their memory for a range of events.

Recently, Scullin and Ceci (2001) developed the Video Suggestibility Scale for Children (VSSC) to identify individual differences in children's suggestibility. The measure is based on a scale initially created by Gudjonsson (1984) that assesses suggestibility in adolescents and adults. Gudjonsson was interested in what he called interrogative suggestibility, which is composed of several conceptually distinct types of suggestibility. The VSSC targets two of these, which types that Gudjonsson labeled Yields and Shifts. Yields reflect individuals' initial acquiescence to leading questions, a form of suggestibility that has been well studied for nearly a century (Belli, 1989; Binet, 1900; Loftus & Palmer, 1974; McCloskey & Zaragoza, 1985; see also Loftus & Ketcham, 1994). Shifts reflect individuals' tendency to change their answers in response to interviewer challenges, question repetition, and/or negative feedback.[1] This latter form was less well studied until Gudjonsson's and others' work during the 1980s and 1990s (e.g., Garven, Wood, Malpass, & Shaw, 1988; Gudjonsson & Clark, 1986; Poole & White, 1991; Thompson, Clarke-Stewart, & Lepore, 1997).

The VSSC involves children watching a video and then answering questions about the video's contents. After questions are asked a first time, negative feedback (i.e., that children made mistakes) is provided and the questions are repeated. Several scores are derived from the VSSC. Recall scores reflect the amount of correct information that children provide in response to open-ended prompts. Yield scores correspond to children's affirmative responses to leading questions. Shift scores reflect the number of times that children change answers following negative feedback. Finally, Total Suggestibility scores correspond to the sum of children's Yield and Shift scores.

Scullin and colleagues have been interested in whether the VSSC taps several different and relatively stable forms of suggestibility in children and, accordingly, whether the VSSC is a useful screening tool to identify children prone to err in their memory reports. The researchers have conducted several studies comparing children's VSSC performance with their memory for unrelated events (e.g., Scullin & Hembrooke, 1998; Scullin, Kanaya, & Ceci, 2002). Across studies, findings indicate that children's VSSC scores are related to inaccuracies about play events that the children experienced (e.g., helping a lady find a toy monkey) as well as to false assents to fictitious events that the children never experienced (e.g., helping a lady who hurt her ankle). These associations are more robust in children age 4½ years or over than in younger children, and they tend to emerge for the Total

[1]A third type of suggestive question included in the GSS, labeled “false alternatives,” was not included in the VSSC because this type of question was considered to be too difficult for young children (Scullin & Ceci, 2001).

Suggestibility and (to some extent) Yield scores, both of which are positively associated with errors, rather than for the Shift scores.

Despite evidence from Scullin and colleagues' laboratories indicating that the VSSC may be tapping into a trait-like form (or forms) of suggestibility, several important questions remain. For one, it is unknown whether children's suggestibility as measured by the VSSC predicts their memory for events that are both complex and emotionally arousing. On the one hand, emotional events are better remembered than neutral events (e.g., Goodman, Hirschman, Hepps, & Rudy, 1991; see also Reisberg & Hertel, 2004). Thus, children may have a stronger memory trace for emotional events, and strong memory traces are associated with reduced acquiescence to false suggestions (Ceci, Toglia, & Ross, 1988; Pezdek & Roe, 1995). Accordingly, the relations between children's VSSC and memory may be attenuated when the to-be-remembered event is personally significant or emotional. On the other hand, however, insofar as the VSSC taps a stable trait in children, the VSSC should relate to children's memory regardless of the nature of the to-be-remembered event.

A second question concerns whether the two distinct types of suggestibility identified by the VSSC uniquely predict children's memory performance. As already mentioned, Scullin and colleagues (2002) found that children's Total Suggestibility scores (Yields plus Shifts) were more strongly related to their memory and errors than were either of the individual scores. Given the theoretical distinction between the two forms of suggestibility and their different predictive utility in the adult literature (for a review, see Gudjonsson, 2003), it is important to determine whether such a distinction is relevant to children. For instance, initial acquiescence (as measured via Yield) may reflect a general tendency to believe what adults say or perhaps a lack of willingness to contradict adults (e.g., deference to authorities). Such acquiescence may lead to consistently high errors across interviews about different events because children simply follow the adults' suggestions. In contrast, changing answers following adult criticism or question repetition (as measured via Shift) may be associated with children not trusting their own judgments or with lower self-esteem. Associations between answer changing and errors may emerge when questions are repeated or administered in a harsh manner.

Third, in Scullin and colleagues' (2002) investigation, children's VSSC scores were compared with composite memory measures created from children's responses to questions about true and false events across four separate interviews. Several studies have revealed that repeated interviews affect children's memory accuracy and susceptibility to false suggestions in complicated ways (e.g., Brainerd & Ornstein, 1991; Bruck, Ceci, & Hembrooke, 2002; Thompson et al., 1997). Accordingly, it is important to assess whether the two VSSC scales also predict children's memory when it is tested in a single interview.

A final issue concerns whether some third characteristic underlies both children's VSSC performance and memory accuracy and, thus, whether the evident relations between children's VSSC and memory are spurious. One possible characteristic is children's linguistic abilities, which were not controlled statistically in prior VSSC studies. Children are often more suggestible when questions are phrased in a complex, linguistically difficult manner than when they are phrased in a simple manner (Imhoff & Baker-Ward, 1999). Children's language abilities are also often positively related to their memory and negatively related to their suggestibility (e.g., Clarke-Stewart, Malloy, & Allhusen, 2004; Roebers & Schneider, 2004), although not all studies have reported such associations (e.g., Bruck, Ceci, Francoeur, & Barr, 1995; Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001; Greenhoot, Ornstein, Gordon, & Baker-Ward, 1999). Insofar as children with poorer language abilities fail to fully comprehend sentences, they may have difficulty in refuting false suggestions, leading to high errors during the VSSC and other memory interviews.

Social support, suggestibility, and memory

Although direct associations between children's VSSC performance and memory may emerge, the magnitude of these associations may vary depending on the social context in which children are questioned. In other words, children's suggestibility may interact with social context to affect their memory. Researchers have theorized about and empirically tested interactions between child and environmental characteristics as predictors of a range of health, behavioral, and cognitive outcomes (e.g., Belsky, 1995; Boyce & Ellis, in press; Bronfenbrenner & Ceci, 1994; Chess & Thomas, 1991). However, few researchers have examined such interactions in the area of memory development. Notable exceptions include Greenhoot and colleagues (1999), who found that the associations between children's temperament and their memory of a pediatric examination varied depending on whether interviews included or excluded props as mnemonic aids, and Quas, Bauer, and Boyce (2004), who found that the relations between children's physiological reactions to stress and memory differed depending on whether the interviewer was less or more supportive. We contend that similar interactions will emerge between suggestibility and social context predicting children's memory accuracy.

First, children are often, although not always, more accurate when interviewers behave in a warmer, more emotionally available manner than when they behave in a colder, less emotionally available manner (for a review, see Bottoms, Quas, & Davis, in press; for an exception, see Imhoff & Baker-Ward, 1999). Children report being less happy and comfortable with a nonsupportive interviewer than with a supportive interviewer (e.g., Davis & Bottoms, 2002; Quas et al., 2004). Any increased anxiety that results from children being less comfortable may lead to greater difficulty in conducting a memory search, retrieving information, and refuting inaccurate statements provided by an interviewer (e.g., Nathanson & Saywitz, 2003), all of which would contribute to poor performance, regardless of the memory task, and concurrently robust associations between suggestibility and memory. Second, the negative feedback provided in the VSSC might be interpreted more strongly when it is delivered by an interviewer who is emotionally unsupportive than when it is delivered by an interviewer who is supportive. During a supportive interview, children may be confident in their abilities, be more willing to directly contradict an interviewer's false statements, and have more resources available to conduct a memory search (e.g., Davis & Bottoms, 2002; Goodman, Bottoms, Rudy, & Schwartz-Kenney, 1991; Nathanson & Saywitz, 2003). Thus, the strength of children's memory representation rather than social pressure would drive performance, theoretically reducing associations between children's general suggestibility about one event and their memory of a separate event. In other words, although “suggestible” children (according to the VSSC) may be more prone to err regardless of the to-be-remembered event, the expression of this trait may be augmented in a less versus more supportive environment.

Current study

In the current study, 5- and 6-year-olds completed a series of mild laboratory challenges. After approximately a 1-week delay, children's memory for the laboratory challenges was assessed. Half of the children were questioned by a highly supportive interviewer, and half were questioned by a much less supportive or nonsupportive interviewer. After the interview, the VSSC was administered. Children also completed a vocabulary measure. The same interviewer conducted the initial memory test and the VSSC interview while maintaining the same support style.

We hypothesized that direct associations would emerge among children's VSSC performance, the interviewer's supportiveness, and children's laboratory event memory. We specifically expected that children's VSSC performance would be positively associated with

their suggestibility regarding the laboratory event, as observed by Scullin and colleagues (2002). Also consistent with Scullin and colleagues, we expected these associations to be stronger for children's Total Suggestibility and Yield scores than for their Shift scores. We hypothesized that children questioned by a nonsupportive interviewer would perform more poorly on the VSSC and during the memory interview than would children questioned by a supportive interviewer (e.g., Carter, Bottoms, & Levine, 1996; Davis & Bottoms, 2002). In addition to these direct associations, VSSC by social support interactions were hypothesized. Specifically, the relations between children's VSSC and memory were expected to be stronger in the low-support condition than in the high-support condition due to children's reduced comfort refuting the interviewer's false statements. This pattern was hypothesized to emerge for both Yield and Shift scores and to be strongest when children's responses to specific memory questions, as opposed to misleading ones, are considered. When highly leading questions are asked, children may err regardless of social context.

Method

Participants

The participants were 106 children (58 boys and 48 girls) ages 60–85 months (M = 73.10). Children's ethnicities varied, with 57% being of Caucasian non-Hispanic descent, 4.2% of African American descent, 7.4% of Asian descent, 9.8% of Hispanic descent, and 22% “other” or multiethnic. Children were recruited from a list of families interested in university research, by flyers at day care facilities, and by a local marketing firm hired to recruit ethnically and economically diverse families. Most parents (71.3%) had some college education and an annual household income of more than $60,000. In the large urban area where the study was conducted, $60,000 likely reflects a working-class to lower middle-class income. Six additional children completed portions of the study but were not included because they did not return for the second session (e.g., due to illness or scheduling conflicts) or did not have sufficient time to complete the VSSC interview.

Children in the study were taking part in a larger project concerning physiological reactivity and emotion during middle childhood (Quas & Lench, 2005). As a part of the larger project, children's physiological stress responses were monitored during their participation. These data are not relevant to the current report and are not discussed further.

Materials

Demographic questionnaire—This brief parent-completed questionnaire collected information regarding children's age and ethnicity, parents' education, and family income.

Peabody Picture Vocabulary Test—III—The Peabody Picture Vocabulary Test—III (PPVT) is a well-established measure of receptive vocabulary skills (Dunn & Dunn, 1981), standardized for use with 2½-year-olds through adults. Internal consistency estimates range from .67 to .88. Because of our interest in the associations between children's age according to their vocabulary (regardless of chronological age) and their memory and suggestibility, age-equivalent scores rather than percentile rank in relation to chronological age were included in the analyses. Higher scores correspond to more advanced vocabulary understanding.

Laboratory event memory interview—The laboratory event memory interview concerned children's memory for details of what occurred during their first visit to the laboratory. It included free-recall and direct questions. All children were asked all questions so that direct comparisons in performance could be made across children.

The free-recall prompts were designed to elicit narrative information from children about what happened during the entire initial session. Questions asked children to "Tell me everything that happened the last time you came here." Follow-up prompts included "What else happened?" and "I need to know everything you remember."

The direct questions included specific and misleading questions that probed for factual details regarding the initial session. Some questions asked about true details and other questions asked about false details, with questions asking about each of the tasks that children completed during the initial session. Specific questions (n = 40) simply asked whether or not particular activities occurred (e.g., "Did he leave the lights on for the entire time?" [yes], "Did you have to taste anything on your tongue when you were here?" [no], "What was the first thing you and he did in that room?").[2] Misleading questions (n = 28) suggested an incorrect response (e.g., "He didn't let you pick your own family, did he? [yes], "You took your shirt off so they could put the stickers on, didn't you?" [no]) or included false suppositions (e.g., "Remember when the lights went out, what happened after that?" when in fact the lights never went out). Within the specific and misleading questions, correct responses included an approximately equal number of "yes," "no," and open-ended answers.

VSSC birthday video—The VSSC birthday video (Scullin & Ceci, 2001) features several children at a birthday party. The activities in which the children engage include some events that are consistent with typical birthday party activities (e.g., opening presents, eating cake, playing games) and some that are atypical (e.g., a fire alarm, a broken toy). Although the video concerns a positive topic, the tone of the video is only mildly positive and is not arousing.

VSSC interview—The VSSC interview (Scullin & Ceci, 2001) consists of a recall and recognition section. The recall section contains open-ended questions designed to elicit narrative descriptions of the video content. It begins with free-recall prompts (i.e., "Do you remember that video about the birthday party? Tell me everything you remember about the birthday party") and follows with focused but still open-ended questions about individuals at the party (e.g., "Tell me what the boy was wearing") and party activities (e.g. "What happened when the children opened the presents?"). The recognition section consists of 18 yes/no questions, 14 of which are labeled as leading (or as falsely leading) because the correct answers are "no." The additional four questions are correctly leading because the correct responses are "yes." Some falsely leading questions include false suppositions (e.g., "When the clown juggled, did he drop a ball?" when in fact there was no clown at the party). Mild negative feedback (i.e., "You missed a few of the questions. Let's go through again and see if you can do better this time") is provided twice during the recognition section.

Procedure

Session 1: Reactivity protocol—On the family's arrival, each child was left with a female undergraduate research assistant while a graduate researcher privately explained the larger project to the parent. After the parent's written consent was secured, the graduate researcher explained the study to the child in a developmentally appropriate manner and asked for the child's verbal assent.

[2]Researchers have varied in their classifications of yes/no questions as leading or nonleading. Consistent with other researchers (e.g., Carter et al., 1996; Goodman et al., 1991), we use the term "specific" to refer to yes/no and short-answer questions that did not suggest a particular response and "misleading" to refer to questions that explicitly implied an incorrect response or included a false embedded supposition. In a court of law, however, insofar as questions introduce new information not yet provided by a witness, both specific and misleading questions could be classified as leading. To the extent that some of our specific questions were leading, they were at most mildly leading and were much less leading than those questions classified as misleading.

The child was then escorted to a separate room, where a male researcher was waiting to administer a laboratory protocol developed to identify individual differences in children's physiological reactions to stress and challenge (Boyce et al., 1995). The protocol had been employed successfully in prior studies of reactivity and health during middle childhood (Alkon, Goldstein, Smider, Essex, & Kupfer, 2003; Boyce et al., 2001). A modified version, which included removing an unfamiliar substance taste test and adding a brief negative experience interview about how the child coped with emotional events and a story completion task, was administered. The protocol began with the male researcher reading a neutral story. The first task was a positive experience interview that consisted of 3 min of questions regarding the child's age, whether the child had siblings, and with whom the child had played recently. The second task was a 3-min negative experience interview that included asking the child about past experiences that had made the child sad, angry, and scared and what the child did to make those feelings “go away.” Third, the researcher administered the Memory for Sentences, Stanford–Binet Intelligence Scale-IV (Thorndike, Hagen, & Sattler, 1986), which required the child to repeat increasingly difficult sentences read by the researcher. Afterward, the child was asked to sit quietly for 1 min. The next three tasks involved the child viewing emotionally evocative video clips: one sad, one fearful, and one happy. The videos' order of presentation was counterbalanced across support condition, age (5- vs. 6-year-olds), and gender. The researcher then read a second neutral story. The final task was a story completion task (George & Solomon, 1990) based on the MacArthur Story Stem Battery (Bretherton, Oppenheim, Buschbaum, & Emde, 1990; Emde, Wolf, & Oppenheim, 2003). The stories were mildly arousing in that they concerned separation and reunion from parents, events that should activate the attachment system (Bowlby, 1969).

Once the final story was complete, the female researcher returned and reunited the child and parent. The entire session lasted approximately 1½ h.

Session 2: Memory and VSSC interview—Children returned to the university laboratory after approximately a 1-week delay (M = 7.13 days, range = 4–13). Prior to the session, children were randomly assigned (with the restriction that an equal number of male and female 5- and 6-year-olds were included in each condition) to either a high- or low-interviewer support condition. At the outset of the session, the support manipulation was described to parents. This manipulation was not described before the session to ensure that parents did not coach their children about the interviewer's demeanor prior to the session. Parents were also shown the memory and VSSC questions. All parents consented to the second session.

Next, each child's verbal assent to be interviewed was obtained. A female researcher escorted the child to the interview room and read a neutral story. She left, and the interviewer entered to administer the laboratory event interview. Each interviewer was female, had not met the child previously, was blind to the study's hypotheses, and conducted both high- and low-support interviews.

The support manipulation followed that which had been validated in several prior studies (e.g., Carter et al., 1996; Davis & Bottoms, 2002; Quas et al., 2004). In the supportive condition, the interviewer dressed casually and sat close to and facing the child. For the first 2 min of the interview, she built rapport with the child. Next, she asked the laboratory event interview questions. Throughout the interview, she smiled, maintained eye contact, and talked with considerable vocal intonation. She also provided positive feedback at proscribed times during the interview. In the low-support condition, the interviewer entered and sat adjacent to and not directly facing the child. She wore dark clothes, remained silent for 2 min, and looked through her papers without smiling or looking at the child. She then asked

the memory questions. Throughout the interview, she maintained minimal eye contact, did not smile or provide any feedback, and talked in a monotone voice.

Prior studies have revealed that children as young as 4 years of age perceive high-support interviewers more positively than they do low-support interviewers (Quas et al., 2004) and that independent observers can correctly classify the low- and high-support interviewers (Davis & Bottoms, 2002). Interviewers (n = 11) were trained to conduct both types of interviews and conducted some interviews in both conditions. Training involved observing videos of interviewers in both conditions from prior studies, conducting practice interviews, and observing their own interviews via videotape and receiving feedback on them. One-way interviewer analyses of variance (ANOVAs) were conducted within the high- and low-support conditions separately to identify potential interviewer effects. Only interviewers who questioned at least five children (n = 5 interviewers in the high-support condition and n = 4 interviewers in the low-support condition) were included. (It was not statistically appropriate to include interviewers who conducted only a few interviews in each condition in these analyses.) No significant differences in children's memory performance emerged within the high- and low-support conditions, $F(4,28)$ and $F(3,33) \leq 1.90$, respectively. Finally, two female raters, naive to the experimental manipulation, observed 14% of the interviews (i.e., 15 interviews randomly selected to include different interviewers in each condition) and rated the interviewers' behavior on a 4-point scale (1 = *very unsupportive*, 4 = *very supportive*). The two raters' scores were reliable (κ = .81) and differed for only two children (for which the raters fell within 1 point of each other). Mean scores across the raters differed significantly between the high-support (M = 3.63) and low-support (M = 1.14) conditions, t (13) = 9.62, $p < .001$.

The memory interview took approximately 20 min. Afterward, the interviewer left and the female researcher reentered. She showed the child the VSSC video and then administered the PPVT, which altogether took approximately 20 min.

Following the PPVT, the interviewer returned, maintaining the same interpersonal demeanor (supportive vs. nonsupportive) that she had displayed during the laboratory event memory interview. She administered the VSSC interview. She first asked the recall questions and then asked nine of the yes/no questions. She then delivered the negative feedback (i.e., that the child made some mistakes) and repeated the questions. Next, she asked the remaining yes/no questions, provided the negative feedback, and repeated these questions.

On completion of the VSSC interview, the researcher returned and debriefed the child. If the child had been questioned by a nonsupportive interviewer, the child was told that the interviewer had been serious when she asked the child questions but could now be much more relaxed. The interviewer then returned, chatted with the child, and told the child that he or she had done a great job. Errors in the child's interview responses were corrected. Finally, the child and parent were thanked, the child received a toy, and the parent received a small honorarium.

Coding

Two independent raters scored 15% of children's responses. Across all memory and VSSC measures, the proportion agreement ranged from .88 (free-recall units) to .97 (direct questions).

Laboratory event memory interview—Children's free-recall responses were scored for units of correct and incorrect information using a scoring system employed in several prior studies of children's memory and suggestibility (e.g., Poole & Lindsay, 1995; Quas & Schaaf, 2002). Units included agents, actions, or objects that provided information about the

prior event. Units were scored once, and only verifiable factual information was scored. Correct and incorrect units were summed separately. For example, the statement “We watched movies” received 3 correct units (1 each for “we,” “watched,” and “movies”), and the statement “We played dolls, the dolls were of my family” received 4 units (1 each for “we,” “played,” “dolls,” and “of my family”). Because very few children (n = 14) provided any incorrect information (M = 0.24 units, SD = 0.69, range = 1–3), and because of our interest in examining whether children's VSSC predicted their memory accuracy (as opposed to the overall quantity of information provided), only units of correct information were examined.

Children's responses to the specific and misleading questions were scored as one of the following: correct, incorrect, do not know, or unscorable (e.g., child was inaudible, child did not answer question). Proportions were created by summing each type of response and dividing by the number of questions asked. Separate proportions were computed for specific and misleading questions. “Do not know” responses constituted 9 and 10% of children's answers to specific and misleading questions, respectively, and unscorable responses on average constituted 1 and 2% of children's answers to specific and misleading questions, respectively. Neither is considered further.

VSSC—The VSSC was scored according to the procedures developed by Scullin and Ceci (2001). Five scores were derived. Recall scores were computed by counting the number of correct key features of the video reported by children in response to the recall section questions (free-recall and open-ended). A checklist of features that could be remembered (n = 68 across the entire video) was provided by the VSSC developers. Children's responses in our study were compared with this checklist, and the number of correctly reported features was reliably counted. Two Yield scores were computed by summing the number of “yes” responses to the falsely leading direct questions. Yield 1 refers to the number of “yes” responses the first time the questions were asked (i.e., before the negative feedback was provided). Yield 2 refers to the number of “yes” responses the second time the questions were asked (i.e., following the negative feedback). The four correctly leading direct questions are not included in the Yield computations; thus, scores for Yield 1 and Yield 2 could range from 0 to 14. Shift scores were calculated by summing the number of times children changed their responses between the first and second times the questions were asked. Per Scullin and Ceci (2001), changes from “yes” to a different response were counted as Shifts, but changes among “no,” “do not know,” and “other” responses were not.[3] Shift scores included the falsely and correctly leading questions and could range from 0 to 18. Total Suggestibility was the sum of children's Yield 1 and Shift scores (range = 0–32).

Results

Analyses are presented in three sections. First, descriptive statistics of the study variables are presented and potential confounds are explored. Next, analyses tested whether negative feedback provided during the VSSC caused the children to yield more frequently, whether social support affected children's VSSC performance, and whether children's VSSC scores were correlated with their memory performance. Third, the combined effects of children's VSSC performance and social support on their memory for the laboratory event were examined.

[3]Changing the scoring system slightly so that any change in response (e.g., “do not know” to “no” and vice versa) as a Shift did not alter any of the findings reported here.

Preliminary analyses

Means and standard deviations for the study variables are presented in Table 1. For the VSSC, 2 children were not asked the recall questions verbatim and so do not have scores on this measure. In addition, 3 children received a slightly different memory interview and so are not included in the memory data. Finally, 10 children do not have PPVT scores due to measurement administration error. Variables of interest had normal distributions with the exceptions of Recall, Yield 1, specific question proportion correct, and misleading question proportion error scores, which were slightly skewed in the positive direction. The VSSC performance of children in our sample was similar to that of children in prior studies, although our sample's Recall and Yield scores were slightly higher, a pattern that is likely due to the shorter delay between the video and interview in our study relative to prior studies. We return to this issue in the Discussion.

Correlations indicated that the delay between Session 1 and the Session 2 interview was unrelated statistically to children's memory, with *rs*(103) ranging from −.07 to .08. In terms of gender differences, *t* tests revealed that girls had a higher mean VSSC Recall score (*M* = 10.79) than did boys (*M* = 8.57) and that girls provided a greater proportion of correct responses to specific questions about the laboratory event (*M* = .75) than did boys (*M* = .*72*), *ts*(101 or 102) ≥ 2.03, *ps* < .05. No other gender differences in performance emerged, *ts* < 1.10, *dfs* 100–104, and none of the effects reported here varied when gender was controlled. Thus, gender is not considered further.

Individual differences in children's suggestibility

Next, children's VSSC performance was examined. First, we investigated whether the negative feedback provided during the VSSC caused children to yield more frequently the second time the questions were asked. A paired *t* test, which compared Yield 1 scores to Yield 2 scores, revealed that children's scores increased across the two measures (*M* difference = 2.29, *SD* = 3.38), *t*(101) = 6.85, *p* < .01. The result is consistent with that reported in prior studies and indicates that the negative feedback may have caused children to assent more frequently, although it is also possible that children assented more often simply because the questions were repeated.

Second, we conducted a series of one-way social support analyses of covariance (ANCOVAs) with children's VSSC Recall, Yield, Shift, and Total Suggestibility scores as separate dependent measures. Children's VSSC mean performance in each support condition, along with children's memory mean performance, is presented in Table 2. Children's vocabulary understanding was covaried due to its significant association with children's VSSC performance (see Table 3). Contrary to our hypotheses, no statistically significant differences were found, although the difference in children's Yield 1 scores approached significance, *F*(1,92) = 3.73, *p* < .10. Children yielded slightly more frequently when questioned by a nonsupportive interviewer than when questioned by a supportive interviewer. However, in general, children's mean VSSC performance in the high- and low-support conditions did not vary substantially (Table 2). We discuss this result subsequently.

Third, bivariate correlations were computed among children's age, vocabulary understanding (age-equivalent PPVT scores, which reflect their age according to their vocabulary abilities regardless of chronological age), VSSC scores, and laboratory event memory. Results are presented in Table 3. Children's chronological age was positively correlated with their vocabulary understanding, VSSC Recall scores, and laboratory event interview proportion of correct responses to specific questions. Children's vocabulary understanding was also related to both their VSSC and memory performance. Specifically, better vocabulary was associated with children providing a greater amount of correct narrative information in

response to the VSSC Recall questions and the memory interview free-recall questions. Better vocabulary was also associated with reduced suggestibility as indexed by children's VSSC Yield scores and greater accuracy and fewer errors in response to the memory interview specific and misleading questions.

Correlations among the VSSC measures revealed that children's Yield 1 scores were positively correlated with their Yield 2, Shift, and Total Suggestibility scores, all of which were positively correlated with each other. These correlations suggest that making a greater number of initial errors during the VSSC was related to making a greater number of errors when the questions were asked the second time and with increases in children changing their answers following the negative feedback. Thus, although the Yield and Shift dimensions of suggestibility are theoretically distinct, in our sample the two dimensions were not tapping completely independent processes.

Finally, several significant correlations between children's VSSC and memory performance emerged. Children's VSSC Recall was associated with all memory measures with the exception of children's incorrect responses to misleading questions: providing more correct details about the VSSC video was associated with increased accuracy and reduced errors (Table 3). Larger Yield 1 scores were related to children providing fewer correct and more incorrect answers to both specific and misleading questions. A similar but less robust pattern was evident for Yield 2 scores, which were associated with fewer correct and more incorrect responses to misleading questions: Larger Shift scores were associated with fewer correct responses to misleading questions. Finally, children's VSSC Total Suggestibility scores were associated with fewer correct and more incorrect responses to misleading questions. These results reveal, at least preliminarily, that the VSSC was related to children's memory for the complex laboratory event, particularly in terms of Recall and initial Yield scores predicting errors and heightened suggestibility about the laboratory event. The next step was to examine whether these associations remained when vocabulary ability was controlled or varied across social support conditions.

Social support, suggestibility, and memory

The combined effects of children's VSSC performance, vocabulary, and social support on their memory and suggestibility for the laboratory protocol were assessed via five sequential linear regressions. Dependent variables were the number of correct units of information children provided in free recall, their proportions of specific questions correct and incorrect, and their proportions of misleading questions correct and incorrect. Within the specific and misleading questions, children's correct and incorrect proportion scores were necessarily negatively related, $rs(103) \geq -.58$, although they were not perfectly inversely related, due to "do not know" and unscorable responses. For instance, a child who did not provide a correct response was not necessarily incorrect (e.g., the child may have answered "do not know"). Thus, the two proportion scores were analyzed separately.

Variables were entered into each regression identically in three separate blocks, and all independent continuous variables were centered before inclusion according to guidelines established by Aiken and West (1991). At Step 1, children's age in months, vocabulary understanding, and social support (0 = *low support*, 1 = *high support*) were entered. At Step 2, the VSSC variables: Recall, Yield 1, and Shift were entered. Children's Yield 1 scores, rather than Yield 2 scores, were included for several reasons. Yield 1 reflects children's willingness to acquiesce the first time the questions were asked, whereas Yield 2 reflects children's acquiescence to leading questions following the negative feedback and question repetition, both of which can affect children's accuracy (e.g., Poole & White, 1991; Scullin et al., 2002). Thus, Yield 1 is theoretically a better indicator of the first form of suggestibility of interest to Gudjonsson (1984) and Scullin and Ceci (2001). Finally,

consistent with Gudjonsson (1984), children's Yield 2 scores were more strongly correlated with their Shift scores than were their Yield 1 scores, and this could lead to problems with collinearity.[4] At Step 3 of the regressions, two interaction terms—Yield 1 × Social Support and Shift × Social Support—were entered to test our hypotheses concerning the VSSC and social context as combined predictors of children's memory and suggestibility.

First, the units of correct information provided in free recall were examined. The model was nonsignificant at each step, Fs ≤ 2.13. Thus, neither children's age, nor VSSC, nor vocabulary predicted the amount of correct narrative information that children provided about the laboratory event.

Next, children's proportion of correct responses to specific questions was examined. Results, displayed in Table 4, revealed that entering age, vocabulary, and social support at Step 1 explained a significant portion of the variance in performance. Adding the VSSC variables at Step 2 significantly increased the explanatory power of the model. The change in R^2 at Step 3 approached significance, with the overall model accounting for 34% (adjusted) of the variance, $F(8,84) = 6.90$, $p < .01$. Because predictions had been made about VSSC by context interactions, results of the final step were examined. According to the beta coefficients, children's PPVT, Recall, and Yield 1 scores, and the Yield 1 × Social Support interaction were significant.

Increases in children's vocabulary understanding regardless of chronological age were associated with a higher proportion of correct responses to specific questions. Increases in children's VSSC Recall scores were also positively related to their proportion of correct responses. The interaction revealed a trend in the expected direction (Fig. 1). Among children questioned in a nonsupportive manner, larger Yield scores (i.e., an initial tendency to assent to the VSSC questions) were associated with a lower proportion of correct responses to specific questions about the laboratory event. Among children questioned by a supportive interviewer, larger Yield scores were associated with a somewhat higher proportion of correct responses. Stated another way, VSSC Yields predicted poorer memory in terms of fewer correct responses to specific questions only when children were questioned in a cold, emotionally unavailable, nonsupportive manner. When children were questioned in a positive supportive manner, Yield scores were generally unrelated to children's memory accuracy or perhaps were slightly positively related.

A similar and more robust pattern emerged in the regression predicting specific question errors (Table 5). The entry of age, vocabulary, and social support explained a significant portion of the variance at Step 1, and adding the VSSC variables significantly increased the model's explanatory power. The inclusion of the interactions at Step 3 was also significant, $F(8,84) = 5.10$, $p < .01$. Significant predictors included children's VSSC Recall and Yield scores and the Yield 1 × Social Support interaction. As children's VSSC Recall scores increased, errors in response to specific questions decreased. Also, increases in children's Yields were associated with increases in their errors in response to specific questions. However, as can be seen in Fig. 2, this pattern was being driven by children questioned in a nonsupportive manner. Among children interviewed by a supportive interviewer, Yield scores were unrelated to specific question errors.

[4]The regressions were repeated substituting children's Total Suggestibility scores and the Social Support × Total Suggestibility interaction for the Yield 1 and Shift scores and their respective interactions. Findings remained similar, with children's Total Suggestibility scores predicting their specific and misleading question performance. The adjusted R^2 values were slightly smaller than when the Yield 1 and Shift scores were included. Furthermore, the interaction terms involving social support were nonsignificant. Thus, including Yield 1 and Shift separately was more informative.

Two final regressions focused on children's misleading question performance, that is, children's suggestibility. As can be seen in Table 6, for correct responses, the entry of age, vocabulary, and social support at Step 1 explained a significant portion of the variance. When the VSSC variables were entered, the variance accounted for by the model increased significantly by 22%, overall $F(6,86) = 9.02$, $p < .001$. Both Recall and Yield were significant predictors. The addition of the interaction terms did not significantly improve the model (although the overall F remained significant).

Significant predictors at Step 2 included children's VSSC Recall and Yield scores and interviewer support. Higher Recall scores and lower Yield scores were associated with increases in the number of correct responses to misleading questions. Also, children questioned in a high-support manner answered a greater proportion of misleading questions correctly than did children questioned in a low-support manner (see also Table 2).

Finally, children's incorrect responses to misleading questions were examined. Results are presented in Table 7. The inclusion of age, vocabulary, and social support explained a significant portion of the variance. The explanatory power of the model increased significantly when the VSSC variables were included, but not when the interactions were included; however, the overall model remained significant at Step 3. At Step 2, $F(6,84) = 8.80$, $p < .001$, only children's Yield scores were significant; as Yields increased, so did errors to misleading questions.

Discussion

The purpose of this study was to examine the relations between children's suggestibility and their memory of a salient personal experience and to determine whether interviewer demeanor moderated these relations. Results provide new insight into individual differences in children's memory and suggestibility and indicate that individual differences may interact with sociocontextual characteristics to affect children's memory for personal experiences, a pattern that highlights the need for continued research in this important area.

Individual differences in children's suggestibility

In our study, a number of noteworthy findings emerged regarding suggestibility as a source of individual differences in children's memory accuracy. For one, some researchers have speculated that children's suggestibility includes distinct types or dimensions: acquiescence (Yields) and answer changing (Shifts). In our study, these two types of suggestibility were significantly correlated. The correlation's magnitude was similar to those reported by Gudjonsson (1984) in his studies of adolescents' and adults' interrogative suggestibility. A negative correlation between Yields and Shifts was reported by Scullin and colleagues (2002) among children under 4½ years of age, and this likely emerged due to children indiscriminately changing most responses to “yes” following negative feedback. Thus, a developmental change may exist in children's responsiveness to negative feedback, with our 5- and 6-year-olds appearing more adult-like in their responses.

Slight methodological differences between our studies and Scullin and colleagues' studies (e.g., Scullin & Ceci, 2001) may also account for the positive correlation between the suggestibility measures that we observed. Our delay between the VSSC video and interview was approximately 20 min, whereas Scullin and colleagues' delay was several days. We administered the memory interview, the VSSC video, and the interview in that order during a single session so that children could be immediately debriefed about interviewer demeanor after the VSSC, to prevent interference between children's VSSC video memory and their original event memory, and to simulate same-day interrogation practices in forensic contexts (which may involve administering a forensic interview and other relevant questionnaires

during a single visit). This shorter delay likely contributed to our sample's higher Recall and lower Yield scores, and Yielding (i.e., assenting) less often initially gave children more opportunities to change to “yes” responses the second time the questions were asked, which could have contributed to the positive Yield–Shift association. Of note, despite some differences in results across studies, other findings were comparable (e.g., similar variability in VSSC performance and associations between VSSC and memory). Thus, the VSSC measure itself appears to be consistent across laboratories even with some alterations in its administration.

A second important result concerning the VSSC, although unexpected, was the lack of interviewer support effect on children's VSSC performance. This result is inconsistent with some (e.g., Davis & Bottoms, 2002) but not all prior studies (e.g., Imhoff & Baker-Ward, 1999; Quas et al., 2004). Supportive interviewers appear to be most beneficial when children are asked highly leading questions (e.g., Davis & Bottoms, 2002), a pattern observed in our regressions predicting children's misleading question accuracy. Although the VSSC includes a few highly leading questions, most are simply yes/no questions for which the correct answer is “no.” The lack of highly leading questions could have eliminated the potential for direct effects of social support on children's VSSC. Of course, that children's VSSC performance was unaffected by variations in interviewer demeanor is promising for the VSSC's utility as a forensic screening tool.

Third, with regard to the VSSC as a predictor of children's memory for a separate event, several significant associations emerged in support of our predictions. The effect sizes of the associations were medium to large (Cohen, 1988) and were similar in magnitude to those reported by Scullin and colleagues (2002). However, these associations were evident only when children's VSSC Recall and Yield scores were examined, with higher Recall scores being related to better memory performance and higher Yield scores being related to poorer memory performance. Also, the associations were to some extent affected by social context, a point to which we return shortly.

The VSSC Recall scores may be tapping children's general ability to remember or recount prior experiences, or a form of intelligence that itself affects memory or perhaps children's general willingness to talk about prior experiences. Thus, it will be necessary, in future studies, to measure children's general suggestibility and memory abilities separately to determine how each is related to their accuracy when recounting salient personal experiences. Higher Yield scores were directly associated with reduced accuracy in children's responses to misleading questions about the laboratory event. These associations do not simply reflect a “yes” bias. Although the Yield scores reflect the number of incorrect “yes” responses to the VSSC questions, the direct questions about the laboratory event were counterbalanced for “yes,” “no,” and open-ended responses. Thus, children's acquiescence to leading questions may well reflect a relatively stable trait that predicts their answers to highly suggestive questions about multiple events.

Unexpectedly, children's Shift scores did not predict their memory. It is possible that our procedures did not tap the same underlying Shift construct as that in former VSSC studies. In particular, despite the shorter delay between the VSSC video and interview in our study relative to that in prior studies, our children's Shift scores were slightly (but nonsignificantly) higher, indicating that our sample was as willing, if not more so, to change answers following the negative feedback. It is also possible that children's Shift tendencies may predict their memory only when they have been subjected to multiple leading interviews about alleged events (e.g., Scullin et al., 2002; but see also Memon, Holliday, & Hill, 2003) or have been pressured using highly leading interview tactics to change their responses in a single interview (Scullin & Bonner, 2003). Shifts may be unrelated to

memory when children are interviewed once about a salient personal experience, and there is no overt social pressure to provide certain responses. In other words, because Shifts involve repeated questioning plus negative feedback, it may be important to ask memory questions repeatedly and in a highly leading manner to uncover Shift–memory associations. Finally, given that children's Yields (and not Shifts) predicted their memory errors, it remains unclear whether both measures are necessary when attempting to identify children prone to inaccuracies. Instead, and consistent with Scullin and colleagues (2002), children's initial acquiescence, or the combination of acquiescence and answer changing, may provide the most useful insight into which children are likely to err.

As a final comment, even with children's age and vocabulary understanding included in the models, their Recall and Yield scores remained significant predictors of their memory, with Yield scores being in conjunction with social support. Thus, it was not the case that a third variable, in this case vocabulary, explained the significant VSSC–memory associations. Moreover, in the regressions, children's vocabulary ability (and not age) predicted their specific question accuracy. The lack of age effects likely reflects the restricted age in our sample. However, consistent with prior research (e.g., Clarke-Stewart et al., 2004; Roebers & Schneider, 2004), linguistic ability predicted better memory independent of age. Verbally advanced children may have better understood the questions, facilitating their ability to provide correct responses. The PPVT may also have served as a proxy for cognitive ability (Hodapp & Gerken, 1999), which is related to children's verbal abilities, memory, and VSSC performance (e.g., Roebers & Schneider, 2001; Young, Powell, & Dudgeon, 2003).

Social support, suggestibility, and memory

The second goal of our study was to examine whether the associations between individual differences in children's suggestibility and memory vary depending on the supportiveness of the interview context. We expected that the associations between children's Yields and Shifts and their memory would be stronger when the interviewer was nonsupportive than when the interviewer was supportive and that these associations would emerge for nonleading or mildly leading (i.e., specific), as opposed to strongly leading (i.e., misleading), questions. Our results provided modest support for our hypotheses. Children's Yield 1 scores predicted their accuracy in response to specific questions when the interviewer was less supportive but were unrelated to their accuracy when the interviewer was more supportive. The interaction was not observed for children's responses to misleading questions. Instead, for misleading questions, children's Yield 1 scores and social support directly predicted performance.

The VSSC interview assessed children's suggestibility for information contained in a brief video they had watched. Children may not have had strong motivation to attend to or recall the video later, and this may have made even the mildly leading VSSC questions difficult to answer or may have reduced children's willingness to engage in the interview task. The laboratory event, in contrast, consisted of mild challenges in which children participated directly. Personal involvement enhances memory and reduces suggestibility (Tobey & Goodman, 1992). Children's better memory, combined with a supportive interviewer who perhaps made children more comfortable, may have increased their ability to answer questions about what happened. Insofar as children's VSSC and memory interview performances in the high-support condition were being affected by different processes (e.g., motivation vs. memory representation), the lack of significant associations might be expected. However, when the interviewer was not supportive or when the memory questions were strongly leading, the strength of children's event memory trace may not have been sufficient to reduce inaccuracies among children who tend toward acquiescence. Such a possibility would lead to direct associations between children's VSSC Yield 1 scores and misleading question accuracy regardless of the interviewer's demeanor and associations only

in the low-support condition between children's VSSC Yields and specific question accuracy.

Caveats and conclusions

Although our study reveals new insights into internal and external sources of influence on children's memory accuracy, several caveats must be mentioned. First, the interviewer maintained the same demeanor for both the VSSC and the memory interviews. This eliminated potential confounds associated with different individuals (one who was supportive and one who was not) questioning children about separate events and confusion that could have resulted from the same interviewer behaving differently when questioning children about the two events. Such confounds could have affected children's performance independent of interviewer demeanor. However, it will be important in the future to examine how the associations between children's suggestibility and memory vary as the context itself changes. Second, children's ages were restricted to 5 and 6 years. The effects of interviewer demeanor on children's memory and suggestibility and the associations between children's VSSC and memory vary across development. For instance, the benefits of high-support interviewers are more consistent among older children than among preschool-age children (cf. Davis & Bottoms, 2002; Goodman et al., 1991; Imhoff & Baker-Ward, 1999). Also, children's VSSC performance is more predictive of accuracy when questioned about true/false events among children age 4½ years or over than among younger preschoolers (Scullin et al., 2002). As such, research is needed to determine whether interactions between children and sociocontextual characteristics change with development.

In closing, our results reveal some support for suggestibility as an individual difference characteristic predictive of children's memory accuracy, especially when children are asked highly leading questions. However, caution is warranted regarding the generalizability of these results to forensic contexts given that children's suggestibility was unrelated to their ability to answer specific questions when the interviewer behaved supportively. Instead, it was only when the interviewer behaved nonsupportively that children's suggestibility predicted their ability to answer specific questions. Of course, the latter findings do not mean that children should be interviewed in a nonsupportive manner as a means of increasing the magnitude of associations between their suggestibility and memory errors. As we observed, interviewing children in a nonsupportive manner is often associated with other adverse effects such as directly reducing children's accuracy when answering misleading questions. Instead, our results highlight the need to take into account not only characteristics within children but also the context in which they are questioned when evaluating children's eyewitness memory abilities.

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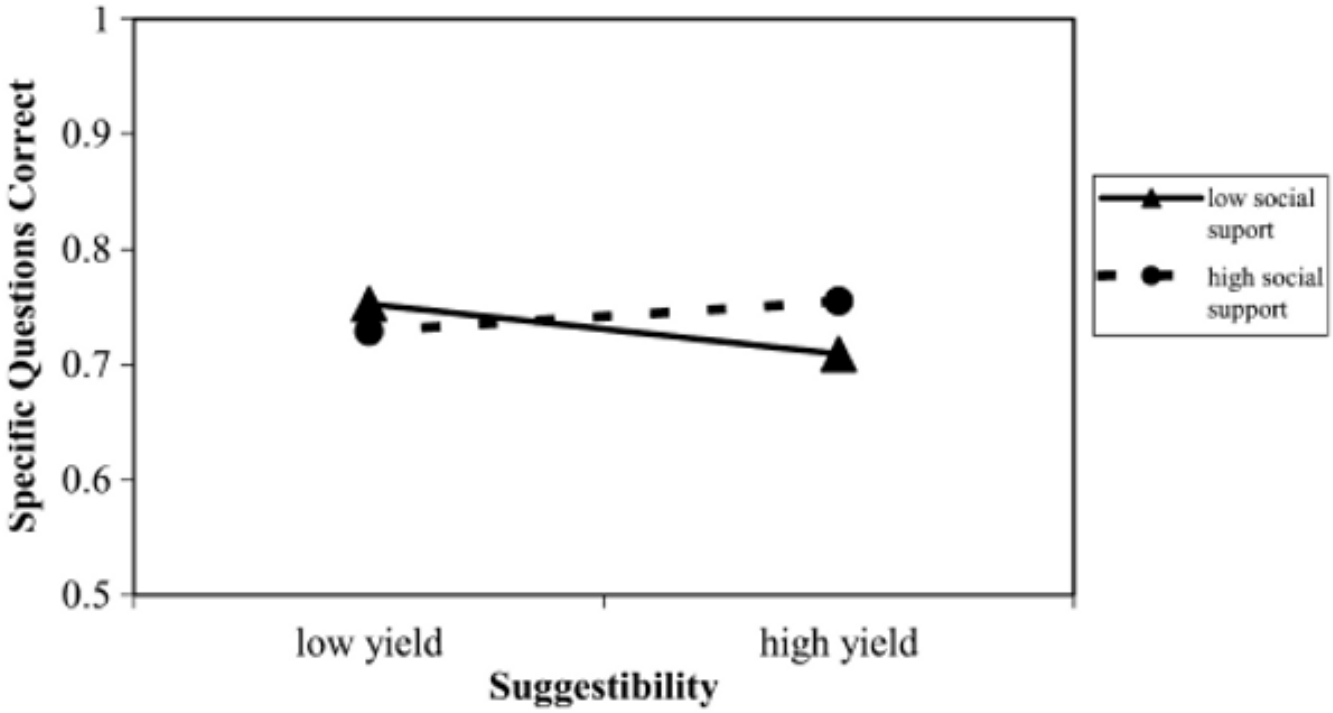

Fig. 1.
Plot of the significant interaction predicting children's proportion of specific correct responses as a function of their VSSC Yield 1 performance and interviewer demeanor. The end points on the graph denote 1 *SD* above and below the mean.

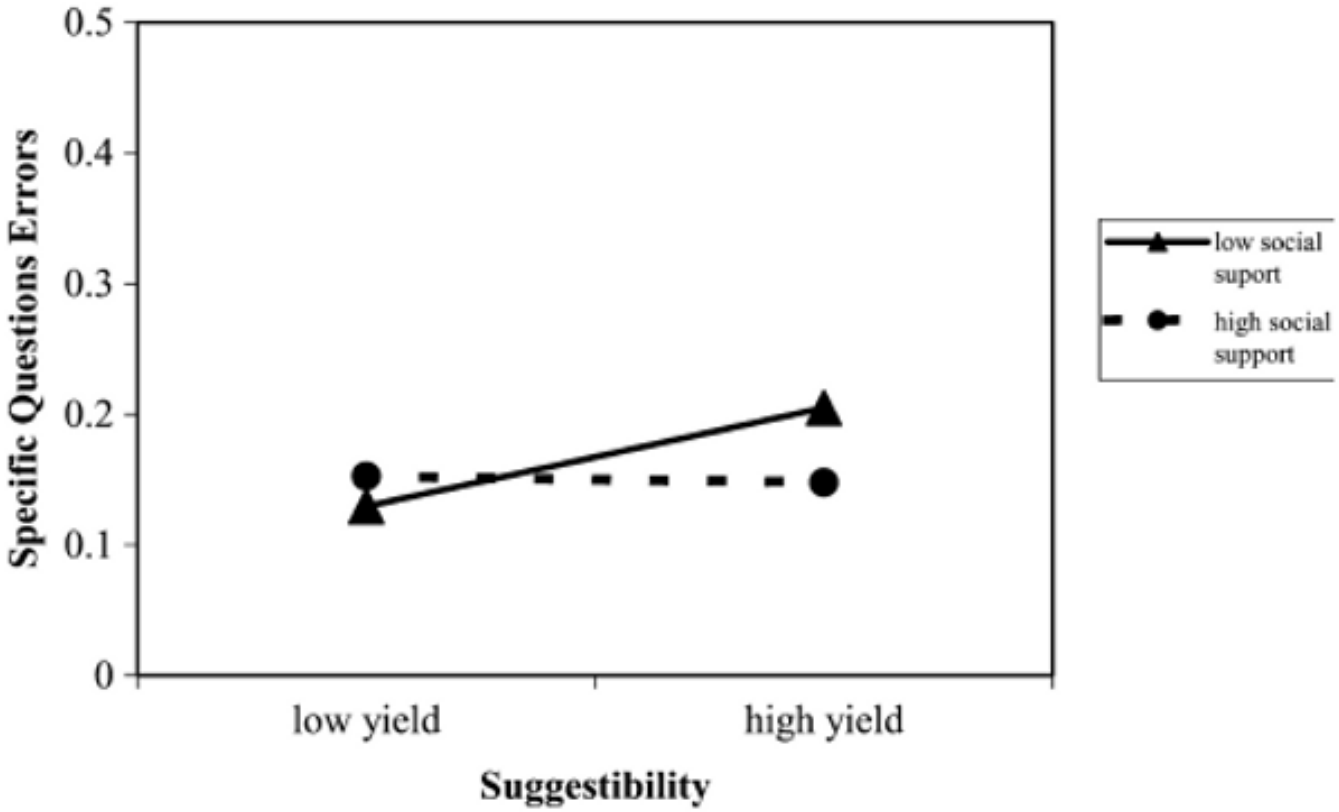

Fig. 2.

Plot of the significant interaction predicting children's proportion of specific question errors as a function of their VSSC Yield 1 performance and interviewer demeanor. The end points on the graph denote 1 *SD* above and below the mean.

Table 1

Descriptive statistics of study variables

Variable	*N*	*M*	*SD*
Age in months	106	73.10	6.41
Vocabulary score	96	79.58	12.10
VSSC performance			
Recall	104	9.57	5.19
Yield 1	106	3.66	2.67
Yield 2	102	6.00	3.50
Shift	106	6.55	4.00
Total Suggestibility	106	10.21	5.30
Event memory performance			
Free recall units correct	103	11.57	8.03
Specific question proportion correct	103	.74	.09
Specific question proportion errors	103	.16	.07
Misleading question proportion correct	103	.59	.20
Misleading question proportion errors	103	.29	.14

Note. Total Suggestibility corresponds to the sum of Yield 1 and Shift. The *ns* vary slightly due to administration error for some parts of some measures.

Table 2

Mean VSSC and laboratory event memory interview performance in children questioned by a high-support versus low-support interviewer

	Social support condition	
	Low support	**High support**
VSSC performance		
Recall	9.89 (5.53)	8.78 (4.76)
Yield 1	4.21 (2.90)	3.23 (2.46)†
Yield 2	5.96 (3.29)	5.98 (3.61)
Shift	6.66 (3.50)	6.34 (4.35)
Total Suggestibility	10.88 (5.02)	9.57 (5.58)
Event memory performance		
Free recall units correct	12.83 (9.25)	10.33 (6.38)
Specific question proportion correct	.74 (.09)	.74 (.09)
Specific question proportion incorrect	.17 (.08)	.15 (.07)
Misleading question proportion correct	.55 (.19)	.63 (.20)*
Misleading question proportion incorrect	.31 (.13)	.26 (.15)†

Note. Standard deviations are in parentheses.

* $p < .05$.

† $p < .10$.

Table 3

Correlations among children's age, vocabulary, VSSC performance, and memory interview performance

	Age in months	Vocabulary understanding	VSSC recall	VSSC Yield 1	VSSC Yield 2	VSSC Shifts	VSSC Total Suggestibility
Age in months	1.00						
Vocabulary scores	.25*	1.00					
VSSC performance							
Recall	.43**	.24*	1.00				
Yield 1	−.09	−.33**	−.19	1.00			
Yield 2	−.05	−.12	−.07	.42**	1.00		
Shift	.03	.15	−.07	.22*	.74**	1.00	
Total Suggestibility	−.03	−.07	−.14	.69**	.77 **	.86**	1.00
Event memory performance							
Free recall units correct	.14	.23*	.32**	−.10	−.02	.01	−.05
Specific question proportion correct	.27 **	.49**	.43**	−.31**	−.02	.05	−.13
Specific question proportion incorrect	−.06	−.33**	−.27*	.40**	.00	−.03	.19
Misleading question proportion correct	.09	.31**	.29 **	−.52**	−.24*	−.23*	−.44**
Misleading question proportion incorrect	−.06	−.33**	−.20	.58**	.23*	.15	.42**

Note. ns ranged from 96 to 106. For Total Suggestibility, correlations with Yield 1 and Shift are part/whole correlations.

* $p < .05$.

** $p < .01$.

Table 4

Regression results predicting children's proportion of correct responses to specific questions

Step and predictor	ΔR^2	Standardized βs		
		Step 1	Step 2	Step 3
Step 1	.247**			
Age in months		0.158	0.019	−0.00
Vocabulary scores		0.432**	0.35**	0.353**
Social support		0.073	0.067	0.064
Step 2	.110**			
Recall		—	0.347**	0.339**
Yield 1		—	−0.106	−0.659*
Shift		—	0.014	−0.109
Step 3	.039†			
Social Support × Yield 1		—	—	0.585*
Social Support × Shift		—	—	0.114

Note. Model summary at Step 2: F change (3,86) = 4.921, $p < .01$, adjusted $R^2 = .313$. Model summary at Step 3: F change (2,84) = 2.714, $p < .10$, adjusted $R^2 = .339$.

* $p < .05$.

** $p < .01$.

† $p < .10$.

Table 5

Regression results predicting children's proportion of incorrect responses to specific questions

Step and predictor	ΔR^2	Standardized βs		
		Step 1	Step 2	Step 3
Step 1	.134**			
Age in months		−0.015	0.083	0.076
Vocabulary scores		−0.335**	−0.210†	−0.187†
Social support		−0.160	−0.115	−0.115
Step 2	.114**			
Recall		—	−0.238*	−0.228*
Yield 1		—	0.276*	1.080**
Shift		—	−0.056	−0.519
Step 3	.075*			
Social Support × Yield 1		—	—	−0.884**
Social Support × Shift		—	—	0.501

Note. Model summary at Step 2: F change (3,86) = 4.333, $p < .01$, adjusted $R^2 = .195$. Model summary at Step 3: F change (2,84) = 4.684, $p < .05$, adjusted $R^2 = .259$.

* $p < .05$.

** $p < .01$.

† $p < .10$.

Table 6

Regression results predicting children's proportion of correct responses to misleading questions

Step and predictor	ΔR^2	Standardized βs		
		Step 1	Step 2	Step 3
Step 1	.167**			
Age in months		0.025	−0.065	−0.057
Vocabulary scores		0.30**	0.195*	0.187†
Social support		0.291*	0.217*	0.217*
Step 2	.219**			
Recall		—	0.200*	0.198*
Yield 1		—	−0.354**	−0.515†
Shift		—	−0.169	−0.022
Step 3	.005			
Social Support × Yield 1		—	—	0.163
Social Support × Shift		—	—	−0.202

Note. Model summary at Step 2: F change (3,86) = 5.968, $p < .01$, adjusted $R^2 = .139$. Model summary at Step 3: F change (2,84) = 0.330, $p = .720$, adjusted $R^2 = .333$.

* $p < .05$.

** $p < .01$.

† $p < .10$.

Table 7

Regression results predicting children's proportion of incorrect responses to misleading questions

Step and predictor	ΔR^2	Standardized βs		
		Step 1	Step 2	Step 3
Step 1	.149**			
Age in months		0.013	0.063	0.032
Vocabulary scores		−0.332**	−0.185†	−0.166
Social support		−0.220*	−0.121	−0.123
Step 2	.232**			
Recall		—	−0.097	−0.095
Yield 1		—	0.471**	0.654*
Shift		—	0.073	−0.188
Step 3	.026			
Social Support × Yield 1		—	—	−0.188
Social Support × Shift		—	—	0.575†

Note. Model summary at Step 2: *F* change (3,86) = 10.729, $p < .01$, adjusted $R^2 = .120$. Model summary at Step 3: *F* change (2,84) = 1.831, $p = .166$, adjusted $R^2 = .350$.

* $p < .05$.

** $p < .01$.

† $p < .10$.