Child Abuse & Neglect 35 (2011) 659–669

Contents lists available at ScienceDirect

Child Abuse & Neglect

Evidence supporting restrictions on uses of body diagrams in forensic interviews☆

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ARTICLE INFO

Article history:
Received 26 July 2010
Received in revised form 6 May 2011
Accepted 9 May 2011
Available online 21 September 2011

Keywords:
Children
Eyewitness testimony
Forensic interviews
Body diagrams

ABSTRACT

Objective: This study compared two methods for questioning children about suspected abuse: standard interviewing and body-diagram-focused (BDF) interviewing, a style of interviewing in which interviewers draw on a flip board and introduce the topic of touching with a body diagram.
Methods: Children ($N = 261$) 4–9 years of age individually participated in science demonstrations during which half the children were touched two times. Months later, parents read stories to their children that described accurate and inaccurate information about the demonstrations. The stories for untouched children also contained inaccurate descriptions of touching. The children completed standard or BDF interviews, followed by source-monitoring questions.
Results: Interview format did not significantly influence (a) children's performance during early interview phases, (b) the amount of contextual information children provided about the science experience, or (c) memory source monitoring. The BDF protocol had beneficial and detrimental effects on touch reports: More children in the BDF condition reported experienced touching, but at the expense of an increased number of suggested and spontaneous false reports.
Conclusions: The two props that are characteristic of BDF interviewing have different effects on testimonial accuracy. Recording answers on a flip board during presubstantive phases does not influence the quality of information that children provide. Body diagrams, however, suggest answers to children and elicit a concerning number of false reports.
Practice implications: Until research identifies procedures and/or case characteristics associated with accurate reports of touching during diagram-assisted questioning, interviewers should initiate discussions about touching with open-ended questions delivered without a body diagram.

Research on children's eyewitness testimony has produced widespread consensus regarding the fundamental best-practice standards for conducting forensic interviews of alleged abuse victims (e.g., APSAC Task Force on Investigative Interviews in Cases of Alleged Child Abuse, 2002; Kuehnle & Connell, 2009; Poole & Lamb, 1998). Experts and policy groups caution interviewers to avoid suggesting specific themes or conclusions early in interviews, and they recommend that interviewers build rapport, explain ground rules, encourage children to talk by asking open-ended questions about neutral topics, and transition to the topic of abuse using the least suggestive prompts possible. During substantive (i.e., abuse related) phases, guidelines encourage interviewers to favor open-ended prompts (e.g., "Tell me more about . . ."), test alternative hypotheses

☆ This research was supported by grants SES-0718889 and SES-0718856 from the National Science Foundation.
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doi:10.1016/j.chiabu.2011.05.004

about the origins of allegations and the meaning of children's responses, and assist investigations by exploring required topics (e.g., questions that could help recover physical evidence and questions dictated by charging needs).

Internationally, these standards are packaged in protocols that emphasize developmentally appropriate verbal prompts, with limited or no use of interviewing aids or props. This style, which we will call standard forensic interviewing, has historical roots in the Step-Wise interview from Canada (Yuille, 1988; Yuille, Hunter, Joffe, & Zaparniuk, 1993) and the *Memorandum of Good Practice* from the UK (Home Office, 1992; see also Home Office, 2007). Although local practices vary the order of interview phases and the suggested wording of instructions, the basic structure of these early protocols has been widely adopted in the US and abroad (e.g., Bohannan et al., 2004; Scottish Executive, 2003; State of Michigan Governor's Task Force on Children's Justice and Department of Human Services, 2004).

To improve adherence to practice guidelines, Michael Lamb and his colleagues developed a highly structured standard protocol, the National Institute of Child Health and Human Development (NICHD) protocol, which is the most widely researched forensic interviewing protocol (Lamb, Hershkowitz, Orbach, & Esplin, 2008). There is substantial evidence that this protocol improves interviewers' behavior (e.g., Lamb et al., 2009; Sternberg, Lamb, Orbach, Esplin, & Mitchell, 2001) and the quality of information provided by child witnesses (e.g., Hershkowitz, Fisher, Lamb, & Horowitz, 2007). Nonetheless, the conviction that props help children report sexual abuse has garnered support for an alternative style in which interviewers use body diagrams to elicit disclosures.

The most well-known diagram-assisted procedure is the RATAC® (rapport, anatomy identification, touch inquiry, abuse scenario, and closure) protocol, which by 2011 had been used in interviewer training workshops in 17 US states and Japan (National Child Protection Training Center, 2011). During this procedure, an interviewer draws the child's attention to a large sheet of paper where the interviewer writes words and sketches pictures during rapport building. Following brief ground rules instructions, the interviewer presents a body diagram, asks the child to name sexual and nonsexual body parts, and then asks if the child had been touched in any of the places on the diagram. Affirmative responses trigger prompts to describe those events (Anderson et al., 2010). There is variability in how interviewers use these techniques, however, and some evaluators who are not RATAC trained also question children with body diagrams. Consequently, we use the term "body-diagram-focused" (BDF) interviewing to refer to a general style of interviewing in which interviewers ask children specific questions about touching while displaying a body diagram.

On the surface, BDF interviewing deviates from several established interviewing principles. Unlike standard procedures, in which interviewers sometimes introduce body diagrams late in interviews to clarify children's reports (or to seek additional information when case evidence justifies such probing), BDF interviewers use body diagrams to introduce the topic of inappropriate touching. As a result, these interviewers raise sexual issues early in interviews by displaying a naked child, prime specific body parts by asking children to name those parts, and then ask yes-no questions, thus inviting children to point to locations on the body diagram (e.g., "Has anyone touched you in any of these places?"). This "suggest-prime-point" procedure violates the basic tenants that interviewers should (usually) avoid suggesting sexual themes early in interviews, use information children provide as a starting point for further questioning (rather than suggesting possible starting points), and exhaust open-ended prompts before resorting to more focused and (when case features warrant) option-posing (including yes-no) questions.

Although body diagrams suggest answers, it may be that BDF interviewing increases true disclosures without an unacceptable risk of false reports (as argued by Russell, 2008). Some findings are pessimistic, however. In one study, 5- and 6-year-olds who were interviewed with body diagrams immediately after being touched reported less than half of the touches they had experienced, and 36% of their touch reports were inaccurate (Willcock, Morgan, & Hayne, 2006, Study 2). Across the 3 interview delays included in this study (an immediate interview, a 1-day delay, and a 1-month delay), 7% of children falsely reported genital touching and 24% falsely reported touching to their breasts. In another study, body diagrams produced more errors and failed to increase the number of details regarding experienced touches (Brown, Pipe, Lewis, Lamb, & Orbach, 2007).

Bruck (2009) evaluated 3- to 7-year-olds' performance as a function of the placement of body diagrams in the interview (before or after verbal questions), interview timing (1 week after events or immediately afterward), and the number of the target touches. Children's accuracy was poor with and without diagrams, even when interviewers immediately asked about only four touches (two to the child and two by the child) that research assistants had emphasized; for example, "First, I need to measure your wrists. I'm measuring your wrists really loosely. Now, I'm touching your wrists really tight. I touched your wrists and you are a big boy." Importantly, body diagrams failed to improve performance and led to more errors than verbal questions alone when interviewers used diagrams after they had already asked open-ended and yes-no questions.

In contrast, Steward and Steward (1996) found that displaying anatomical aids (a body diagram or doll) did help children report touches received during medical examinations—but at a cost. One month after the examinations, displaying anatomical aids before a general question about touch boosted the percentage of children who accurately reported genital touching from 18% to 69%, but the rate of false reports of genital touching also increased from 0% to 5%. Moreover, 22% of children reported anal touching that had not occurred, and error rates increased when interviewers added direct questions about specific body parts depicted on the anatomical aids. (For example, 30% of children who had not experienced anal touches said that they had.) Note that error rates in this and other studies do not tell us how the children would have responded to interviewing aids had adults in their lives previously expressed unfounded concerns about touching.

Despite these findings, it is premature to conclude that body diagrams do or do not help children report touching. One limitation of existing research is the fleeting nature of the touching. Also, researchers have not embedded body diagrams in

the instructional context that characterizes BDF interviewing. Specifically, they have not conducted rapport building with a flip board and markers, as is typical of BDF interviews, which may decrease children's anxiety. This model of rapport building may also help children acclimate to props, thereby reducing confusion when interviewers introduce body diagrams. Instead of taking a standard interviewing protocol as the norm and asking what happens when interviewers add body diagrams, it may be more ecologically valid to compare a BDF protocol to a similar protocol without the flip board and body diagram phases that are characteristic of BDF interviewing.

We designed the current study to make this comparison. In addition to embedding body diagrams in the context of other BDF techniques, our comparison of BDF with standard interviewing differed in several ways from earlier research on body diagrams. First, we counteracted the brevity of casual touching by having male assistants touch half of the children twice during a failed activity, using items the children kept for a period of time to increase the salience of these events. (For example, a wrist band was too small, so he measured the child's wrist with his hands before taping on a longer band that remained on the child throughout a 15-minute event.) Second, we examined reports from children who were touched and children who only heard suggestions about touching. This procedure allowed us to compare the ability of BDF and standard interviewing to discriminate between experienced and suggested events. Third, we increased participant diversity by including 4- to 9-year-olds from 2 research sites. Fourth, we modeled our BDF protocol after procedures observed in actual forensic interviews. Finally, we added a source-monitoring phase to determine whether the selection of interviewing protocol impacted children's ability to distinguish between events they had experienced, events that were only suggested, and novel (i.e., control) events.

This design addressed four questions about the possible benefits and risks of BDF interviewing:

1. *Do BDF props help interviewers build rapport?* If watching interviewers draw on a flip board relaxes children, then children assigned to BDF interviewing should be more likely than those receiving standard interviewing to answer questions verbally (rather than by nodding) and without prompting during early interview phases. Also, children who feel more comfortable should provide more information in response to the first open-ended question about the science experience.
2. *Do BDF practices encourage accurate disclosures of touching?* If BDF interviewing promotes accurate disclosures, then children interviewed with a body diagram should be more likely than those interviewed with a standard protocol to report experienced touching (without a significant increase in false reports).
3. *Do BDF practices influence reports of contextual information?* BDF interviewers ask numerous specific questions about the body diagram early in interviews. If specific questions train children to provide only brief answers (Sternberg et al., 1997), then children interviewed with a body diagram might report less information about what they saw, heard, and were doing during target events.
4. *Do BDF practices influence source monitoring?* In laboratory studies, specific memory cues sometimes cause people to forget contextual information that could help specify the source of their knowledge (e.g., Shaw, Bjork, & Handal, 1995). If props and specific questions have the same effect, then children interviewed with a BDF protocol might answer source-monitoring questions (i.e., questions that ask whether knowledge is from personal experience or another source) less accurately.

Method

Participants

Following approval from institutional review boards at 2 research sites, families were recruited by posting advertisements in local papers and distributing fliers in schools and day care centers. To reduce the transmission of information across children, only one child per family participated. Families received $20 for each session, which was given to participating children or distributed among family members according to parents' instructions.

The final sample included 261 children (49.4% female) from 4 to 9 years of age: 128 4- to 6-year-olds (M_{age} = 5.5 years) and 133 7- to 9-year-olds (M_{age} = 8.5 years). Just under half (n = 125) lived in small town/rural communities in the Midwest. Participants at this site were predominantly Caucasian (90.4%) and only 5.6% Hispanic. These families were economically diverse, with 20.7% of parents reporting family incomes under $30,000 per year and 48.8% reporting incomes under $50,000 per year. Children at the second site (n = 136), in the New York metropolitan region, were more racially diverse (82.4% Caucasian, 8.1% African American, 2.9% Asian, and 6.6% "other"), with 8.1% of the parents at this site reporting that their children were Hispanic. The families at this site had higher incomes than those in the Midwest site, with only 8.3% reporting family incomes under $50,000 per year. All children were fluent in English although, across sites, 6.5% of families reported that another language was also spoken in the home.

Because many interviewers believe that BDF procedures are especially helpful for working with younger children, we divided the sample into younger (4- to 6-year-olds) and older (7- to 9-year-olds) age groups. Sample sizes by condition assignments were as follows: BDF interview, touched ($n_{younger}$ = 33, n_{older} = 34); BDF interview, not touched ($n_{younger}$ = 30, n_{older} = 33); standard interview, touched ($n_{younger}$ = 33, n_{older} = 29); and standard interview, not touched ($n_{younger}$ = 32, n_{older} = 37). Source-monitoring data from one younger child (in the BDF, not touched condition) were lost due to interviewing errors.

Mr. Science events and baseline interviews

Immediately after families arrived at university laboratories for initial sessions, assistants obtained parental consent and then child assent (for children less than 7 years of age) or consent (for children 7 years of age or older). The first session began with a 15-minute, interactive target event during which Mr. Science secured ties on the back of the child's lab coat, set a timer, and explained four science demonstrations. After each demonstration, Mr. Science and the child chatted informally while the child handled the materials or recreated the demonstration (see Poole & Lindsay, 2001). Individual children experienced one of two demonstration sets: (a) pulley systems, floating paperclips, catching tops with and without prism glasses, and testing paper airplanes, or (b) the magic eyedropper, blowing up balloons without blowing, making a telephone, and lifting drawings with play putty.

Children assigned to the touch condition also experienced two target touches. Prior to the first science demonstration, Mr. Science tried to wrap a small wrist band around the child's wrist, marveled at how big the child's wrist was, wrapped his fingers around the wrist to measure it, and retrieved a larger band that he taped onto the child. After the demonstrations, Mr. Science removed the wrist band and then tried unsuccessfully to stick a worn-out reward sticker on the child's shoulder, after which he handed the child a strip of stickers instead.

Immediately after the target events, a female interviewer began a baseline interview by asking the child to describe a favorite game or thing to do. After building rapport, she delivered 3 open-ended prompts to encourage the child to talk about everything that had happened in the science room. The target events were video recorded, and the baseline and final interviews were audio and video recorded.

Misinformation from parents

Several months after the target event, each parent received a book in the mail, *A Visit to Mr. Science*, with instructions to set the book aside until they heard from an assistant who would schedule the final interview. Instructions on the first page of the book, which were reiterated during the scheduling call, asked parents to read the book on 3 consecutive days before the interview, to record those dates on the front cover, and to read twice in one day if they inadvertently missed a day. Each story described contextual details (e.g., "His family went to a parking lot next to a big brick building. . .") followed by descriptions of two science demonstrations the child had experienced and two nonexperienced demonstrations. Because there were eight possible science demonstrations (four that the child had experienced), each child could later be asked about two experienced science demonstrations that were not described in the book, two experienced demonstrations that were described in the book, two demonstrations from the nonexperienced set that were suggested in the book, and two control (neither experienced nor suggested) demonstrations.

Counterbalancing of multiple versions of the book, along with the two demonstration sets, produced a within-subject design in which the eight science demonstrations appeared in all four of the aforementioned science demonstration conditions across children. As a result, reporting patterns for various event conditions were not due to differences in the salience of individual science demonstrations.

The books mailed to children who had not been touched also described the two target touch events (wrist and shoulder), thereby creating suggested touch events for these children. We did not include a group of untouched children who were not misinformed about touching because prior research has found low rates of falsely reporting novel touch events in the Mr. Science procedure (Poole & Lindsay, 2001, 2002).

Final interviews

The mean delay between science experiences and final interviews was 3.9 months ($SD = .55$, range = 2.8 to 5.7 months). To reduce the frequency of rescheduled visits, families had the option of a laboratory or home interview.

Individual children were randomly assigned to a BDF or standard interview with restrictions to balance (as closely as possible) mean age, the number of males and females, and the number of children who had received each of the counterbalanced science event conditions. Twenty interviewers conducted both BDF and standard interviews using the same introduction, ground rules, and rapport-building questions, which we modeled after more than a dozen BDF interviews sent to us for review. Interviewers did not know which events individual children had experienced, and they did not interview children they had spoken with during baseline interviews. (See Table 1 for an overview of the interviewing protocols.)

Standard interviews

Presubstantive phases. Because we were interested in how props influence children's testimonies, rather than other differences between standard and BDF interviews, interviewers delivered the same dialog during presubstantive phases in the two conditions. Therefore, standard interviews involved the brief introduction, ground rules, and rapport-building dialog we found in actual BDF interviews, only delivered without props. (Standard interview protocols recommend more elaborated presubstantive phases.)

After introducing herself (introduction phase), each interviewer began by asking whether the child would talk loudly for the audio recorder, would tell the truth, and would correct the interviewer if she used a big word that the child did not

Table 1
Phases of the standard and body-diagram-focused interview protocols.

Standard interview	Body-diagram-focused interview
Presubstantive phases	
Introduction	Introduction (with a flip board)
Ground rules	Ground rules (with a flip board)
Rapport building	Rapport building (with a flip board)
Substantive phases	
	Body part identification (with a body diagram)
	Positive touch inquiry (with body diagram still displayed)
Topic introduction	Topic introduction (with body diagram still displayed)
	Touch questions (with a body diagram)
Open-ended questions	Open-ended questions (with body diagram still displayed)
Follow-up questions about things Mr. Science gave the child	
Source-monitoring phase	
Source-monitoring questions	Source-monitoring questions (with body diagram still displayed)

understand (ground rules phase). The interviewer then asked how the child's name was spelled, how old the child was, whether the child lived in a house, an apartment, or something else, and who lived with the child (with prompts to elicit additional people until the child said "No"; rapport building phrase).

Substantive phases. Each interviewer established the topic of the science experience (topic introduction) and delivered 4 open-ended questions about this experience, waiting 10 seconds after the child stopped speaking before delivering the next prompt (open-ended questions phase): (a) "I want to know what happened that day in the science room. . .start with the first thing that happened and tell me everything you can, even things you don't think are very important"; (b) "Tell me more about what happened in the science room"; (c) "Sometimes we remember a lot about how things looked. . .tell me how everything looked in the science room"; (d) "Sometimes we remember a lot about sounds or things that people said. . .tell me all the things you heard in the science room."

Standard interviews also contained follow-up questions to promote disclosures of touching. Interviewers asked children who had mentioned a wrist band or sticker to tell what happened by embedding children's earlier testimony into prompts (e.g., "What happened with/when ___?"); children who had not mentioned one or both of these items were asked, "Did Mr. Science give you anything else?", followed by prompts to "Tell me about that" (follow-up questions phase).

Source-monitoring phase. Immediately after the simulated forensic interview, the interviewer delivered questions to determine the child's ability to distinguish between experienced and suggested events. The interviewer first asked the child to recall the story that contained accurate and misleading information, and then trained the child to say "no" in preparation for yes-no questions about events the child did not mention (source-monitoring story questions). ("Now I am going to ask whether some other things were in the story. For example, I might ask if Mr. Science flew across the room in the story. If I ask you about something, and you don't remember it, just tell me 'no.' Did the story say that Mr. Science flew across the room? Good, that's right; he didn't fly across the room, so you were right to say 'no.' Let's do some more. Did the story say that. . .?") Next, the interviewer explained that some things in the story might have really happened, but that there might have been things in the story that "you didn't really do. . .things that were only in the story." She then told the child to "say 'yes' if you really remember that something happened when you visited Mr. Science. If you don't remember something, or it was just in the story, say 'no.'" Questions about each of the 10 protocol events started with a phrase to identify the target event, followed by a yes-no question (source-monitoring event questions; For example, "Making paper airplanes—did Mr. Science really make paper airplanes?"). Each child received an individually randomized order of 10 questions with the restriction that 1 of the 2 questions in each event condition (experienced demonstration not described in the book, experienced demonstration described in the book, demonstration suggested by the book, control demonstration, and touch event) appeared in the first and second block of questions.

BDF interviews

Presubstantive phases. The introduction, ground rules, and rapport building phases of the BDF interview paralleled the standard interview except that interviewers periodically wrote on a flip board. For example, interviewers started rapport building by writing their names on the board, and they drew an icon to represent the child's house (or apartment, trailer, etc.)

Substantive phases. Each interviewer explained that children have different names for things and put a body diagram on the flip board that was an outline of an unclothed child with gender-neutral hair. (There were facial features, a belly button, and knee creases inside the outline but no nipples or genitalia.) She then asked "What is this?" while pointing to the hair/head, nose, lips, arm, knee, feet, shoulder, and wrist (body part identification phase). Next she asked if the child got hugs from Mom or Dad and where he/she was touched when hugged (positive touch inquiry), followed by a demonstration if the child failed to respond; for example, the interviewer hugged herself and said, "She/he touches you right here, on your shoulders, right?"

The interviewer then mentioned the science experience (topic introduction phase) and asked, "Did someone touch you in any of these places in the science room?" while motioning her finger around the body diagram. Each report of touching by the child was marked on the body diagram and the child was asked, "Who touched you there?", followed by "Did someone touch you anywhere else?" After marking all reported touches, the interviewer returned to the each report and asked two open-ended questions that invited the child to tell everything that had happened (touch questions phase). The interviewer then asked the same four open-ended questions about the science experience as in the standard interview.

Source-monitoring phase. Interviewers delivered the same source-monitoring phase as in the standard condition (see Table 1).

Data coding

Audio recorded interviews were transcribed by one of the assistants and shadowed by another, with a third referring to video recordings to resolve discrepancies and add notes describing nonverbal responses. Two coders then independently categorized children's answers to yes/no questions in the ground rules, rapport-building, and topic introduction phases, as well as the "Do you get hugs. . ." question in the BDF condition, as "yes" without prompting (the desired response) or another response ("yes" with prompting, "no" without prompting, "no" with prompting, don't know, no response, irrelevant response, or other). Intercoder agreement was 99.3%, Cohen's kappa = .95. Assistants also recorded whether these responses were verbal, nonverbal (i.e., a head nod), or "other"; intercoder agreement was 99.6%, Cohen's kappa = .99.

To quantify narratives about the Mr. Science experience (baseline and final interviews, not including the source monitoring phase), 2 assistants first recorded whenever children mentioned any of 13 events. Twelve events involved components of the Mr. Science protocol: putting on the lab coat, 8 possible science demonstrations, the wrist band and sticker, and any mention of the book that parents had read. Assistants also recorded intrusions, which were descriptions of events that were not part of the Mr. Science protocol but that an uninformed listener would not recognize as off topic talk. Overall agreement for the 13 events (number of agreements/number of events recorded by at least 1 assistant) was 97.2%. Cohen's kappas for the presence/absence of individual events across questions ranged from .97 to 1.00 for components of the science experience; intrusions were infrequent and hard to distinguish from off-topic talk, Cohen's kappa = .69.

Assistants also recorded reports of touching by Mr. Science, including any report of a sticker being placed on a child's shoulder, narratives about the wrist band if the child clearly described touching, and responses to direct questions about touching in the BDF condition. Intercoder agreement (number of agreements/number of touch reports recorded by at least one coder) was 95.7%, Cohen's kappa = .98. (All touch reports were confirmed as experienced or nonexperienced by reviewing video recordings of the science experience to screen for nonscripted touching.) Whenever children did not clearly indicate that they were talking about another event, assistants also coded narratives that described touching by people who had not been in the science room or had not touched the child while visiting the room. During the body diagram phase of BDF interviews, 6 children (4.6% of children who received BDF interviewing) mentioned numerous people and touches. Assistants agreed perfectly about which of these were off topic intrusions but had more difficulty agreeing on the number of discrete reports in these narratives: overall agreement = 85.2%, Cohen's kappa = .92.

When narrative answers are scrubbed to delete uninformative words (e.g., off-topic talk, conjunctions, false starts, and repeated phrases), the number of remaining words (i.e., modified word count) correlates highly with coding systems based on discrete units of information (Dickinson & Poole, 2000). To determine the amount of information that individual children volunteered, one assistant calculated the modified word count for each response, which a second assistant proofread. A third assistant independently coded baseline and final interviewers from 20 randomly selected children (10 from each research site); intercoder agreement on retaining or deleting individual words was 92.9%, Cohen's kappa = .81. Finally, the words in each response were categorized as words about the science experience or words about touching and, within these categories, whether the information described was experienced, suggested, or an intrusion. Because only a small percentage of freely recalled narratives about experienced events are detail errors in the Mr. Science paradigm, such as confusing the color of an item or the order of two events, all words about experienced events counted as information provided about experienced events. (See Poole & Lindsay, 2001, for typical findings regarding detail errors.)

Results

Preliminary analyses

Children assigned to cells in the 2 (interview condition: BDF vs. standard) by 2 (touch condition: touched vs. not touched) design were demographically similar. Mean ages within cells ranged from 64.8 to 66.8 months for children in the younger group, all *p*s from an Analysis of Variance (ANOVA main effects and interactions) > .46, and from 100.7 to 102.4 months for those in the older group, *p*s > .52. There were no significant imbalances in the percentages of females (range across cells = 49.2 to 50.0), Caucasian children (range = 82.6 to 88.1), Hispanic children (range = 4.8 to 10.1), or children in families with incomes of $50,000 or more (range = 69.0 to 77.3); *p*s (logistic regressions) > 47. The children assigned to various conditions were equally verbal during the baseline interview, *p*s > .19, and mean intervals between the science experience and the final interview were comparable across condition assignments, ranging from 3.8 to 4.0 months, *p*s > .17.

Table 2
Percentage of children who reported touching by Mr. Science.

Touch condition (event type)	Body-diagram-focused interview	Standard interview	
		Before follow-up questions	After follow-up questions
Target touches			
Touched (experienced)	9.0	0.0*	1.6 *ns*
Not touched (suggested)	25.4	5.8**	18.8 *ns*
Nontarget touches			
Touched (inaccurate intrusion)	17.9	0.0**	0.0**
Not touched (inaccurate intrusion)	11.1	0.0**	0.0**

Note. Significance values report results of two-sided Fisher's exact tests comparing the percentages of children in BDF and standard interviewing conditions who made one or more reports of touching by Mr. Science. *ns* = nonsignificant.
* $p < .05$.
** $p < .01$.

The percentage of families choosing a laboratory (vs. home) interview was 45.0% in the BOF and standard conditions. Interview location did not significantly influence children's performance: The correlation between location and accuracy on the final 10 source-monitoring questions (about which events had actually occurred), with age controlled, was −.03, *ns*.

Comparisons of results between the 2 research sites found no significant interactions involving site and interviewing condition for analyses of children's behavior during presubstantive interview phases, the quantity and accuracy of touch reports, or the amount of information reported about the science experience that did not involve touching (i.e., contextual information). The only significant finding was a 3-way interaction between interviewing condition, touch condition, and site for overall accuracy on source-monitoring questions regarding which events had really happened, $F(1, 251) = 4.78$, $p = .03$. Follow-up tests showed that among children who had not been touched, standard interviewing was associated with higher accuracy at the small town/rural site, whereas BDF interviewing was associated with higher accuracy at the urban site. As this was the only difference in a large number of comparisons, and sample sizes were modest for fine-grained comparisons, we collapsed over research sites to answer the following questions.

Do BDF props help interviewers build rapport?

There was no evidence that interviewing props put children at greater ease compared to verbal questions alone. A series of ANOVAs with interviewing condition and age group as factors revealed no significant main effects of interviewing condition and no interviewing condition by age group interactions across numerous variables that might index children's comfort level: the percentage of ground rules questions answered by saying "yes" without prompting, the percentage of these questions answered verbally (rather than by nodding), the percentage of rapport-building questions answered without prompting, whether children responded "yes" without prompting when asked if they remembered the science room, and whether they answered this question verbally, all *ps* > .05. Most children were cooperative and verbal: They provided "yes" responses without prompting to 93.4% of ground rules instructions and answered 99.4% of the rapport-building questions. Also, 96.9% of the children said they remembered the science event when interviewers first introduced the topic. Not all variables were at ceiling, however. For example, younger children answered only 65.5% of ground rules questions by speaking rather than nodding.

Because some means nonsignificantly favored BDF interviewing, we also computed "total comfort" scores by pooling individual children's scores across all variables. Once again, children in the two interviewing conditions performed comparably, $M_{BDF} = 90.0\%$, $M_{standard} = 89.0\%$, $p = .49$, and there was no interviewing condition by age interaction, $p = .23$. Also, BDF techniques did not significantly influence how many informative words children provided in response to the first open-ended question about the science experience, $M_{BDF} = 64.9$, $M_{standard} = 57.4$, $p = .32$, $p_{age \times condition} = .45$.

Do BDF practices encourage disclosures of touching?

BDF interviewing had beneficial and detrimental effects on the accuracy of touch reports (see Table 2). No child in the standard condition reported touching by the end of the open-ended questions phase, whereas a minority (9.0%) of children in the BDF condition did (all in response to touch questions delivered with a body diagram; 90% *CI* = 3.2% to 14.7%). Disclosure rates between BDF and standard conditions were not significantly different once an additional disclosure elicited by follow-up questions in the standard condition was included (9% vs. 1.6%). A power analysis determined that 155 touched children would need to be interviewed in each condition for this difference to reach significance with $\alpha = .05$ and power = .80. (Sample sizes in the current study were 67 and 62 touched children the BDF and standard protocols, respectively.)

Although BDF interviewing elicited more touch disclosures than open-ended questions alone, BDF practices also increased reports of touches that were only suggested by the story. (See the second row of Table 2, labeled "Not Touched.") Once again, the difference between conditions was statistically significant only before children in the standard condition received follow-up questions.

BDF interviewing had another detrimental effect on testimonial accuracy: Some children pointed to nontarget body parts, that is, parts that had not been touched by Mr. Science or suggested by the book (bottom panel of Table 2). Across touch conditions, 14.5% of children in the BDF condition reported false intrusions of touching by Mr. Science, usually by pointing to body parts interviewers had primed during body part labeling. In contrast, this type of false allegation never occurred in the standard condition.

The fact that it is easy for children to make false allegations by pointing to body parts has a counterintuitive consequence: Even though BDF interviewing elicited more touch reports, only a minority of the children who reported one or more touches in this condition made all accurate allegations—and this would still be the case if the base rate of touching (i.e., the percentage of children in the total sample who were actually touched) was higher than the 50% built into this study. To illustrate, we computed the percentage of touched children in the BDF condition who made only true reports of touching by Mr. Science (true cases = 4.5%), true and false reports (mixed cases = 4.5%), and only false reports (false cases = 13.4%). Untouched children could not generate true or mixed cases, but 33.3% made one or more false allegations. Therefore, the percentage of true cases for a sample in which 50% of children were touched was 4.5 (the percentage of touched children who made all true reports)/(4.5 + 4.5 + 13.4 + 33.3), or only 8.1%. The percentage of touched children in the standard condition (after follow-up questions) who populated true, mixed, and false cases was 1.6%, 0.0%, and 0.0%, respectively, with 18.8% of untouched children generating one or more false allegations. Therefore, the percentage of true cases generated by standard interviewing was 1.6/(1.6 + 18.8), or 7.8%. Now consider a hypothetical sample in which 80% of children were touched and 20% were not. Weighting the percentages of children in the 3 types of cases with these base rates reveals that 14.6% of cases generated by BDF interviewing would involve all true disclosures compared to 25.4% of cases generated by standard interviewing. Thus, for this protocol characteristic (the percentage of allegation cases involving all true reports), the difference between BDF and standard interviewing increasingly favors standard interviewing as the percentage of children in the sample who were actually touched increases.

In addition to suggested and spontaneous false allegations (i.e., intrusions) against Mr. Science, 6 children in the BDF condition (4.6%), but none in the standard condition, were confused by the line of questioning and reported touches by people other than Mr. Science. The following transcript excerpt, which begins after the interviewer had introduced the topic and the child had already made disclosures of touching by his mother and brother, illustrates this problem:

Interviewer:	Okay. So did someone touch you anywhere else in the science room?
Child:	Yes.
Interviewer:	Show me where you were touched.
Child:	Uh, from here, here, here, here, here. (Child pointed to the body diagram.)
Interviewer:	Who touched you there?
Child:	My mom and my dad and my brother and my other brother and my dad and my mom.
Interviewer:	So your mom, your dad, your brother, and your other brother. Okay, well, I'm talking about the science room. So did someone touch you in any of these places while you were in the science room?
Child:	Yes.
Interviewer:	Okay. Where did they touch you while you were in the science room?
Child:	Uh, all of this here.
Interviewer:	All of that?
Child:	Yeah.
Interviewer:	Okay. Who touched you all over?
Child:	Uh, hmm, my, my, my dad.

Children who volunteered off-topic touch reports mentioned family members, friends, an unidentified stranger, and a lobby assistant, with four of these children mentioning multiple people.

It is important to note that the benefits and risks of BDF interviewing were not restricted to younger children. Four of the 6 children who accurately disclosed touching were 7–9 years of age, as were 7 of the 16 children who reported suggested touching and 11 of the 19 children who made other false allegations against Mr. Science. Off topic intrusions of touching by people other than Mr. Science generally involved younger children, with 5 4- to 6-year-olds and 1 9-year-old involved in these reports.

Do BDF practices influence reports of contextual information?

Allegations of abuse are more credible when children can describe activities that occurred before and after touching experiences. In this study, there was no evidence that BDF interviewing encouraged or discouraged children from describing contextual information (i.e., details about the science experience that did not involve touching).

To code children's narrative responses, we divided words spoken (modified word count) about the room and the science activities into experienced, suggested (by the misleading book), and intruded (neither experienced nor in the book). A 2 (interview condition: BDF vs. standard) by 2 (touch condition: touched vs. not touched) by 2 (age group: 4–6 vs. 7–8 years) ANOVA on the amount of experienced information children reported confirmed the expected age effect, $F(1, 253) = 89.89$, $p < .001$. On average, younger children provided 75.05 words describing components of their laboratory visits, compared to 184.53 words from the older children. However, main effects of interviewing and touch conditions were not significant for experienced information ($ps = .13$ and .77, respectively), and there were no significant interactions, $ps > .42$.

Similarly, interviewing and touch conditions did not significantly influence the amount of suggested information the children reported, and there were no significant interactions involving these condition assignments and age, *p*s > .12 The percentage of children who mentioned one or more suggested science demonstrations paralleled other suggestibility studies (e.g., Poole & Lindsay, 2001, 2002; see Ceci, Kulkofsky, Klemfuss, Sweeney, & Bruck, 2007, for a review): Thirty percent of children ages 4–8 years described some suggested information (28% of 4-year-olds, 34% of 5-year-olds, 28% of 6-year-olds, 37%, of 7-year-olds, and 23% of 8-year-olds), but this figure dropped to 11% among 9-year-olds. A trend analysis confirmed a decline in suggestibility from 7 to 9 years, $F(1, 132) = 8.89$, $p = .003$.

Only 6 children (2.3%) described experiences that were unrelated to the Mr. Science protocol (i.e., intruded demonstrations), and this phenomenon occurred in both interviewing conditions.

Do BDF practices influence memory source monitoring?

Source-monitoring questions determined children's ability to specify whether knowledge of events is from personal experience or some other source (e.g., conversations with adults or, in this study, the misleading story). Here we report performance on the 10 yes-no questions that asked whether each protocol event *really* happened (source monitoring event questions).

Mean percentages correct were similar in the BOF (77.8%) and standard conditions (76.5%), $p = .51$, and interviewing condition did not interact significantly with touch condition or age group, *p*s > .45. ANOVAs conducted separately on each type of event (experienced demonstration, experienced and described demonstration, suggested demonstration, control demonstration, and touch event) also failed to find a significant effect of interviewing condition on source monitoring.

Findings mirrored other studies with the Mr. Science paradigm (Poole & Lindsay, 2001, 2002). The children accurately said "yes" to most questions about experienced science demonstrations that were mentioned in the book ($M = 96.0\%$ correct), and the two age groups performed comparably on these events. They had more difficulty recalling experienced science demonstrations that were not refreshed by the book ($M_{overall} = 73.8\%$), with older children recalling more of these events ($M = 65.8\%$) than younger children ($M = 81.6\%$), $F(1, 252) = 14.33$, $p < .001$. The children also had difficulty rejecting suggested demonstrations ($M = 69.0\%$), although this skill improved with age ($M_{younger} = 53.5$, $M_{older} = 83.8$), $F(1, 252) = 40.33$, $p = <.001$. Suggestibility was not entirely due to yeah-saying, however, as children performed better on control demonstrations ($M = 94.0\%$), with this skill also improving with age ($M_{younger} = 89.8$, $M_{older} = 98.1$), $F(1, 252) = 11.43$, $p = .001$.

There were also age differences for questions about touch events. For children who had been touched, percentages correct (i.e., saying "yes") were $M_{younger} = 34.8$ versus $M_{older} = 49.2$ ($M_{overall} = 41.9$), $F(1, 252) = 5.22$, $p = .02$. For children who had not been touched (but who heard that they were), percentages correct (i.e., saying "no") were $M_{younger} = 45.9$ versus $M_{older} = 78.6$ ($M_{overall} = 63.4$), $F(1, 252) = 19.03$, $p < .001$.

Discussion

This study is the first comparison of BDF and standard interviewing that included touched children and children who only experienced false suggestions about touching. Differences in performance between the two protocols were restricted to reports of touching. Although having the interviewer draw on a flip board seems child friendly, we found no evidence that this practice produced more child interaction than verbal questions alone. Also, children who experienced BDF and standard interviewing provided comparable amounts of contextual information about the science experience and showed equivalent performance during the source-monitoring phase, when interviewers asked whether specific events really happened. The lack of differences for these outcome measures is good news for interviewers who like using paper and markers to establish relationships with children and deliver scripted instructions, because these props have no known risks that carry over into other aspects of eyewitness performance.

Our touch report findings illustrate the dilemma faced by forensic interviewers. Children's responses to open-ended questions focused on the science activities rather than touching, although more children described touching when interviewers asked increasingly specific questions (i.e., follow-up questions in the standard protocol and source-monitoring questions). But misled children reported more false information as questions became more specific. This problem is so well documented that a major goal of protocol research has been to reduce dependence on questions that mention specific details (e.g., "What did. . .look like?" is more open-ended than "What color was the. . ..?"), provide specific options (e.g., "Where were you?" is more open-ended than "Were you in the living room or the kitchen?"), or suggest information the child never mentioned (Lamb et al., 2009). Because specific questions about touch appear early in the BDF protocol, this procedure elicited more true reports than the open-ended questions in the standard protocol but at the expense of a large increase in the number of suggested reports.

Just because BDF interviewers did not mention a particular person or type of touching does not make the use of body diagrams nonsuggestive. All children have been touched in numerous places by numerous people, so asking if anyone has touched the child is disingenuous in the sense that children can respond appropriately only if they already know—as they usually do—what adults want the topic of conversation to be. Because interviewers always have the option of asking focused questions later in interviews, there does not seem to be a rationale for introducing yes-no questions early in interviews.

In addition to eliciting reports of suggested touches, body diagrams led some children to point to body parts that had not been touched or described in the story. Diagrams are therefore more suggestive than questions alone because children rarely

acquiesce to initial yes-no questions that ask about novel (nonexperienced and nonsuggested) touches (e.g., less than 3% of 3- to 8-year-olds in the second session of Poole & Lindsay, 2001). Also, yes-no questions rarely prompt children to describe events that are unrelated to information embedded in the questions (A flurry of invented false reports is a phenomenon researchers see in a small percentage of preschoolers, who sometimes produce fantastic reports even during open-ended questioning, and in children with histories of suggestive conversations (e.g., Ceci & Bruck, 1995).). Due to the combination of suggested and spontaneous false reports (i.e., intrusions) in the BDF condition, calculations assuming two base rates of touching (50% and 80% touched children in the total sample) showed that accuracy differences would increasingly favor standard interviewing as the percentage of children in a sample who were touched increased.

Unless subsequent research paints a different picture, these findings suggest that policy makers should place a moratorium on the practice of introducing body diagrams early in interviews. There are several reasons for this conclusion. First, studies that included children who experienced events and children who only heard adults mention those events have found that open-ended questions are less likely to elicit reports of suggested information (e.g., Poole & Lindsay, 2001). This is why most researchers (even those who studied genital touching) have recommended that interviewers begin by asking children if they know why they are being interviewed that day, followed by open-ended questions (e.g., Steward & Steward, 1996, p. 153). Second, the standard practice of introducing the topic with open-ended prompts and following with increasingly focused prompts may better support memory retrieval by giving children time to accept what the interview is about and to think about inappropriate actions by people in their lives. For example, Hershkowitz, Orbach, et al. (2007) found that children who would later give no information about abuse were relatively less engaged during presubstantive interview phases, suggesting that these children would benefit from more rapport-building and support before interviewers initiated abuse-related questions. The bottom line is that specific questions are more likely to elicit reports of information that was only suggested to children, body diagrams add an additional risk of spontaneous intrusions due to the ease of pointing, and there is no evidence from the existing literature that these risks are counteracted by benefits compared to well-established procedures. As a result, it is the responsibility of people who wish to continue conducting BDF interviews to show that early introduction of body diagrams is effective and safe.

Of course, the benefits and risks of interviewing techniques depend on case features, so this conclusion has caveats. Low disclosure rates in analog studies are a predictable consequence of the fact that the children had not (to investigators' knowledge) previously disclosed touching. (See Pipe, Lamb, Orbach, & Cederborg, 2007, for discussions of how disclosure patterns relate to child characteristics and prior disclosure histories). It is important to distinguish between this situation and the high disclosure rates found in some field studies (reflecting the fact that many investigations are initiated by disclosures; For example, Hershkowitz, Horowitz, & Lamb, 2005). It is possible that a technique could produce a higher false allegation rate than standard procedures when used to interview nondisclosers yet not be more suggestive when used with children who have already disclosed. This could occur if previous disclosures consolidated memories for true and false events, thereby minimizing differences in performance across interviewing protocols.

Given how difficult it was to change past interviewing practices, such as the use of misleading questions and anatomical dolls, it is easy to predict how the current findings are likely to be challenged and dismissed. One foreseeable criticism is the oft-cited observation that the children in most eyewitness studies were not exposed to embarrassing or traumatic events. However, concerns about false allegations are primarily concerns about children who have not been abused—which is exactly the population laboratory research studies.

A second foreseeable criticism is that no child in our research falsely reported genital touching, and other studies collectively found few forensically relevant false reports. However, our body diagrams lacked genitalia, interviewers did not prime genital areas by asking children to name them, and the children were not in a social environment that expressed concerns about sexual abuse. The fact is that findings from early research on risky practices replicated as studies progressed from relatively neutral to more sexually explicit materials and emotionally charged events, probably because these findings reflect general principles of memory and social influence. (For examples, consider the impact of combining interviewing aids with specific questions in Steward & Steward, 1996, and data on forensically-meaningful false reports in Bruck, Ceci, & Francoeur, 2000). Unless evidence emerges to document why children involved in sexual abuse investigations are exempt from general cognitive and social principles, the best way to protect the credibility of children's testimonies is to make a small change to BDF interviewing that will better align that procedure with current best-practice standards: Simply place body diagrams after open-ended questioning when a prop is needed to clarify verbal reports or when case evidence (e.g., images or a definitive medical finding) justifies using a more suggestive memory cue.

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