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Research article

The utility of direct questions in eliciting subjective content from children disclosing sexual abuse

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ABSTRACT

Background: Children alleging sexual abuse rarely exhibit emotion when disclosing, but they may be able to describe their subjective reactions to abuse if asked.

Objective: This study examined the extent to which different types of questions in child sexual abuse interviews elicited subjective content, namely emotional reactions, cognitive content, and physical sensations.

Participants and setting: The study included transcripts of 205 Child Advocacy Center interviews with 4- to 12-year-old children alleging sexual abuse.

Methods: We coded questions for question type, distinguishing among invitations, wh- questions, yes/no and forced-choice questions, and suggestive questions. We coded both questions and answers for whether they referenced subjective content.

Results: When questions did not reference subjective content, the most productive questions were invitations, though they elicited subjective content less than 5% of the time. When questions specifically referenced subjective content, children were likely to explicitly mention such content, particularly in response to “how feel” and “what think” questions. Children’s responsiveness and productivity was enhanced by requests to elaborate on their subjective responses, and both emotional and physical reactions could be elicited. There was little evidence of non-responsiveness or counterintuitive reactions to abuse. Younger children were less likely than older children to provide subjective responses to questions that did not reference subjective content, but were no less likely to do so when asked questions with subjective content.

Conclusions: Children, even young children, can be successfully encouraged to provide subjective content about sexual abuse, particularly when free recall questions are supplemented with “how feel” or “what think” questions.

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1. Introduction

Children exhibit little emotion when disclosing abuse, both when questioned by forensic interviewers (Castelli & Goodman, 2014; Katz et al., 2012; Sayfran, Mitchell, Goodman, Eisen, & Qin, 2008; Wood, Orsak, Murphy, & Cross, 1996) and when questioned in court (Goodman et al., 1992; Gray, 1993). For example, Gray (1993) found that children testifying in court tended to show little affect and over 80% failed to cry. Even when child witnesses do exhibit emotion, those emotions could be attributable to the stressfulness of testifying rather than children's reactions to abuse (Lyon, Scurich, Choi, Handmaker, & Blank, 2012). Indeed, Gray (1993) found children's expressiveness during their testimony changed little between abuse and non-abuse topics.

When children fail to exhibit emotion during their abuse disclosures, they are less likely to be viewed as credible by police officers (Leander, Christianson, Svedin, & Granhag, 2007), prosecutors (Castelli & Goodman, 2014), judges (Leander et al., 2007), and jurors (Golding, Fryman, Marsil, & Yozwiak, 2003; Myers, Redlich, Goodman, Prizmich, & Imwinkelried, 1999; Regan & Baker, 1998). For example, Myers et al. (1999) surveyed jurors who had heard children testifying in 42 sexual abuse trials, and found that "[e]motions or emotional behaviors such as crying, fear, and embarrassment were important" factors in evaluating children's credibility (p. 406). The importance of observing witness demeanor in assessing witness credibility is a classic theme in the law, and specifically endorsed by the United States Supreme Court with respect to child witnesses (Coy v. Iowa, 1988).

An alternative to exhibiting emotion during disclosure is to describe one's reactions to abuse. An important component of a convincing narrative is the inclusion of subjective reactions, including emotional reactions, thoughts, and physical sensations (Pennington & Hastie, 1992). A number of researchers have emphasized the importance of eliciting children's subjective reactions to abuse in assessing credibility (Newman & Roberts, 2014; Snow, Powell, & Murfett, 2009; Westcott & Kynan, 2006). Furthermore, children's thoughts and feelings about other aspects of the case are important in abuse cases that go to trial. Children tend to delay reporting sexual abuse, and delays will be challenged as inconsistent with the truth (Stolzenberg & Lyon, 2014). Children's ability to explain their reasons for delay in disclosing, which include feelings such as embarrassment, shame, and fear (Alaggia, Collin-Vézina, & Lateef, 2017), likely contribute to their perceived credibility.

Some practice guidelines (American Professional Society on the Abuse of Children (APSAC), 2012) and researchers (Lyon et al., 2012; Newman & Roberts, 2014) have recommended that interviewers specifically ask children to describe their reactions to abuse and other aspects of the case. The NICHD structured protocol does not specifically recommend questions about children's subjective reactions (Katz, Paddon, & Barnett, 2016); however, the revised NICHD protocol recommends that when children spontaneously describe subjective reactions, interviewers' ask for elaboration in order to show support for the child (Hershkowitz, Lamb, & Katz, 2014), and the state of Utah has implemented the protocol with the addition of recall questions about children's thoughts and feelings regarding the abuse (H. Stewart, personal communication, July 27, 2018).

However, expecting children to describe their subjective reactions may be asking too much of them. Some studies find that large percentages of children fail to mention subjective reactions when disclosing sexual abuse. Lamb et al. (1997) examined 98 investigative interviews conducted with 4- to 13-year-old children, and found that of the 85 that were judged as plausible, just over half did not contain any report of "subjective feelings" (p. 261). Katz et al. (2016) examined 97 interviews with 3- to 14-year-old children using the NICHD structured protocol, and found that 36% contained no emotion words, not even in the pre-substantive phase during which the interviewers built rapport.

1.1. Why do children fail to describe their reactions to abuse?

There are a number of reasons why abused children might not make reference to their subjective reactions. First, younger children may be incapable of describing their reactions, due to cognitive and linguistic immaturity. For example, Roberts and Lamb (2010) noted that younger children (3- to 8-year-olds) may lack "reflective awareness of their affective or cognitive internal states" (p. 1071). Aldridge and Wood (1998) argued that "examination of child interview transcripts reveals...that questions put to children in relation to their feelings yield few satisfactory responses" (p. 1221). In reviewing their experimental work in which children were asked how child story characters would feel about different scenarios, the authors argued that "[q]uestions tapping emotions may well be unproductive with children under the age of at least 8 years, due to their limited linguistic repertoire" (Aldridge & Wood, 1997, p. 1232). This has led to recommendations that "[i]nvestigators should...avoid questions about emotional concepts (e.g., 'How did that make you feel?')" (London, 2001, p. 131).

Two studies have found age differences in the amount of subjective information children produce when disclosing abuse. Comparing 3- to 8-year-olds to 9- to 16-year-olds, Roberts and Lamb (2010) found age differences in references to "affective information" and "cognitive operations" in three different samples of children disclosing sexual abuse. Similarly, examining 3- to 14-year-old children questioned with the NICHD structured protocol, Katz et al. (2016) found that 10- to 14-year-olds used more words reflecting emotions than 4- to 6-year-olds. However, these differences could be attributable to older children's greater productivity overall, and neither study found that references to thoughts or feelings were non-existent among the younger children.

A second reason why abused children might provide few subjective details is because they are reluctant to do so. Maltreated children have been found to use fewer emotion words when describing negative events than when describing positive events (Ahern & Lyon, 2013), and children experiencing greater anxiety during events subsequently used fewer evaluative terms or emotion words when describing those events (Greenhoot, Johnson, & McCloskey, 2005; Peterson & Biggs, 1998).

A third reason is that children may need to be asked specific questions in order to be able to describe their reactions to abuse. The NICHD structured protocol emphasizes the utility of maximizing the use of invitations, questions that refer to what "happened" and ask the child to "tell more" about previously mentioned details, and invitations have been shown to be highly productive in eliciting details

about abuse (Lamb, Brown, Hershkowitz, Orbach, & Esplin, 2018). However, a focus on “everything that happened” may communicate to the child that the events are more important than the child’s reactions to those events. Specific reference to subjective content in questions may make clear the interviewer’s interest in such content, and could help to alleviate the difficulties that younger children and reluctant children exhibit in responding.

Developmental psychologists routinely recognize the need to adequately cue children in order to uncover their incipient understanding. For example, Aldridge and Wood’s (1997) experimental results were challenged by Harris and Jones (1997), who pointed to research finding that even preschool children “have the ability to understand and talk about their own emotions” (p. 1220). Specifically, with respect to Aldridge and Wood’s method, Harris and Jones noted that children’s simplistic responses to the hypothetical scenarios might be due to the researchers’ use of a single question probing each protagonist’s feelings rather than more specific questions (e.g., asking how a protagonist whose hair was pulled felt about the wrongdoer, and not just how she felt generally).

The research examining the importance of question type in eliciting children’s subjective reactions presents a mixed picture. Westcott and Kynan (2004) examined 70 sexual abuse interviews with 4- to 12-year-old children, and found that only 20% of children spontaneously described their emotional reactions (5% of children under 7) and only 10% spontaneously described their physical reactions (no child under 7). On the other hand, there was some mention of emotional reactions in 66% of the interviews and physical reactions in 47%, suggesting that more specific questions were useful. Unfortunately, however, the authors did not specify what was meant by spontaneous, and what sort of questions elicited reactions. Furthermore, a subsequent paper discussing the same interviews noted that the interviewers did a poor job of eliciting narrative responses from children, which suggests that children’s capacity for spontaneous production may have been underestimated (Westcott & Kynan, 2006).

Snow et al. (2009) examined 51 sexual abuse interviews with 3- to 16-year-old children, and failed to find question type differences in whether children produced “internal response[s], which refers to the way the person affected by the initiating event felt” (p. 557). The authors only distinguished between questions they called “open-ended,” which were “designed to elicit an elaborate response without dictating what specific details the child needed to report,” (p. 559), and all other questions, which were classified as specific. Hence, the authors would group together quite disparate questions, such as recall questions referring to subjective reactions generally (e.g., “How did you feel?”) and recognition questions probing for specific reactions (e.g., “Did it hurt?”).

Newman and Roberts (2014) examined 61 sexual abuse interviews with 4- to 13-year-olds, and showed that when the questions inquired into subjective features, children gave more subjective details. Because the interviews used the NICHHD protocol, it is likely that the questions were predominantly non-suggestive recall questions, though this is not explicitly discussed. In sum, question type has not been consistently or clearly defined across studies examining children’s production of subjective content in sexual abuse interviews, making it difficult to determine whether questions specifically referencing subjective reactions were necessary or helpful in eliciting subjective content.

1.2. Can “how did you feel” questions reliably elicit children’s reactions to abuse?

An obvious candidate for eliciting subjective information from children is to ask “how did you feel” about the abuse. However, researchers have specifically criticized the use of “how” questions, particularly with younger children (Aldridge, 2010). Malloy, Orbach, Lamb, and Walker (2017) examined the use of “how” and “why” prompts in sexual abuse interviews with preschool children, and found that children provided the requested information only 20% of the time, though they did not specifically examine responses to “how did you feel,” and acknowledged that those questions could be useful.

Lyon et al. (2012) examined the likelihood that different types of questions would elicit subjective information from 80 5- to 18-year-olds questioned about sexual abuse in court and 61 6- to 12-year-olds questioned in forensic interviews. They found that children were much more likely to generate subjective information if the question inquired into subjective content, and that “how did you feel” questions were particularly effective at eliciting subjective content. Younger children were less likely than older children to provide subjective content generally, but no less likely to do so in response to “how did you feel” questions.

Even if “how did you feel” successfully elicits subjective reactions, the question might lead to other difficulties. Young children tend to provide minimally sufficient responses given the form of the question, a tendency called formal reticence (Lyon, McWilliams, & Williams, 2019; Stolzenberg & Lyon, 2017; Stolzenberg, McWilliams, & Lyon, 2017). Hence, they predominantly provide unelaborated “yes” and “no” responses to yes/no questions, and choose one of the proffered responses when asked forced-choice questions. A question such as “how did you feel” can easily be answered with a single word (e.g., “sad”). Indeed, cursory responses to feelings questions were common in a study examining 4- to 5-year-olds’ reports of a health visit (Fängström, Sarkadi, Lucas, Calam, & Eriksson, 2017), and in a study examining 4- to 9-year-old maltreated children’s responses to stories depicting emotionally evocative events (Ahern & Lyon, 2013). Moreover, research comparing the relative productivity of wh- questions in interviews with 4- to 13-year-olds has found that what-how subjective questions (which would include “how did you feel”) were less productive than what-how questions that inquired into actions or causes (Ahern, Andrews, Stolzenberg, & Lyon, 2018); similar findings were found in 6- to 12-year-olds’ testimony (Andrews, Ahern, Stolzenberg, & Lyon, 2016).

Lyon et al. (2012) provided anecdotal evidence that “[e]ncouraging children to elaborate on their one-word responses (e.g., “Tell me about that, sad”) might be an effective means of eliciting greater detail” (p. 455). Ahern and Lyon (2013) found that these prompts, which they called cued-emotion prompts, increased children’s production of emotion words both during rapport building and when responding to emotionally evocative stories. Whether these prompts would be effective in questioning children about sexual abuse has not been tested.

Aldridge (2010) has argued that even with older children, “how did you feel?” can be a difficult question, because it is ambiguous whether the question refers to emotional or physical feelings. This was supported by Lyon et al. (2012), who found that children

provided both emotional and physical responses to this question. However, they emphasized that children were inevitably responsive, and suggested that “when children provide physical reactions to the ‘how did you feel’ question, interviewers can profitably follow-up with a ‘what did you think’ question to elicit emotional reactions. Conversely, when children provide emotional reactions to ‘how did you feel’ question, we would predict that interviewers could elicit physical reactions by following up with ‘how did your body feel?’” (Lyon et al., 2012, p. 455). Whether a combination of “how did you feel” and “how did your body” questions could elicit both emotional and physical reactions has not been tested.

A final potential problem with asking children questions about their subjective reactions to abuse is that they might not match professionals and laypeople’s expectations. Children might often provide neutral or even positive responses, which could undermine their credibility, or make jurors take the harms of abuse less seriously. Although we know of no support for this proposition, and Katz et al. (2016) found that most of children’s references to emotions during the substantive phase of forensic interviews were negative, this concern has been expressed to us by practitioners who are wary of questions about abused children’s emotions.

In sum, there is uncertainty in the literature regarding the utility of questions inquiring into children’s subjective reactions to abuse. Young children may have cognitive and linguistic difficulty in describing their reactions; children of all ages may be reluctant to do so. Questions may need to explicitly reference subjective reactions in order to elicit such information, but “how did you feel” questions might be difficult to understand and may elicit incomplete, reticent, or non-credible responses.

2. The current study

The purpose of the present study was to assess the productivity of different types of questions in eliciting subjective information from 205 4 to 12-year-old children disclosing sexual abuse. We classified questions along two dimensions, question type (invitations, wh- questions, yes/no and forced-choice questions, and suggestive questions) and content (whether there was reference to subjective content). We classified children’s answers for whether they provided subjective information, and when the question specifically requested that information, whether the child’s reference was explicit (i.e., spontaneously generated by the child) or implicit (i.e., simply acknowledging the content queried by the question).

We tested seven hypotheses: 1) When questions do not reference subjective content, invitations will be most productive in eliciting such content; 2) References in the question to subjective content will increase the likelihood that children’s responses explicitly mention subjective content; 3) “How feel” and “what think” questions will be most effective in eliciting explicit subjective content; 4) Invitations following “how feel” questions will be highly productive in eliciting explicit subjective content; 5) “How feel” questions will elicit both emotional and physical content, and “how did your body feel” will reliably elicit physical content; 6) Children will predominantly provide negatively valenced responses to “how feel” questions about abuse; 7) Younger children will be less productive, but will nevertheless be capable of providing subjective content in response to the “how feel” and “what think” questions.

3. Methods

3.1. Sample and participants

The sample consisted of 205 forensic interviews conducted in English with 4- to 12-year olds ($M = 7.89$, $SD = 2.61$; 78% female) disclosing sexual abuse. The interviews were selected from 421 interviews conducted between 2004 and 2013 that had been conducted at one of five different interview sites. Interviews were excluded if conducted in Spanish, if the child fell outside the age range, or if the child failed to disclose sexual abuse. The interviewers were forensic interviewers who had typically received the California Forensic Interview training, a state-wide training that emphasizes the need to reduce the use of recognition questions and to maximize the use of recall questions. The interviews had been transcribed and anonymized for training purposes, with the consent of the parents or legal guardian, and the archived data was used for the current study.

Fifty-eight percent of the sample ($n = 119$) alleged multiple instances of sexual abuse. Categorizing the relationship between the child and alleged perpetrator, 35% were parent-figures (father, mother, foster parent, step-parent), 35% were a family member (sibling, step-sibling, aunt/uncle, grandparent), 29% were a familiar person (neighbor, coach, family friend, babysitter), and 1% were strangers. Forty-two percent of children alleged abuse that involved penile-vaginal penetration, oral copulation, or sodomy; the rest of the sample involved less severe allegations such as exhibitionism, kissing, fondling, or digital penetration with the genitals.

3.2. Coding

All question-answer pairs beginning with the first question about abuse were coded for question type. The categories included invitations (recall questions that asked the child to tell “everything that happened” or to tell “more about” information previously disclosed in the interview), wh- questions (what, how, where, when, why, who), yes/no questions (including “Do you know...” and “Do you remember...” questions), forced-choice questions (e.g. “Did you feel angry or sad?”), suggestive questions (either tag questions, e.g. “You felt sad, didn’t you?” or negative-term questions, e.g. “Didn’t you feel bad?”), and non-questions (instructions, fragments, or echoes). Wh- questions that explicitly focused on asking about subjective information were further classified as either “how feel” questions (e.g., “How did you feel when that happened?”) or “what think” questions (e.g. “What did you think about that?”).

All question-answer pairs were also coded for whether the question-answer pair contained a reference to subjective content: an emotional reaction, cognitive content, or physical sensation. Subjective content could be found in the question, the answer, or both. In the answer, subjective content could be explicit or implicit. Subjective content was explicit if the child uttered a subjective term not

mentioned by the interviewer (e.g. “How did you feel?” “I felt sad”) and implicit if the child assented to a subjective term in the question (e.g. “Did it hurt?” “Yes”). We distinguished between emotional/cognitive terms (e.g. “I felt mad” or “I was scared”) and physical sensation terms (“My private parts hurt”). If a subjective term could be categorized as either emotional/cognitive or a physical sensation, the context of the question-answer pair was used to correctly classify the meaning. For example, responses to “How did you feel?” were presumed to be emotional/cognitive, unless the child’s response clarified their response was physical (e.g. “How did you feel?” “My body felt pain.”), and by contrast, responses to “How did your body feel?” were presumed to be physical sensations, unless the child’s response clarified otherwise (e.g. “How did your body feel?” “I was thinking about how scared I was.”). If context did not clarify the intent, a subjective term was classified as emotional/cognitive.

Two research assistants coded all question-answer pairs, independently coding 20% of the sample with all variables having a minimum reliability of $K = .80$.

4. Results

The sample of 205 interviews yielded a total of 37,005 substantive question-answer pairs. On average, interviewers asked 8 questions about subjective content ($SD = 7.19$), and children reported an average of 10 subjective reactions ($SD = 8.82$), with six cases, or 3% of the sample, having no mention of subjective content. In order to assess age effects, we created groups of younger (4-7-year-olds, 45%) and older children (8-12-year-olds, 55%).

4.1. Question productivity: question type and content

Of primary interest was the efficacy of different question types and whether the question referenced subjective content in eliciting subjective content from the child. First, we examined those questions where questions did *not* reference subjective content. As is clear from Table 1, questions that failed to reference subjective content rarely elicited subjective content from children. We conducted an ANOVA on the proportion of children’s responses that provided explicit subjective content, entering age (younger versus older children) and question type (tell me, wh-, and yes/no) as between-subjects factors. For this analysis, given the small numbers of suggestive and tag questions, they were combined with the overall category of “yes/no” questions. There was a main effect of age, $F(1, 35,198) = 31.13, p < .001, \eta^2 = .01$, and question type, $F(1, 125.31), p < .001, \eta^2 = .07$. Older children were more likely to provide subjective content ($M = .03, SD = .16$) than younger children ($M = .02, SD = .12$). To assess multiple comparisons for question type effects, Bonferroni’s correction was used. Invitations were significantly more likely to elicit subjective content than were wh- questions, $t(21,113) = 8.52, p < .001, 95\% CI [.02, .04]$ or yes/no questions, $t(16,794) = 16.85, p < .001, 95\% CI [.04, .05]$. In addition, wh- questions were significantly more likely to elicit subjective content than were yes/no questions, $t(32,495) = 10.40, p < .001, 95\% CI [.01, .02]$ (see Table 1 for descriptives). There was no interaction between question type and age, suggesting that the efficacy of question type did not vary depending on the age of the child.

A parallel ANOVA was conducted on question-answer pairs in which the question *did* reference subjective content (Table 2), and we assessed how likely children responded with explicit subjective content. In this analysis, question type had four categories – “how feel,” “what think,” other wh- questions, and yes/no. All invitations are considered below, because their productivity addresses the separate question of whether children can elaborate on their subjective responses. There was only a main effect of question type, $F(1, 1257) = 8.85, p < .001, \eta^2 = .21$. “How feel” questions were the most productive, and significantly better than all of the other question type categories: “what think”, $t(870) = 7.60, p < .001, 95\% CI [.19, .39]$, other wh-, $t(868) = 11.78, p < .001, 95\% CI [.31, .50]$, and yes/no, $t(995) = 20.30, p < .001, 95\% CI [.49, .65]$. “What think” questions were more productive than other wh-, $t(440) = 3.04, p = .029, 95\% CI [.08, .24]$, and yes/no questions, $t(567) = 7.95, p < .001, 95\% CI [.18, .40]$. Other wh- were more productive than yes/no questions, $t(565) = 4.28, p < .001, 95\% CI [.06, .27]$.

To assess whether subjective questions were more likely than non-subjective questions to elicit explicit mentions of subjective content from children, an ANOVA was conducted on the proportion of children’s responses that included subjective content, with age (younger versus older children) and content (subjective versus not subjective) included as between-subjects factors. There was a main effect of age, $F(1, 37,001) = 14.44, p < .001, \eta^2 = .00$, and content, $F(1, 37,001) = 11,947.75, p < .001, \eta^2 = .24$. Older children were more likely to provide a subjective reaction ($M = .05, SD = .23$) than younger children ($M = .03, SD = .18$). Questions asking about subjective reactions were more likely to elicit explicit mentions of subjective reactions from children ($M = .51, SD = .50$) than were questions not asking about subjective reactions ($M = .02, SD = .14$).

Table 1
Efficacy of Questions Not Referencing Subjective Content in Eliciting Subjective Content.

Question Type	Frequency (% of all Questions)	Subjective
Invitations	2,707 (8%)	5.4%
Wh-	18,408 (52%)	2.5%
Yes/No	12,254 (35%)	1.0%
Forced Choice	1,474 (4%)	0.7%
Suggestive	361 (1%)	0.0%

Table 2
Efficacy of Questions Referencing Subjective Content in Eliciting Subjective Content.

Question Type	Explicit Content	Implicit Content	Denies Content	Answers without Content	Don't Know	Seeks Clarification	Non-responsive	Total Times Questions was asked
How Feel	75% (487)	3% (17)	1% (7)	10% (63)	8% (49)	4% (27)	0% (0)	650
What Think	48% (107)	19% (43)	1% (3)	19% (41)	10% (23)	3% (6)	0% (0)	222
Other Wh-	34% (75)	16% (36)	0% (0)	33% (73)	8% (17)	8% (18)	1% (1)	220
Yes/No	17% (54)	35% (109)	32% (103)	11% (34)	1% (4)	3% (10)	0% (0)	314

Note. A total of 33 question-answer pairs are omitted due to low frequency (forced-choice $n = 26$, suggestive $n = 7$).

4.2. "How feel" questions: productivity of invitation follow-ups

As noted in the introduction, some researchers have suggested that interviewers could encourage children to elaborate on their subjective responses. For example if the child provides a cursory response to "how did you feel?" (e.g., "sad"), interviewers might elicit more information by asking the child to "tell me more about feeling sad." Using number of words as a proxy for productivity (Dickinson & Poole, 2000), we examined the cases in which general "how feel" questions were followed up with invitations in which interviewers asked children to "tell more" about their subjective reaction. Follow-up questions ($M = 18.70$ words per response, $SD = 26.27$) were reliably more productive than the initial "how feel" question ($M = 7.17$ words per response, $SD = 9.24$), $t(195) = 4.12$, $p < .001$, 95% CI [6.01, 17.06]. Follow-up questions elicited similar numbers of subjective terms ($M = .88$, $SD = .81$) as the initial "how feel" question

Table 3
Valence, Frequency and Content of Children's Evaluative Responses to General How Feel Questions.

Valence and Evaluation	Frequency	Example
Negative	66%	
Sad	11%	A. "I wasn't so angry anymore, but I will never, ever forgive him. I'll probably always be sad now."
Bad	9%	A. "It felt like I wanted to throw up or something. I felt sick, I felt like it hurt me so bad ."
Afraid or Scared	5%	A. "I got really scared . I almost cried. Well I did cry a little bit, but in scaredness because he will kill me. I know he won't hesitate to, because he is crazy. And then he said he has another boy that he did it to whenever he tried. He was like saying all this stuff that he has another boy. He's saying that he did it to my little brother."
Disgust	5%	A. "Yeah disgusting , yucky, yucky, yucky, yucky, yucky (uh-huh). So yucky."
Didn't like	5%	A. "I didn't like it."
Angry or Mad	5%	A. "I feel like so mad like I want to like kill him like boom kill him (ok) with knife like [makes stabbing noise]."
Weird	6%	A. "A little bit weird , what he was doing."
Upset	4%	A. " Upset . That I have to say this again and again and again."
Uncomfortable	2%	A. "I didn't like it, it felt uncomfortable ."
Hurt	1%	A. "It felt like I wanted to throw up or something. I felt sick, I felt like it hurt me so bad."
Cry	1%	A. "I wanna cry ."
Unhappy	1%	A. "It made me feel not happy ."
Didn't want	1%	A. "I felt like I wanted him to stop doing that."
Not good	1%	A. "I don't really feel good about what he's done to me."
Positive	7%	
Good	3%	A. "I felt good cause I think 'you could tell them what happened (mm-hmm) and he'll stop doing that (mm-hmm) and I feel proud of myself cause I told."
Happy	< 1%	A. "I feel happy . I have a great dad. He cares about me and he never beats me or yells at me (mm-hmm). And that's what Alex did. He beats me, yells at me, and just did whole bunch of horrible things to my family..."
Better	< 1%	A. "I felt like he really shouldn't have done that and that could be counted as a sin (uh-huh) but even though it really could, but I feel like that was pretty wrong and nasty (uh-huh) and I feel like I'm glad that he's out of the house (uh-huh) cause things are going way better without him in the house."
Relief	< 1%	A. "Um [3 second pause] worried of [child's mother's] reaction, relieved that I finally got some weight of my shoulders (mm-hmm) and worried of what will happen in the future."
Neutral	23%	
Physical feel	16%	A. "I just felt someone going inside my shirt."
Other	5%	"I wanted to go to bed"
Okay	1%	A. "I'm ok . Yeah (mm-hmm). The first time I had to talk with an interviewer at the [city] Police, which is not too far, I didn't want to talk to a man, but I had to so. Then I was, right there I was nervous (ok). But I'm not."
Denial	3%	
Nothing	2%	A. "It didn't feel like nothing."
Regular	1%	A. "It was regular , like my mom does it (uh-huh) when I was, when she gave me baths."

($M = 1.18$, $SD = .63$). Qualitatively, children tended to provide explanations for their subjective reactions in responding to the follow-up questions (e.g. “Tell me more about feeling scared” “I was scared because I didn’t know what he was going to do because everybody was asleep and I didn’t know so I was just scared thinking about what I could do to get away”).

4.3. “How feel” questions: emotional versus physical

As also noted in the introduction, “how did you feel” questions can be phrased generally (e.g., “How did you feel”) or more specifically to suggest physical reactions (e.g., “How did your body feel?”). Therefore, we examined how often each form occurred, and how often each elicited emotional, cognitive, or physical content. First, we found that 39% of “how feel” questions were phrased generally (“How did you feel?”) whereas 61% were phrased to ask specifically about physical reactions. We then assessed how children reacted to the different types of “how feel” questions, comparing emotional/cognitive reactions to physical reactions. There was a significant difference in the kinds of responses children provided, $\chi^2(2, 650) = 245.90$, $p < .001$. Children provided higher proportions of emotional/cognitive content in response to general “how feel” questions (70%) compared to physical “how feel” questions (18%). Conversely, children provided higher proportions of physical responses to the physical evaluation “how feel” questions (63%), than they did to the general “how feel” questions (4%). Hence, general “how feel” questions predominantly elicited emotional/cognitive reactions, whereas physical “how feel” questions predominantly elicited physical reactions.

4.4. Subjective content in response to “how feel” questions

Children might often provide uninformative or counterintuitive responses to “how feel” questions, and this could undermine their credibility. We classified responses by their responsiveness, valence, and whether the question-answer pair referred to the abuse itself or to events after the abuse, including disclosure (Table 3). Negatively valenced responses were the most common (66%), with neutral the next most frequent (23%), followed by positively valenced responses (7%). Notably, the neutral and denial of feeling responses were predominantly physical reactions. Children’s response patterns varied across time frame (abuse or after abuse) with regards to whether they reported positive or negatively valenced responses, $\chi^2(1, 418) = 97.20$, $p < .001$. When discussing abuse, children were much more likely to report negative evaluations (98%) than when discussing what happened after abuse (64% negative).

5. Discussion

This study examined the extent to which different types of questions elicited subjective content – emotional reactions, cognitive content, or physical sensations—in the forensic interviews of 205 4- to 12-year-old children alleging sexual abuse. As predicted, when questions did not refer to subjective content, the most productive questions were invitations, open-ended recall questions that have been recommended for eliciting children’s reports of abuse. However, children provided subjective content in response to these questions only 5% of the time, and younger children were less responsive than older children. When questions specifically referenced subjective content, and in particular when interviewers asked children “how feel” (and to a lesser extent, “what think”) questions, children were very likely to explicitly mention subjective content in their responses, and younger children were no less likely than older children to do so. These findings are consistent with prior research demonstrating that explicitly referencing subjective or subjective content (Newman & Roberts, 2014) and asking “how feel” questions (Lyon et al., 2012) increases the likelihood that children will describe their emotions, thoughts, and physical reactions to abuse.

This study is novel in addressing other concerns that have been raised with respect to the productivity of questions about abused children’s subjective reactions. Invitations following children’s responses to “how feel” questions were productive, and tended to elicit explanations of children’s reactions. Furthermore, “how feel” questions elicited predominantly emotional reactions, and could be phrased so as to elicit predominantly physical reactions (e.g., “how did your body feel?”). Finally, children were responsive to “how feel” questions, and almost universally mentioned negatively valenced reactions to abuse. When they mentioned positive feelings, they were typically discussing disclosure and ending the abuse. There was little evidence that younger children were incapable of answering subjective questions.

The results have clear implications for practice. Forensic interviewers can profitably include questions about children’s subjective reactions when questioning children about sexual abuse, and these questions will help to overcome children’s failure to provide subjective information when asked free recall questions about “what happened.” When children provide informative yet brief responses, interviewers can elicit additional subjective information through invitations that ask children to “tell more” about their reaction.

5.1. Limitations and future directions

As in all field studies, one cannot say with complete confidence that the sexual abuse reports were true. We did not have access to potentially corroborative evidence in the case files. To the extent that false reports are more or less likely to contain references to subjective content, this could affect our results. However, researchers examining children’s false disclosures of sexual abuse have estimated that they are quite uncommon, typically less than 5% of allegations (Everson & Boat, 1989 [4.7%]; Faller, 1988 [3%]; Jones & McGraw, 1987 [2%]; Oates et al., 2000 [2.5%]). Furthermore, we have confidence in the veracity of our reports given the fact that the interviews were conducted either by child advocacy centers or by interviewers in dependency court, and not by child custody evaluators or psychologists questioning children in highly contested custody cases.

It is unclear whether true reports have more subjective content than false reports. Lamb et al. (1997) found that children in cases deemed to be false allegations mentioned subjective reactions in 38% of the cases, non-significantly lower than the half of children who mentioned subjective reactions in cases deemed to be true. Importantly, however, that study assessed whether children provided any subjective information, rather than the quantity or quality of that information, and the interviewers did not attempt to elicit subjective information. Recall questions that specifically request subjective reactions without suggesting such reactions are likely to test children's capacities to sustain a false report that they have confabulated or that they have been coached to deliver. At any rate, professionals and fact-finders are likely to disbelieve children who do *not* provide subjective content, and it is thus important to give children an opportunity to do so (Golding et al., 2003; Leander et al., 2007; Myers et al., 1999).

We were also unable to validate children's reports of their reactions. However, there is consistent evidence that recall questions are least likely to elicit fabricated or suggested information (Lamb et al., 2018), and the "how feel" and "what think" questions that appeared most productive in this study are recall questions.

Another limitation was the relatively small number of cases in which interviewers followed up children's subjective responses with invitations requesting elaboration. Indeed, invitations in general were relatively uncommon, consisting of less than 10% of the questions. This suggests that although the interviews were not highly suggestive or closed-ended (as evidenced by the relatively small percentage of yes/no, forced-choice and suggestive questions), the interviewers could have benefitted from improved training on the greater productivity of invitations. Greater use of invitations to follow-up subjective responses would provide a clearer test of invitations' efficacy in eliciting additional subjective content.

There are a number of promising avenues for future research. First, the productivity of different types of "how did you feel" and "what did you think" questions can be assessed. Interviewers could ask children for their feelings and thoughts about the perpetrator before the first time abuse occurred, and children's answers might help explain subsequent ambivalence about acquiescing to the abuse and keeping the abuse a secret. Interviewers could ask children about their feelings and thoughts both during the abuse and after the abuse, and children might be able to describe different reactions that help explain how their reactions evolve over time (such as initial surprise and subsequent sadness, or initial disgust and subsequent guilt) (Lyon et al., 2012). Interviewers finding that children faltered when asked invitations seeking elaboration of their subjective reactions (e.g., children who shrug when asked to "tell me more about feeling sad") might try more direct questions seeking causal explanations, such as "what about it made you feel sad?" or, with a non-confrontational tone, "why did it make you feel sad?" Interviewers asking "how did your body feel" questions could ask children how specific parts of their body felt when abuse occurred, possibly elucidating the intimacy of the physical contact, and thus clarifying whether the touching was abusive and if so how serious. Interviewers questioning recanting children could ask children about their feelings and thoughts about the perpetrator, other influential family members, and the child's living situation in order to determine possible motives for both true and false recantations.

Future research could also explore the possible relation between case characteristics and children's subjective reactions. Obviously important factors include age, gender and abuse characteristics such as the relationship between the child and the perpetrator, the severity of abuse, and the frequency of abuse. Younger children will find it difficult to express more complicated emotional reactions, such as mixed emotions and ambivalence (Larsen, To, & Fireman, 2007). Younger children may be more prone than older children to expressing confusion and disgust when describing abuse, because of their lacking sexual knowledge and an association of genitalia with toileting. Older children may be more likely to describe how their feelings about the perpetrator could taint their relationships more generally, such as by undermining trust in family or making them unable to enjoy physical intimacy. Other potentially important factors include culture and language. Children (and those who care for them) from some cultures may be unprepared and unwilling to discuss subjective reactions. For example, researchers have noted that in many East-Asian cultures, "verbalization about feeling states is treated as superfluous and even improper" (Wang, 2001;). It may also be interesting to study the effect of interviewer characteristics on children's disclosures.

Finally, research should explore the effects of children's descriptions of their subjective reactions on fact-finders, such as interviewers and juries. An impetus for asking children about their reactions was the finding that children tend to exhibit little emotion when disclosing abuse, and the negative effect that this has on their credibility. It is thus natural to ask whether children's description of their reactions increases their credibility.

In sum, recall questions specifically inquiring into how sexually abused children's feelings and thoughts are productive means of eliciting subjective information, and can be a useful supplement to open-ended free recall questions about what happened during and after abuse. In turn, invitations seeking elaboration of subjective content are also productive. Even young children can describe their reactions to abuse, as long as interviewers pursue questioning that is specific without being misleading.

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References

- Ahern, E. C., & Lyon, T. D. (2013). Facilitating maltreated children's use of emotional language. *Journal of Forensic Social Work*, 3, 176–203. <https://doi.org/10.1080/1936928X.2013.854124>
- Ahern, E. C., Andrews, S. J., Stolzenberg, S. N., & Lyon, T. D. (2018). The productivity of wh- prompts in child forensic interviews. *Journal of Interpersonal Violence*, 33, 2007–2015. <https://doi.org/10.1177/0886260515621084>

- Alaggia, R., Collin-Vézina, D., & Lateef, R. (2017). Facilitators and barriers to child sexual abuse (CSA) disclosures: A research update (2000–2016). *Trauma, Violence & Abuse*. <https://doi.org/10.1177/1524838017697312>
- Aldridge, M. (2010). Vulnerable witnesses in the criminal justice system. In M. Coulthard, & A. Johnson (Eds.), *Routledge handbook of forensic linguistics* (pp. 296–314). Abingdon, UK: Routledge.
- Aldridge, M., & Wood, J. (1997). Talking about feelings: Young children's ability to express emotions. *Child Abuse & Neglect*, 21, 1221–1233. [https://doi.org/10.1016/S0145-2134\(97\)00097-5](https://doi.org/10.1016/S0145-2134(97)00097-5)
- Aldridge, M., & Wood, J. (1998). *Interviewing children: A guide for child care and forensic practitioners*. Chichester, UK: John Wiley & Sons Ltd.
- American Professional Society on the Abuse of Children (APSAC). (2012). *Forensic interviewing in cases of suspected child abuse*. Retrieved from Chicago, IL: Author <https://www.apsac.org/apsacpublications>.
- Andrews, S. J., Ahern, E. C., Stolzenberg, S. N., & Lyon, T. D. (2016). The productivity of wh- prompts when children testify. *Applied Cognitive Psychology*, 30, 341–349. <https://doi.org/10.1002/acp.3204>
- Castelli, P., & Goodman, G. S. (2014). Children's perceived emotional behavior at disclosure and prosecutors' evaluations. *Child Abuse & Neglect*, 38, 1521–1532. <https://doi.org/10.1016/j.chiabu.2014.02.010>
- Coy v. Iowa. (1988). 487 U.S. 1012.
- Dickinson, J. J., & Poole, D. A. (2000). Efficient coding of eyewitness narratives: A comparison of syntactic unit and word count procedures. *Behavior Research Methods Instruments & Computers*, 32, 537–545. <https://doi.org/10.3758/BF03200826>
- Everson, M. D., & Boat, B. W. (1989). False allegations of sexual abuse by children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 230–235. <https://doi.org/10.1097/00004583-198903000-00014>
- Faller, K. C. (1988). Criteria for judging the credibility of children's statements about their sexual abuse. *Child Welfare*, 389–401.
- Fängström, K., Sarkadi, A., Lucas, S., Calam, R., & Eriksson, M. (2017). "And they gave me a shot, it really hurt": Evaluative content in investigative interviews with young children. *Children and Youth Services Review*, 82, 434–443. <https://doi.org/10.1016/j.chiayouth.2017.10.017>
- Golding, J. M., Fryman, H. M., Marsil, D. F., & Yozwiak, J. A. (2003). Big girls don't cry: The effect of child witness demeanor on juror decisions in a child sexual abuse trial. *Child Abuse & Neglect*, 27, 1311–1321. <https://doi.org/10.1016/j.chiabu.2003.03.001>
- Goodman, G., Taub, E., Jones, D. P. H., England, P., Port, L., Rudy, L., ... Melton, G. (1992). Testifying in criminal court: Emotional effects on child sexual assault victims. *Monographs of the Society for Research in Child Development*, 57, 1–159. <https://doi.org/10.2307/1166127>
- Gray, E. (1993). *Unequal justice: The prosecution of child sexual abuse*. New York, NY: Free Press.
- Greenhoot, A. F., Johnson, R., & McCloskey, L. A. (2005). Internal state language in childhood recollections of adolescents with and without abuse histories. *Journal of Cognition and Development*, 6, 547–570. https://doi.org/10.1207/s15327647jcd0604_6
- Harris, P., & Jones, D. (1997). Commentary on "talking about feelings" (Aldridge & Wood, 1997). *Child Abuse & Neglect*, 21, 1217–1220. [https://doi.org/10.1016/S0145-2134\(97\)00096-3](https://doi.org/10.1016/S0145-2134(97)00096-3)
- Hershkowitz, I., Lamb, M. E., & Katz, C. (2014). Allegation rates in forensic child abuse investigations: Comparing the revised and standard NICHD protocols. *Psychology Public Policy and Law*, 20, 336–344. <https://doi.org/10.1037/a0037391>
- Jones, D. P., & McGraw, J. M. (1987). Reliable and fictitious accounts of sexual abuse to children. *Journal of Interpersonal Violence*, 2, 27–45. <https://doi.org/10.1177/088626087002001002>
- Katz, C., Hershkowitz, I., Malloy, L. C., Lamb, M. E., Atabaki, A., & Spindler, S. (2012). Nonverbal behavior of children who disclose or do not disclose child abuse in investigative interviews. *Child Abuse & Neglect*, 36, 12–20. <https://doi.org/10.1016/j.chiabu.2011.08.006>
- Katz, C., Paddon, M. J., & Barnett, Z. (2016). Emotional language used by victims of alleged sexual abuse during forensic investigation. *Journal of Child Sexual Abuse*, 25, 243–261. <https://doi.org/10.1080/10538712.2016.1137666>
- Lamb, M. E., Sternberg, K. J., Esplin, P. W., Hershkowitz, I., Orbach, Y., & Hovav, M. (1997). Criterion-based content analysis: A field validation study. *Child Abuse & Neglect*, 21, 255–264. [https://doi.org/10.1016/S0145-2134\(96\)00170-6](https://doi.org/10.1016/S0145-2134(96)00170-6)
- Lamb, M., Brown, D. A., Hershkowitz, I., Orbach, Y., & Esplin, P. W. (2018). *Tell me what happened: Structured investigative interviews of child victims and witnesses* (2nd ed.). London: Wiley.
- Larsen, J. T., To, Y. M., & Fireman. (2007). Children's understanding and experience of mixed emotions. *Psychological Science*, 18, 186–191. <https://doi.org/10.1111/j.1467-9280.2007.01870.x>
- Leander, L., Christianson, S.Å., Svedin, C. G., & Granhag, P. A. (2007). Judges', lay judges', and police officers' beliefs about factors affecting children's testimony about sexual abuse. *The Journal of Psychology Interdisciplinary and Applied*, 141, 341–357. <https://doi.org/10.3200/JRPL.141.4.341-358>
- London, K. (2001). Investigative interviews of children: A review of psychological research and implications for police practices. *Police Quarterly*, 4, 123–144. <https://doi.org/10.1177/109861101129197770>
- Lyon, T. D., Scuirich, N., Choi, K., Handmaker, S., & Blank, K. (2012). "How did you feel?" Increasing child sexual abuse witnesses' production of evaluative information. *Law and Human Behavior*, 36, 448–457. <https://doi.org/10.1037/h0093986>
- T.D. Lyon, K. McWilliams, & S. Williams. (2019). Child witnesses. In N. Brewer & A.B. Douglass, Psychological science and the law, Guilford; New York, NY, 157-181.
- Malloy, L. C., Orbach, Y., Lamb, M. E., & Walker, A. G. (2017). "How" and "why" prompts in forensic investigative interviews with preschool children. *Applied Developmental Science*, 21, 58–66. <https://doi.org/10.1080/10888691.2016.1158652>
- Myers, J. E., Redlich, A. D., Goodman, G. S., Prizmich, L. P., & Imwinkelried, E. (1999). Jurors' perceptions of hearsay in child sexual abuse cases. *Psychology Public Policy and Law*, 5, 388–419. <https://doi.org/10.1037/1076-8971.5.2.388>
- Newman, J. E., & Roberts, K. P. (2014). Subjective and non-subjective information in children's allegations of abuse. *Journal of Police and Criminal Psychology*, 29, 75–80. <https://doi.org/10.1007/s11896-013-9133-y>
- Oates, R. K., Jones, D. P., Denson, D., Sirotnak, A., Gary, N., & Krugman, R. D. (2000). Erroneous concerns about child sexual abuse. *Child Abuse & Neglect*, 24, 149–157. [https://doi.org/10.1016/S0145-2134\(99\)00108-8](https://doi.org/10.1016/S0145-2134(99)00108-8)
- Pennington, N., & Hastie, R. (1992). Exploring the evidence: tests of the story model for juror decision making. *Journal of Personality and Social Psychology*, 62, 189–206. <https://doi.org/10.1037/0022-3514.62.2.189>
- Peterson, C., & Biggs, M. (1998). Stitches and casts: emotionality and narrative coherence. *Narrative Inquiry*, 8, 51–76. <https://doi.org/10.1075/ni.8.1.04pet>
- Regan, P., & Baker, S. (1998). The impact of child witness demeanor on perceived credibility and trial outcome in sexual abuse cases. *Journal of Family Violence*, 13, 187–195. <https://doi.org/10.1023/A:1022845724226>
- Roberts, K. P., & Lamb, M. E. (2010). Reality-monitoring characteristics in confirmed and doubtful allegations of child sexual abuse. *Applied Cognitive Psychology*, 24, 1049–1079. <https://doi.org/10.1002/acp.1600>
- Sayfran, L., Mitchell, E. B., Goodman, G. S., Eisen, M. L., & Qin, J. (2008). Children's expressed emotions when disclosing maltreatment. *Child Abuse & Neglect*, 32, 1026–1036. <https://doi.org/10.1016/j.chiabu.2008.03.004>
- Snow, P., Powell, M., & Murrett, R. (2009). Getting the story from child witnesses: Exploring the application of a story grammar framework. *Psychology Crime and Law*, 15, 555–568. <https://doi.org/10.1080/10683160802409347>
- Stolzenberg, S. N., & Lyon, T. D. (2014). How attorneys question children about the dynamics of sexual abuse and disclosure in criminal trials. *Psychology Public Policy and Law*, 20, 19–30. <https://doi.org/10.1037/a0035000>
- Stolzenberg, S. N., & Lyon, T. D. (2017). "Where were your clothes?" Eliciting descriptions of clothing placement from children alleging sexual abuse in criminal trials and forensic interviews. *Legal and Criminological Psychology*, 22, 197–212. <https://doi.org/10.1111/lcrp.12094>
- Stolzenberg, S. N., McWilliams, K., & Lyon, T. D. (2017). Ask versus tell: Potential confusion when child witnesses are questioned about conversations. *Journal of Experimental Psychology Applied*, 23, 447–459. <https://doi.org/10.1037/xap000136>
- Wang, Q. (2001). "Did you have fun?": American and Chinese mother-child conversations about shared emotional experiences. *Cognitive Development*, 16, 693–715.

- Westcott, H. L., & Kynan, S. (2004). The application of a "story-telling" framework to investigative interviews for suspected child sexual abuse. *Legal and Criminological Psychology*, 9, 37–56. <https://doi.org/10.1348/135532504322776843>
- Westcott, H. L., & Kynan, S. (2006). Interviewer practice in investigative interviews for suspected child sexual abuse. *Psychology Crime and Law*, 12, 367–382. <https://doi.org/10.1080/10683160500036962>
- Wood, B., Orsak, C., Murphy, M., & Cross, H. J. (1996). Semi-structured child sexual abuse interviews: Interview and child characteristics related to credibility of disclosure. *Child Abuse & Neglect*, 20, 81–92. [https://doi.org/10.1016/0145-2134\(95\)00118-2](https://doi.org/10.1016/0145-2134(95)00118-2)