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The Use of Visual Aids in Forensic Interviews with Children

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We examined interviewers' use of visual aids (e.g., diagrams, dolls, drawings), their questioning strategies, children's productivity, and factors associated with visual aid use in 98 forensic interviews with children (6–16 years) about sexual abuse. Use of aids was common: 62% of interviews included at least one, with sketch-plans being the most common (74% of interviews using aids). Interviewers predominantly asked direct ("wh-") questions alongside visual aids. Interviews with aids comprised fewer invitations than interviews without them (excluding questions that were asked alongside aids). Visual aids did not increase (or decrease) children's productivity: Children remained consistent in their responding style irrespective of whether aids were used or not. We did not identify any significant predictors of interviewers' use of visual aids. Given that visual aids can compromise children's accuracy, we suggest that interviewers minimize their use and be mindful of the questions they pose in conjunction with them.

General Audience Summary

When children are interviewed about maltreatment, their testimony is critical to the outcome of both criminal and care and protection investigations. Children's initial descriptions of what happened may lack sufficient detail for important decisions to be made, and so interviewers may subsequently use a variety of strategies, such as more focused questioning or visual aids (e.g., dolls, diagrams, drawings) to support children in responding to their questions. Our study examined how often interviewers used such aids in their interviews with children about suspected sexual abuse. We found that aids were used in the majority of the 98 interviews we examined (62%): Asking children to make a drawing of the location of the alleged events was the most common aid employed, especially with older children. We were also interested in whether interviewers used different questioning approaches when they included visual aids in their interviews compared to interviews conducted without aids. When interviewers used aids they predominantly asked specific questions (e.g., "wh" questions such as "what were you doing?"), and across the entire interview asked fewer optimal questions (e.g., "tell me everything you remember about that") than when aids were not used. Because interviewers may use aids to increase children's responding we compared the likelihood of children responding productively (with relevant information) to questions in interviews with and without aids. Visual aids did not improve (or reduce) children's level of productivity. Children were consistent in their responding style—either remaining non-productive, or continuing to be productive irrespective of whether aids were used or not. Our results suggest that aids may not have the intended effect on children's responding, and may also be associated with an interviewing style that does not conform to evidence-based practice. Given the frequency of this technique in practice, we need to understand more about when and why interviewers use aids and establish an evidence base to guide interviewers in when they might be most (or least) likely to be effective.

Keywords: Visual aid, Forensic interview, Children, Eyewitness testimony, Interviewing, Child maltreatment

Author Note

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Forensic interviewers questioning children about alleged maltreatment must balance two potentially conflicting goals: to obtain very detailed descriptions from children about the alleged events, and to minimize the likelihood of children including false details in their reports. Unfortunately, interviewers' attempts to maximize detail may actually inflate error, especially if visual aids (e.g., dolls, body diagrams, or drawings) are used to elicit details about the alleged events during the substantive part of the interview. Interviewers seem to use visual aids for a number of reasons (e.g., to establish rapport or reduce anxiety; Poole & Dickinson, 2014), with a common function being to increase children's responsiveness when discussing the alleged abuse (Hlavka, Olinger, & Lashley, 2010).

The evidence regarding how visual aids influence children's testimony varies across different types of aids. By and large research suggests that although anatomical dolls and body diagrams may increase the amount of information children report (Aldridge et al., 2004; Steward et al., 1996), the accuracy or reliability of the information tends to be lower compared to children who were interviewed without them (Brown et al., 2007; Bruck, Ceci, & Francoeur, 2000). In contrast, evidence for the impact of asking children to draw and talk is more equivocal: some studies show drawing whilst recalling facilitates an increase in the amount that children report without compromising accuracy (Butler, Gross, & Hayne, 1995; Gross & Hayne, 1999), others do not demonstrate differences in the amount of information reported between children who draw whilst recounting an experience and those interviewed without drawing (McLeod, Gross, & Hayne, 2016; Salmon, Pipe, Malloy, & Mackay, 2012), and still others demonstrate negative effects on accuracy (Otgaar, van Ansem, Pauw, & Horselenberg, 2016).

Despite the concerns expressed by researchers about the impact of some aids on the reliability of children's testimony (Brown, 2011; Poole & Bruck, 2012; Poole, Bruck, & Pipe, 2011), many professional protocols and guidelines include recommendations about how and when to use visual aids in interviews with children (e.g., APSAC, 2012; Ministry of Justice, 2011). It is likely, then, that forensic interviewers use such tools with children; however, we know little about the frequency of such practice. The first goal of our study, therefore, was to determine whether aid use is common in forensic interviews with children. We focused on the use of aids (e.g., different types of drawings, body diagrams, dolls) during the substantive phase of the interview where children's accounts of alleged maltreatment were elicited. Given the well-documented gap between research-based recommendations for interviews with children and practice, (e.g., Luther, Snook, Barron, & Lamb, 2015), we expected that, as in earlier research (e.g., Bow, Quinnell, Zaroff, & Assemany, 2002), aids would be frequently used.

Using visual aids appears to also influence the types of questions interviewers use alongside them. In particular, aids are associated with an increase in the use of questions that compromise children's testimony. For example, interviewers ask more complex (Santtila, Korkman, & Sandnabba, 2004), closed-ended (Aldridge et al., 2004), and suggestive questions (Santtila et al., 2004) when using aids, which may contribute to errors or inconsistencies in children's reports. Aids are also associated with decreases in the use of optimal question types (e.g., very broad open-ended invitations such as "tell me everything you can remember"; Salmon et al., 2012). In our study, we examined the kinds of questions interviewers used with aids and expected to see that invitation prompts would be rare, and that instead interviewers would be more likely to ask direct ("wh-"), closed-ended questions. We also examined whether the proportion of different prompt types differed between interviews that included visual aids versus those that did not. We expected that interviews using visual aids would contain proportionally fewer invitations and more direct or closed-ended prompts than interviews without aids (Salmon et al., 2012).

Many protocols that make provisions for the use of visual aids as part of questioning about allegations in an interview (including that used by all interviewers in this study) advise that their use should be restricted to the *latter* stages of the substantive part of the interview. Early research indicated that interviewers often prematurely introduce aids before children have exhausted their verbal recall about the abuse allegation (Boat & Everson, 1996; Thierry, Lamb, Orbach, & Pipe, 2005). We explored whether this remains the case in contemporary practice by examining when interviewers introduced aids in the interview; we expected that their use would not be restricted to the latter stages of the interview.

We know little about what contributes to interviewers' decision-making about whether and how to use a visual aid in an interview. Some research suggests that dolls are more likely to be used with children who are less talkative (Lamb, Hershkowitz, Sternberg, Boat, & Everson, 1996; Santtila et al., 2004). We examined whether the child's level of non-productive responding to verbal prompts predicted the use of visual aids, and expected that children who were less productive in response to interviewers' questions would be more likely to be presented with a visual aid.

Given that younger children tend to provide less detail about events than older children, it is possible that interviewers may be more likely to use visual aids with them (e.g., Boat & Everson, 1988). However, the substantial body of research—largely focused on young children and showing that aids tend to compromise children's accuracy—may have reduced interviewers' use of them with young children. Further, Boat and Everson (1996) showed that the use of anatomically detailed dolls in interviews did not vary according to children's age. We examined whether children's age would predict the use of visual aids but did not expect to see a significant association.

We also examined whether the inclusion of an aid was associated with higher rates of productive responding to interviewer prompts by the children, thereby validating their use, and conversely, whether productive responding decreased following their use, indicating detrimental effects on children's reporting. To do this we used sequential analysis to determine whether the associations between question types and productivity varied across interviews that contained an aid compared to those that did not. Finally, we explored whether interviewer or allegation characteristics predicted the use of visual aids. These analyses were exploratory and, as such, no specific predictions were made.

Method

Ethical consent was granted by the School of Psychology Human Ethics Committee at Victoria University of Wellington, the New Zealand Police Force Research Access Committee, and Child, Youth and Family Research Committee (the government ministry that oversees social workers who conduct forensic interviews with children). A condition of the consent from these organizations was that parents or guardians of the children being interviewed also give consent, and that we coded children's responses directly from the videos (without transcription). A study describing the interviewing dynamics and the general characteristics of the interviews has been published elsewhere (Wolfman, Brown, & Jose, 2016a; Wolfman, Brown, & Jose, 2016b); in this study we focus on differences between interviews using visual aids and those that did not.

Participants

All child interviewers in New Zealand were invited to participate in the research project ($n = 81$; note many of these interviewers were not currently practicing, or conducted a minimal number of interviews each year). Twenty-seven interviewers consented to be part of the study; twelve were social workers (44%) working for Child, Youth and Family and the remainder were police officers with the New Zealand Police. All interviewers had completed the same (national) training course and followed the national specialist child witness interviewing model. Twelve of the interviewers (44%) worked full time as specialist child interviewers. Interviewers averaged 4.88 years of experience interviewing children since completing their compulsory training course ($SD = 6.25$ years; range: 0.5–22 years) and conducted an average of 3.59 interviews per week ($SD = 1.47$ interviews; range: 1–7 interviews).

The interviewers obtained parental consent for 98 interviews conducted between June 2012 and May 2013 with children between 6 and 16 years old ($M = 12.11$ years, $SD = 3.16$ years) to be included in the study. All of the interviews dealt with allegations of sexual abuse. The majority of the children interviewed were females (91% females).

Allegation Characteristics

The majority of the allegations related to non-penetration sexual abuse (62%). Almost half of the allegations pertained to multiple episodes of abuse (48.5%). Most (65.3%) of the suspects were known but not related to the children, 20.4% were relatives, and 14.3% were strangers. Most of the suspects were male (97%). Interviews ranged from 9.75 to 131 min ($M = 60$ min, $SD = 25$ min).

Procedure

Transcription. Official transcripts of the forensic interviews in this sample were not available. Interviewers' utterances were transcribed by the first author from interview DVD recordings. In accordance with the legal and ethical permissions governing our access to the DVD recordings, children's response behavior (i.e., productive response, hereafter referred to as "productive", non-productive response, hereafter "non-productive") was coded directly from the DVD recordings but the content of their responses was not transcribed nor examined directly.

Coding. The data for this study were drawn from the substantive phase of the interview. We specifically focused on this phase for two reasons: First, we were interested in the use of visual aids for supporting children's recall of information about alleged events, and second, the national interviewing protocol (and the training that interviewers received) does not provide any guidance about the use of aids during the rapport building phase. The substantive phase of the interview began when the interviewer asked the child to talk about the alleged incident(s) and terminated when the interviewer began discussing a neutral topic in preparation for ending the interview.

Interviewer's utterances. Interviewers' utterances were coded using the National Institute of Child Health and Human Development (NICHD) Investigative Interview coding scheme (Orbach et al., 2000). Interviewer utterances were coded as one of the following: Invitations, Cued-Invitations, Direct, Option-posing, or Suggestive questions (see Table 1 for definitions and examples).

Children's responses. Children's responses were coded as productive (provided information about the allegation) or non-productive (did not provide further information about the allegation). The non-productive category included "I don't know", "I don't remember", "I don't understand", off-topic responses, restatements of previous utterances (i.e., repeated information), and silence.

Reliability coding. All of the interviews were coded by the first author. Interviewer utterances and children's response behavior in twenty-six interviews (25% of the total) were independently coded by one of two trained reliability coders blind to the hypotheses of the study. Inter-rater reliability was substantial (interviewers' utterances: Cohen's $\kappa = 0.74, p < 0.001$; children's response behavior: Cohen's $\kappa = 0.74$, $p < 0.001$). Twenty-one interviews (20% of the total) were also coded a second time by the first author to establish intra-rater reliability. Excellent intra-rater reliability was achieved for both interviewers' utterances (Cohen's $\kappa = .91$, $p < .001$) and children's response behavior (Cohen's $\kappa = .87$, $p < .001$).

Results

How Often Do Forensic Interviewers Use Visual Aids With Children?

Sixty-one of the 98 interviews (62.2%) included at least one visual aid during the substantive phase of the interview. The most frequently used aid was a sketch-plan (asking children to draw the spatial layout or location of the alleged events; 73.8%), followed by a body-diagram (21.3%), non-anatomically detailed doll (16.4%), and others (e.g., list of names, drawing, timelines, note of what happened; 18%). Of the interviews that included at least one visual aid, 72.1% included just one ($n = 44$), 24.6% used two ($n = 15$), and 3.3% ($n = 2$) used three different types of visual aids. Thus, consistent with our hypothesis,

Table 1
Definition of Interviewer Utterances

Interviewer utterances	Definitions	Examples
Invitations	Questions or statements that prompted free-recall responses	"Tell me everything you can remember"
Cued-Invitations	Questions or statements that utilized details disclosed by the child as cues to prompt free-recall responses	"You told me that he took you to that special place. Tell me about that special place"
Direct questions	Asked for specific information or details about the allegation from the child	"What were you wearing?" "When did this happen?"
Option posing	(1) Questions that require a yes/no response	"Did you see what he looks like?"
	(2) Questions that require a selection from options given by the interviewers	"Did he touch you under or over your clothes?"
	(3) Focus the child's attention more narrowly on aspects of the account that the child did not previously mention but do not imply that a particular response is expected	"Did anyone see what happened?" [When the child had not disclosed about any other witnesses]
Suggestive	Statements or questions that communicated to the child what answer they should give or the interviewers assumed certain information that were not disclosed by the child themselves	"He touched you, didn't he?"

inclusion of visual aids in interviews with children was common.

We next examined what types of aids were used with younger and older children. We divided those children who were interviewed with aids into a younger (6–10 years; $n = 18$) and older (11–16 years; $n = 43$) group and calculated the frequency of use of each aid. Chi-square analyses showed that a greater proportion of older than younger children were given sketchplans: $\chi^2(1, N = 61) = 7.46$, $p = .006$ (see Figure 1), whereas a greater proportion of younger than older children were given human body diagrams, $\chi^2(1, N = 61) = 8.15$, $p = .004$. There were no differences in the percentages of younger and older children given dolls, $\chi^2(1, N = 61) = .63$, $p = .43$ or other types of aids, $\chi^2(1, N = 61) = .30$, $p = .58$.

What Types of Questions Did Interviewers Ask Alongside Visual Aids?

We examined the number and types of questions interviewers asked during the substantive phase of the interview while utilizing visual aids with children. On average interviewers asked 7.68 questions alongside the aids (Minimum = 0, Maximum = 48, $SD = 10.04$), which was 4.9% of the total questions asked in the interviews (Minimum = 0%, Maximum = 25%, $SD = 5.9\%$). Interviewers most typically asked direct questions (83.4%), followed by option-posing (10.6%), cued-invitation (3.1%), and invitation questions (2.9%) (see Table 2). Suggestive prompts were never used with aids. We next examined the DVDs of the interviews to look at how the aids were being used. In the majority of the cases (89.8%), interviewers used visual aids with questions to prompt the child to talk more about something that they had previously reported, rather than to elicit new information (10.2%). In summary, as predicted, interviewers most frequently asked direct or closed questions in conjunction with visual aids and rarely posed invitation or cued invitation prompts. We did not see evidence to support some researchers concerns that aids may be paired with suggestive questions in our sample.

How Did Interviews with Aids Compare to those Without on the Proportion of Question Types Comprising the Interview (Excluding those Asked Alongside Visual Aids?)

Given that interviewers conducted multiple interviews resulting in nested data, Generalized Estimating Equation

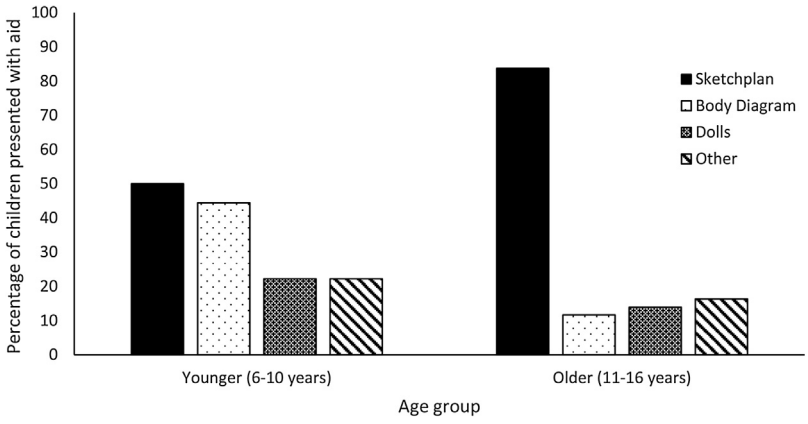

Figure 1. Percentage of younger and older children given different types of visual aids during their interview.

Table 2
Descriptive Statistics for the Number and Proportion of Interviewers' Questions Posed in Conjunction with Visual Aids

Interviewers' questions	Number			Proportion		
	M (*SD*)	Min	Max	*M* (*SD*)	Min	Max
Invitation	0.11(0.45)	0	3	0.03 (0.10)	0	0.50
Cued-Invitation	0.21 (0.66)	0	3	0.03 (0.07)	0	0.33
Direct	5.26 (7.61)	0	41	0.83 (0.16)	0.50	1.00
Option-posing	0.77 (1.36)	0	6	0.11 (0.12)	0	0.40
Suggestive	0 (0)	0	0	0 (0)	0	0
Total	7.69 (10.04)	0	48			

(GEE) analysis was used to examine whether the composition of the interviews (proportions of prompts excluding those prompts asked alongside visual aids) predicted whether visual aids were used or not. We conducted four binary logistic models with the dependent variable being whether visual aids were used or not, and proportions of invitation, cued-invitation, direct, and option-posing prompts as predictor variables (suggestive prompts were excluded given their low frequency).

We found that the proportion of invitations posed to children significantly predicted whether visual aids were used (Wald $\chi^2(1) = 7.26$, $p = .007$). Interviews that had a lower proportion of invitations were more likely to include at least one type of visual aid ($M = 0.09$, $SD = 0.04$) than interviews that did not include visual aids ($M = 0.11$, $SD = 0.06$). The proportion of cued-invitations posed to children did not significantly predict whether visual aids were used (Wald $\chi^2(1) = 19$, $p = .656$), nor did the proportion of direct questions (Wald $\chi^2(1) = 2.26$, $p = .133$) or the proportion of option-posing questions posed to children (Wald $\chi^2(1) = .09$, $p = .761$) (see Table 3 for descriptive statistics).

At What Point in the Interviews were the Aids Introduced?

When we examined the interviews that used a visual aid, a large variation was evident in the number of questions posed in the substantive phase of the interview before the introduction of an aid (Min = 2 and Max = 257). On average interviewers asked 73.97 questions of children before introducing one visual aid ($SD = 56.79$ questions), or 48.9% (Min = 2%, Max = 100%, $SD = 32.2\%$; see Figure 2) of the total number of questions, indicating that visual aids were most often introduced around the mid-point of the interview.

Visual aids were introduced in the first quarter of 32.8% interviews, in the second quarter of 16.4% interviews, in the third quarter of 32.8% of interviews, and in the fourth quarter of 18% of interviews. Thus only 18% of interviews appeared to adhere to the recommendation of the local protocol (and many international protocols) of withholding introduction of visual aids until the final stage of the substantive part of the interview, and almost the same percentage of interviews featured aids within the first 10% of questioning (see Figure 2).

Was Children's Non-Productive Responding Associated with the Use of Aids, and Did Productive and Non-productive Responding Vary When Aids Were Introduced?

We also examined the interviews that used a visual aid to identify the number of non-productive responses by children before interviewers introduced the aid. Again, considerable variation was evident (Min = 0, Max = 30; see Figure 3), but on average interviewers introduced a visual aid after 5.68 non-productive responses from children ($SD = 6.12$). Figure 3 shows that 13.1% of interviews introduced an aid when children were completely productive in response to verbal prompting (i.e., no instances of a non-response), with a further 29.5% using

Table 3
Descriptive Statistics for the Number and Proportion of Interviewers' Questions (Excluding Questions Posed Alongside Visual Aids) Posed During the Substantive Phase of Interviews With Versus Without Visual Aids

	Interviews with visual aids ($n = 61$ interviews)			Interviews without visual aids ($n = 37$ interviews)		
	Mean (*SD*)	Min	Max	Mean (*SD*)	Min	Max
Invitation (raw number)	12.44 (6.84)	2	34	10.19 (5.12)	3	24
Invitation (proportion)	0.09 (0.04)	0.02	0.24	0.11 (0.06)	0.04	0.30
Cued-Invitation (raw number)	19.98 (12.51)	1	53	12.84 (9.14)	0	35
Cued-Invitation (proportion)	0.13 (0.06)	0.02	0.28	0.13 (0.09)	0.00	0.44
Direct (raw number)	94.29 (51.59)	0	241	51.97 (27.83)	0	122
Direct (proportion)	0.58 (0.13)	0.00	0.87	0.51 (0.17)	0.00	0.96
Option-posing (raw number)	32.39 (17.66)	1	91	21.92 (13.87)	0	62
Option-posing (proportion)	0.20 (0.06)	0.06	0.40	0.21 (0.07)	0.00	0.36
Suggestive (raw number)	0.74 (1.19)	0	5	0.65 (1.08)	0	5
Suggestive (proportion)	0.00 (0.00)	0.00	0.04	0.01 (0.01)	0.00	0.06
Total number of questions	159.59 (78.01)	14	381	100.13 (44.92)	25	213

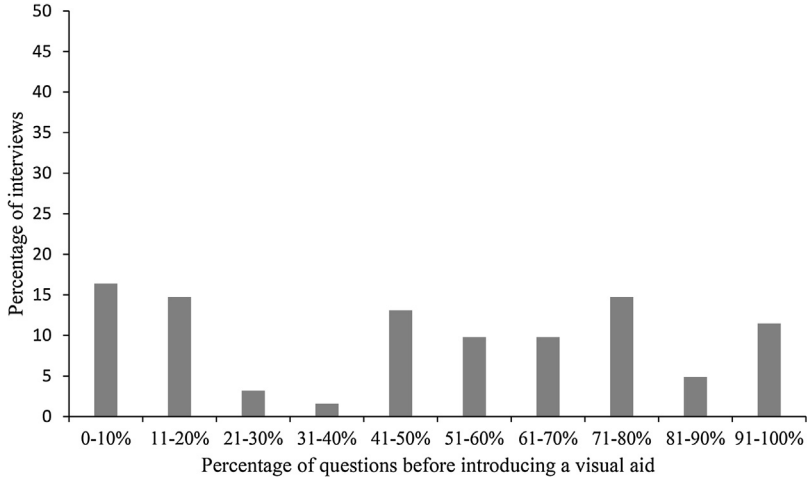

Figure 2. The percentage of questions interviewers posed to children before introducing a visual aid.

them when only 1 or 2 instances of non-productive responding had occurred. Thus, in some interviews, visual aids were utilized even when children responded substantively to verbal questioning.

We were interested in whether children who were given aids were as productive as those who were not prior to the use of aids. To examine this, we compared interviews conducted with and without aids on the proportion of productive responses that children made to questions posed during the first half of the substantive part of the interview (excluding any children who were presented with aids during this half). An independent samples *t*-test showed no significant difference between interviews conducted with aids ($M = .92$, $SD = .07$) and those without ($M = .89$, $SD = .07$; $t(66) = 1.44$, $p = .154$, $d = 0.29$). We next examined productivity in the second part of the interview (when aids had been introduced). An independent samples *t*-test again showed no significant difference between interviews conducted with aids ($M = .93$, $SD = .07$) and those without ($M = .91$, $SD = .07$; $t(66) = 1.24$, $p = .219$, $d = 0.29$).

Given that little is known about how visual aids may influence subsequent interactions between interviewers and children, we used sequential analysis to examine whether the relationship between interviewers' questions and children's responses differed in interviews that employed visual aids compared to those that did not. First, we explored whether the presence of visual aids assisted children in becoming more productive when responding to interviewers' prompts. We examined a simple two-code chain with sequential analysis to predict child behavior from interviewer behavior (interviewer → child). Yule's Q, a measure of effect size, was calculated between speech behaviors for each interview (Bakeman & Quera, 2011). Interviews in which either the given (interviewer question) or target (child response) base rate was less than five instances were excluded from analyses by GSEQ (a program designed to conduct sequential analysis; range of excluded cases across analyses of different prompts was 10–18). A positive Yule's Q indicates that a particular type of speech act is more likely to be followed by another type of speech act, whereas a negative Yule's Q indicates that a particular type of speech act is less likely to be followed by another speech act. Independent samples *t* tests were conducted to compare the Yule's Q of specific sequential associations in interviews that utilized visual aids versus those that did not. We found no significant differences in the Yule's Q for invitation → productive response,

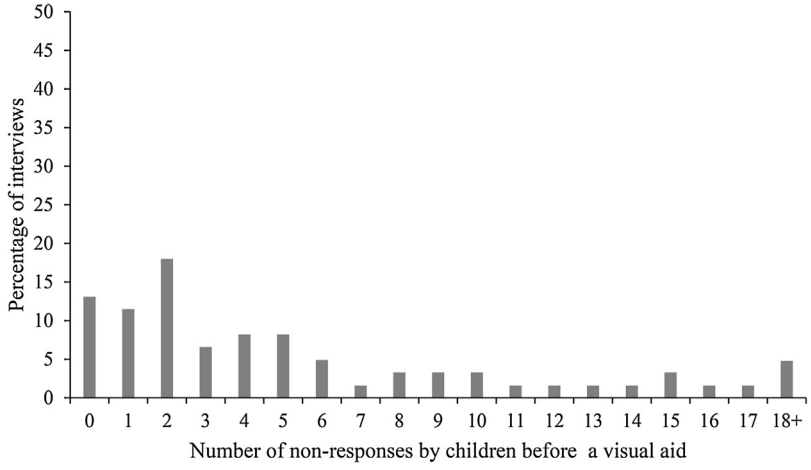

Figure 3. The number of non-productive responses by children before introduction of a visual aid.

cued-invitation → productive response, direct → productive response and option-posing → productive response between interviews that utilized visual aids versus those that did not. This set of results suggests that irrespective of prompt type, visual aids did not assist in children becoming more productive when responding to interviewers' prompts.

Second, we examined whether visual aids helped children who were non-productive become more productive. Our sequential analysis results showed that children's responding style remained consistent irrespective of the intervening questions (e.g., productive response → question → productive response; non-productive response → question → non-productive response). An independent samples *t* test showed that there was no significant difference in the Yule's Q values for productive response → question → productive response for interviews without visual aids ($M = .23$, $SD = .48$) compared to interviews with visual aids ($M = .09$, $SD = .68$), $t(66.04) = 1.03$, $p = .305$, $d = 0.24$. Similarly, an independent samples *t* test showed that there was no significant difference in the Yule's Q values for non-productive response → question → non-productive response for interviews without visual aids ($M = .23$, SD = .48) compared to interviews with visual aids ($M = .09$, SD = 68), $t(66.04) = 1.03$, $p = .305$, $d = 0.24$. Taken together, the results indicate that children were fairly consistent in either relating the information they knew or in being unresponsive, and the presence of visual aids did not lead children to becoming more responsive to interviewers' prompts.

Finally, we examined the chain productive response → question → non-productive response to examine whether interviews with aids actually hindered children's responsiveness. An independent samples *t* test showed that there was no significant difference in the Yule's Q values for interviews without visual aids ($M = -.23$, $SD = .48$) compared to interviews with visual aids ($M = -.09$, $SD = .68$), $t(66.04) = -1.03$, $p = .305$, $d = .24$), indicating that the use of aids did not decrease children's responsivity.

Did Child Characteristics, Interviewer, or Allegation Characteristics Predict the Use of Visual Aids?

First, we examined whether children's age and overall level of non-responsiveness predicted the use of visual aids. We conducted a binary logistic model with the dependent variable being whether a visual aid was used or not, and children's age, and the proportion of non-responsiveness compared to total responses as independent variables. Neither children's age, Wald $\chi^2(1) = 2.62$, $p = .105$, nor their level of non-responsiveness, Wald $\chi^2(1) = .16$, $p = .688$, significantly predicted whether visual aids were used or not.

Next, we examined interviewer characteristics and whether they predicted the use of visual aids. We conducted a binary logistic model with the dependent variable being whether visual aids were used or not, and the following as independent variables: (1) interviewing location (metropolitan vs. rural), (2) professional affiliation (police vs. social worker), (3) interviewing load (full time vs. part time), (4) average number of interviews conducted per week, and (5) years of interviewing experience. None of the variables were significant; location, Wald $\chi^2(1) = 1.85$, $p = .174$; professional affiliation, Wald $\chi^2(1) = .09$, $p = .760$; interview load, Wald $\chi^2(1) = .09$, $p = .760$; years of interviewing experience, Wald $\chi^2(1) = 1.66$, $p = .198$; and average number of interviews conducted per week, Wald $\chi^2(1) = .86$, $p = .354$.

Finally, we examined whether allegation characteristics predicted the use of visual aids. We conducted a binary logistic model with the dependent variable being whether visual aid was used or not, and with the following as independent variables: (1) relationship of the child to the suspect (relative, known person, stranger), (2) type of sexual abuse (penetration vs. non-penetration), and (3) episodes of abuse (one episode vs. multiple). None of the allegation characteristics were significant: relationship of the child to the suspect, Wald $\chi^2(2) = 4.92$, $p = .086$; type of sexual abuse, Wald $\chi^2(1) = .53$, $p = .467$; and episodes of abuse, Wald $\chi^2(1) = 1.12$, $p = .290$.

Duration of Interviews

Finally, we also examined whether the total length of the interviews in minutes (including all phases) differed when aids were included. Interviews with aids were significantly longer ($M = 66.31$, $SD = 24.79$), $t(96) = 3.89$, $p < .0001$, $d = .83$, than interviews without aids ($M = 47.32$, $SD = 21.04$). When we examined the phases of the interview separately it was apparent that the difference in overall duration was attributable to longer time spent on investigating the allegations: there was no significant difference between the two types of interviews in the duration of the presubstantive phase ($M_{(aids)} = 7.65$ min, $SD = 2.38$, $M_{(noaids)} = 7.21$ min, $SD = 2.39$), $t(96) = .88$, $p = .38$, $d = 18$; however, the substantive phase of the interview was significantly longer for children interviewed with aids ($M = 59.21$ min, $SD = 23.77$), $t(96) = 4.36$, $p < .0001$, $d = 93$ compared to those interviewed without ($M = 39.16$, $SD = 18.85$).

Discussion

As expected, visual aids were commonly used in our sample of interviews, and many interviews included more than one. Sketchplans were most frequently used, particularly with older children, followed by body diagrams, which were more commonly used with younger children. The popularity of sketchplans is worrisome given the scant research available to guide interviewers about when they are most likely to be safe and effective. The only study to date examining the impact of sketchplans on children's recall demonstrated increased productivity from children interviewed with them (Jack, Martyn, & Zajac, 2015). In contrast, our analysis of children's responding in forensic interviews did not: more research is needed to determine when and how such aids may support (or alternatively, compromise) children's recall.

Consistent with previous research (e.g., Salmon et al., 2012; Santtila et al., 2004), children were most often asked direct or option-posing questions with the aids: only 3% of questions asked were invitations. Interviews with visual aids comprised

fewer invitations than interviews without aids, although the size of the difference was relatively small (< 5%). Interviewers may use direct questions to elicit descriptions or clarification of children's interactions with the aid (e.g., what they are drawing, or naming a body part on a diagram), or to redirect children's attention to the topic at hand (e.g., McLeod et al., 2016). Unfortunately, such efforts may in fact compromise children's responding by eliciting inaccurate details (Brown et al., 2013) and off-topic responses (Poole & Dickinson, 2011). Suggestive questions were rare in the interviews we studied, and were never posed in conjunction with visual aids, which is reassuring given the concerns expressed by researchers that visual aids may inflate the use of such prompts (Poole & Bruck, 2012).

As expected, interviewers' use of visual aids in interviews did not adhere to many evidence-based recommendations and protocols: Visual aids were frequently introduced very early in the interview, most typically around the mid-point, with very few interviews restricting their use to the last stages of the interview. Extant research has typically examined aids when they are introduced following free recall (but see Dickinson & Poole, 2016), and yet we saw that aids were often introduced in the very early stages of children's interviews in our data. In conjunction with the kinds of questioning strategies that tend to predominate when aids are used, early introduction of aids may influence children's subsequent reporting by increasing children's reliance on the interviewer to direct the conversation (Lamb & Brown, 2006) and by increasing the likelihood of brief, inconsistent, and possibly inaccurate responses (Brown & Lamb, 2015).

In contrast to our prediction that aids would most commonly be used with non-responsive children, aids were often used even when children had been responsive to all but a few (1 or 2) questions posed to them. It is concerning that interviewers were turning to these tools in lieu of good verbal interviewing strategies (Poole & Bruck, 2012). Perhaps interviewers sought to make non-productive children more forthcoming. However, our analyses showed that children interviewed with visual aids were no more likely to move from being non-productive to productive than those interviewed without such aids, which does not support the argument that visual aids increase children's productivity when responding to questions. Interviewers typically used aids to follow-up on previously reported information, rather than to elicit new details, which may explain the early use of them in some cases (e.g., asking a child to indicate on a body diagram where touch occurred). Research examining aids has typically not examined their utility for such a purpose and so we would encourage studies evaluating whether they are effective when used in this manner. Interviews with visual aids were substantially longer than those without, which may have reflected the time taken to use the tools. On the one hand the use of the tools may have facilitated children's continued participation in the interview, yet on the other the extended duration may have taxed both their cognitive and motivational resources. Interviews with visual aids were approximately 20 min longer than those without. In New Zealand and many other countries, children's evidential interviews are recorded and played in court in lieu of children giving testimony. Extended interviews may tax the attentional resources of jury members and judges, however, and so the use of visual aids may also be detrimental to the impact of children's testimony in the courtroom (Burrows & Powell, 2014). The field has surprisingly little evidence to guide interviewers about effective ways to maintain children's engagement and rapport during interviews (Saywitz, Larson, Hobbs, & Wells, 2015), and the impact of using visual aids on these dimensions of an interview should be explored (e.g., Poole & Dickinson, 2014).

A substantial body of evidence has been published demonstrating (at least for some of the aids) that the inclusion of such aids may compromise children's testimony, causing many researchers therefore to recommend that they not be used at all (e.g., Poole & Bruck, 2012). We also saw that using visual aids was associated with interviewers' reliance on less optimal questioning strategies. Many field evaluations have shown that disparities between research-based recommendations and actual practice in how children are questioned about abuse are common (e.g., Johnson et al., 2015). Our results highlight that research-based recommendations are lacking for several commonly used interviewing tools, especially in the way in which the tools are employed in the field (e.g., from the early stages of an interview, with more than one aid during an interview, and to follow-up on previously reported information), and poor uptake of research-based recommendations for those tools that have been studied more extensively.

Limitations and Future Research

We were unable to examine the content of interviewers' questions and children's responses, which may have influenced the contingencies between them. For example, children's productivity when responding to interviewers' questions in the presence of a visual aid may vary according to the focus of the questioning. We were also unable to examine the content of children's responses. As such we were unable to determine whether aids may have increased the *richness* of children's responses rather than whether they simply provided a productive response to a question or not. We were also unable to examine other aspects of the way in which the children responded prior to the use of aids – for example, children's demeanor, tentativeness, and time taken to respond to questions. All of these factors may have influenced how the interviewers assessed children's need for further support, and therefore, their use of visual aids. We also restricted our analysis to the substantive phase of the interview: recent research has demonstrated how the way in which children are questioned during the early (e.g., rapport and narrative practice) stages of an interview can influence children's subsequent responding and interviewer questioning (Brown et al., 2013; Sternberg et al., 1997). An important focus of future research will be to examine whether the inclusion of visual aids during the preparatory phases of an interview have similarly far-reaching effects.

We found that neither years of interviewing experience, job, nor case characteristics predicted the use of visual aids in interviews, nor did children's overall level of productive responding or age. In additional to the variables identified above, a direct assessment of interviewers' beliefs and experiences may be

informative in highlighting what drives their decisions to use visual aids in their practice. It is possible that the null effects observed reflect insufficient power in the analyses. Given our sample size, and the number of behavior chains available for analysis within and across each interview we think this is unlikely, but replication of our findings is important. Finally, the predominant focus to date in empirical research examining aids has focused on samples drawn from early and middle childhood. We need to expand the evidence base to encompass older children too, given that aids are not exclusively used with young children (e.g., in our sample sketch-plans were most commonly used with 12–13 year olds).

Conclusions

Our findings suggest that visual aids are commonly used in forensic interviews with children, and that their presence is associated with deviation from evidence-based recommendations in terms of questioning practice and the timing of the introduction of aids in an interview. Visual aids also do not increase children's productivity when responding to interviewers' questions. Together with previous research, our results highlight that aids are unlikely to support children's accurate and detailed recall: They are problematic for children because they increase the chance of error in their reports, and they are problematic for interviewers because they are associated with a more focused style of questioning, which does not provide the best opportunity for children to provide detailed and accurate descriptions of their experiences.

Conflict of Interest Statement

The authors declare no conflict of interest.

Author Contributions

The first and second author designed the study and developed the coding scheme. The first author coded the data, and together with the second and third author, analyzed the data. The first and second authors prepared the first draft of the manuscript. The third author contributed to subsequent drafts of the manuscript.

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