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Abstract

Disclosure of child sexual abuse can be a stressful experience for the child. Gaining a better understanding of how best to serve the child, while preserving the quality of their disclosure, is an ever-evolving process. The data to answer this question come from 51 children aged 4–16 (M = 9.1, SD = 3.5), who were referred to a child advocacy center in Virginia for a forensic interview (FI) following allegations of sexual abuse. A repeated measures design was conducted to examine how the presence of a service-trained facility dog (e.g. animal-assisted intervention (AAI) may serve as a mode of lowering stress levels in children during their FIs. Children were randomized to one of the two FI conditions: experimental condition (service-trained facility dog present-AAI) or control condition (service-trained facility dog not present-standard forensic interview). Stress biomarkers salivary cortisol, alpha-amylase, immunoglobulin A (IgA), heart rate, and blood pressure, and Immunoglobulin A were collected before and after the FI. Self-report data were also collected. Results supported a significant decrease

in heart rate for those in the experimental condition (p = .0086) vs the control condition (p = .4986). Regression models revealed a significant decrease in systolic and diastolic blood pressure in the experimental condition (p = .03285) and (p = .04381), respectively. Statistically significant changes in alpha-amylase and IgA were also found in relation to disclosure and type of offense. The results of this study support the stress reducing effects of a service-trained facility dog for children undergoing FI for allegations of child sexual abuse.

Keywords: Sexual abuse, children, sexual abuse disclosure, intervention

> Dogs help us to share our secrets and calm us down during stressful times.
>
> *— Anonymous*

Unfortunately, child abuse is a prevalent and recurring issue in the United States. Data from the Child Maltreatment 2015 report (U.S. Department of Health & Human Services, 2017) quantified that roughly 683,487 children were victims of maltreatment in 2015. Of these cases, 6.5% were exclusively victims of sexual abuse. Child Advocacy Centers (CACs) can serve as a place for multiple human service agencies to come together in order to investigate the crimes committed against children (Reardon, 2009). Through the use of forensic interviews (FIs), trained professionals are able to gather pertinent information about the abuse or neglect that a child has experienced, in order to assist in the investigation that may follow.

During a FI for allegations of child sexual abuse (CSA), the interviewer is a stranger to the child. The interviewer is charged with asking questions and gathering information from the child to ascertain if the child needs protection, and if legal action is warranted. It is the goal of the interviewer to gather accurate information from the child through a narrative. During the interview process it is important for the child to feel as though they are safe and in a protected environment to facilitate disclosure during the interview. Needless to say, a FI for CSA can be stressful for children, and interventions are urgently needed to reduce this stress.

Boris Levinson was one of the first psychologists to incorporate a dog during child psychotherapy (Levinson & Mallon, 1969). Levinson posited that dogs can serve as a transitional object and facilitate a therapeutic relationship between the clinician and the child. His path paving work opened the doors for clinicians to integrate animals (e.g.,

animal-assisted intervention; AAI) into therapeutic settings for children who have experienced trauma. There are limited studies incorporating a therapy animal into the FIs for allegations of CSA. Studies have shown that the presence of a therapy animal during the FI decreased biological stress indicators in children (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015). However, more research is needed to support AAI as an evidence-based therapeutic modality for children who may have experienced trauma.

Previous research has examined the utility of forensic interviewing, the positive effects of therapy animals, and the benefits of using biomarker data as related to stress separately, but little work has been done that merges these three factors. Although there are decades of existing research on the effects of animals and biomarkers (Allen, 2003; Eddy, 1996; Friedmann, Katcher, Thomas, Lynch, & Messent, 1983; Katcher, 1981; Nagengast, Baun, Megel, & Leibowitz, 1997; Shiloh, Sorek, & Terkel, 2003; Viau et al., 2010; Vormbrock & Grossberg, 1988; Wilson, 1991), much less has been done in the context of forensic interviews (FIs) specifically, and its focus was on the presence of therapy dogs (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015), rather than a service-trained facility dog. First, this study aims to investigate the effects of service-trained facility dog on stress levels through the use of biomarkers. In addition, we explore this relationship within a highly stressful situation, FIs in alleged child sexual abuse cases.

Forensic interviewing

A CAC serves as a single location that can serve the many needs of a family during the investigative processes following allegations of child abuse or neglect. CACs provide a central location for multiple agencies, including law enforcement, child protective services, district attorneys, medical staff, and other human services workers, to all come together to serve a child that has been a victim of abuse or neglect (Reardon, 2009). One of the primary services offered by CACs is FIs. A FI of a child is a developmentally sensitive and a legally sound method of gathering information regarding allegations of abuse or exposure to violence. This interview is conducted by a competently trained and neutral professional who is equipped with specified knowledge and qualifications to work with children while utilizing research and

practice-informed techniques as part of a larger investigative process (Office of Juvenile Justice and Delinquency Prevention, 2015). In addition, interviewers demonstrate participation in ongoing education in the field of child maltreatment and/or forensic interviewing and also participate in a structured peer review process for forensic interviewers, as a matter of quality assurance. The National Children's Alliance (NCA) reported that in 2013, of the 315,000 children who were served by CACs, 211,831 received FIs. 315,000 cases were served by CAC's in 2014, of those cases that were served by CACs, nearly two-thirds (205,438) reported sexual abuse throughout the investigative processes (National Children's Alliance, 2014).

The use of service and facility animals

The therapeutic benefits of animals have been identified in the literature (Mader, Hart, & Bergin, 1989; McNicholas & Collis, 2000; Phillips & McQuarrie, 2009; Prothman, Bienert, & Ettrich, 2006; Reichert, 1998; Wells, 2007, 2009), but their possible utility in FIs is largely unknown. The Americans with Disabilities Act (2011) supported by the United States Department of Justice has separated service animals from other types of animals used in therapeutic setting such as comfort, companion, or therapy animals. This separation is made through the amount of training that is required along with the tasks or work that is performed by the animal. Service animals are trained in specific actions that provide utility to the needs of their handler. Therapy, comfort, or companion animals however are not trained in specific tasks, and provide their benefits simply through their presence and companionship (Disability Rights Section, p. 1–2).

The presence of therapy animals has been shown to not only create a bridge between the therapist and the child (Reichert, 1998) but to also increase feelings of security and warmth felt by the child within the therapy sessions (Prothman et al., 2006). Not only can this increased sense of comfort lead to higher levels of social interaction but also to a safer environment for disclosures to take place (Mader et al., 1989; McNicholas & Collis, 2000; Phillips & McQuarrie, 2009; Prothman et al., 2006; Reichert, 1998; Wells, 2007, 2009). Animals may be seen as a form of social lubricant that can facilitate healthy and effective communication between the child and the therapist.

Beyond that, the use of dogs within therapy can promote healing and increase recovery rates (Phillips & McQuarrie, 2009), but they can also reduce stress symptoms by fostering bonding within therapy sessions. Service animals, and more specifically service-trained facility dogs, have been shown anecdotally to have significant and important effects on children during therapy, but little research has explored how these findings may translate to the use of service-trained facility dogs during FIs.

Biomarker measures

The use of biomarkers to qualify stress within research can prove to be incredibly useful when working with populations that may be less reliable in their reports, namely children. One form of biomarkers, those that are gathered through salivary samples, serves as non-invasive measures of stress (Kang, 2010). Salivary collection is a non-invasive and pain-free approach to measure biological stress that can prove particularly useful in studies involving traumatized children. Biomarkers such as salivary alpha-amylase (sAA), cortisol, and Immunoglobulin A (IgA) have been shown to be directly related to biological stress (Bosch, De Geus, Veerman, Hoogstraten, & Amerongen, 2003; Dietz, Davis, & Pennings, 2012; Proctor & Carpenter, 2002; Rohleder, Nater, Wolf, Ehlert, & Kirschbaum, 2004). Other forms of biological measures such as heart rate and blood pressure have also been found as a reliable marker of stress (Anderson, Sinkey, & Mark, 1991). As reported elsewhere, biomarkers such as salivary cortisol, alpha-amylase, and IgA are directly related to allostatic load and are indicators of the body's response to stress and homeostasis (Krause-Parello & Gulick, 2015).

Biomarker measures have been tested in the presence of animals in some capacity, whether it be simply through pet ownership (Allen, 2003), through the mechanism of petting or interacting with an animal (Eddy, 1996; Friedmann et al., 1983; Katcher, 1981; Krause-Parello, Tychowski, Gonzalez, & Boyd, 2012; Shiloh et al., 2003; Vormbrock & Grossberg, 1988; Wilson, 1991), through the presence of a dog in a physical exam (Nagengast et al., 1997) or pet presence in general (Viau et al., 2010). Previous research has shown the value of therapy animals for reducing indicators of stress in children undergoing FIs for

allegations of child sexual abuse (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015), but there is a gap in knowledge of the effect of a service-trained facility dog and how this facility dog may transfer to a highly stressful situation, such as an FI.

This research expanded on reported foundational evidence in an effort to further support the therapeutic use of a service-trained facility dog as a stress reducing AAI during FIs in child sexual abuse cases. Therefore, the purpose of this study was to examine how the presence of a service-trained facility dog affects stress levels in children undergoing FIs for child sexual abuse allegations.

Method

Sample

Institutional Review Board (IRB) approval was obtained from a medical school in Virginia and state university, prior to the inception of the study. Children that were referred to a child advocacy center in Virginia were screened based on the information provided by the reporting agencies (police, child protective services, etc.) for criteria necessary for this study. These criteria included that the children were at least four years old, that there were allegations of sexual abuse, and that the child had no known disabilities.

During the intake process, the referring investigator provided details in the police report and/or child protective services complaint. If the report included animal bestiality that involved the child victim, the child was not screened into the study to mitigate any concern that the presence of the dog would negatively impact the child. For children that were screened in to the study, arrangements were made including the exclusion of contacts with the service-trained facility dogs and other dogs (therapy dogs) that were also present periodically at the CAC. Once the children were screened in to the interview, an informed consent process began including consent from a legal parent or guardian, as well as assent from the child participants, ages eight and older. The county prosecutor confirmed that study participants could include both adult and adolescent offender cases. Based on the power tables, a large effect size of d = 1.2 and a .05 level of significance required a minimum number of 24 subjects in total (Cohen, 1988, 1992).

Data collection

This study used data collected at a child advocacy center in Virginia. A repeated measures design was used. The particulars of the study and participants' involvement were explained to both the parents/guardians and the child, and informed consent and assent were obtained, respectively. Parents/guardians were then asked to complete a child demographic and characteristic form to gather data on gender, age, race, living arrangements, and siblings.

Children were randomized using a computer-generated coin toss to one of two FI conditions: experimental condition (service-trained facility dog present-AAI) or control condition (service-trained facility dog not present-standard forensic interview). The children assigned to the AAI condition were instructed that they could interact (e.g., gently petting and talking) with the dog during the interview. Stress biomarkers salivary cortisol, sAA, IgA, heart rate (HR), and blood pressure (BP) were collected before and after the FI. Self-report data from the children were also collected.

Interviewers in the study successfully completed training in multiple nationally recognized forensic interviewing protocols that include the following elements: a minimum of 32 hours of instruction and practice, an evidence-supported interview protocol, pre- and post-testing that reflects understanding of the principles of legally sound interviewing, content that includes child development, question design, implementation of protocol, dynamics of abuse, disclosure process, cultural competency, suggestibility, a practice component with a standardized review process, and required reading of current articles specific to the practice of forensic interviewing. In this study, the forensic interviewer and the handler was the same professional. During a FI, the forensic interviewer asks the child to provide a narrative account of his or her experience to gain a clear and accurate description of alleged events in the child's own words. If this process triggered the child to become upset, the forensic interviewer would take a break from talking about the allegations. Children were asked before the start of the interview if they felt comfortable with the facility dog being present, the dog was only introduced if the child agreed. The children were also made aware that if at any point during the interview they would rather not have the dog present they could tell the

interviewer and the dog would be removed. If the child victim disclosed animal bestiality during the interview, the forensic interviewer used professional discretion to determine if the presence of the dog had an impact on the child. This included monitoring body language and/or if the child victim requested the dog to be removed from the room. To ensure the welfare of the child and the dog, the forensic interviewer could have the dog removed if they believed that the dog or child were in distress. The interviewer would escort the dog out of the room where another member of the CAC would retrieve the dog.

The handler of the facility dog was professionally trained by Canine Companions for Independence. The handler was provided with instruction that meets the Assistance Dogs International Minimum Standards for Assistance Dogs in Public. The handler must be able to demonstrate that their dog can remain calm and display good social behavior while interacting with a variety of people in different environments, knowledge of acceptable training techniques, an understanding of canine care and health, the ability to maintain training, problem solve, and continue to train/add new skills (as required) with their facility dog, an understanding of how to use the dog in animal-assisted interventions and knowledge of local access laws and appropriate public behavior.

At the start of the study the children were taken into the medical clinic, and their biomarker data: BP, HR, and salivary samples were collected by a trained research team member.

During a pediatric forensic medical exam, children may be asked to give a swab from his or her mouth to gather evidence, regardless of the allegations of abuse. Allegations that the child was forced to orally copulate the alleged perpetrator did not impact this medical procedure. In this study, each child was provided an explanation of what the swab was, where it would be placed, for how long it would be placed in the child's mouth and the child was asked if that was okay to do. The procedure for salivary collections involved a study team member with assistance from the child. The swab was placed sublingually in the child's mouth for approximately 90 sec to ensure adequate saturation of approximately 400 μL of saliva.

Each swab was transferred to the tube insert "basket" of the swab storage tube and capped. Thereafter, a polypropylene label was placed on the tube with an identifying bar code. The coded conical tubes containing saliva samples were then placed in the study's locked freezer housed at the CAC and stored and frozen at −20°C as

per manufacturer's protocol (Salimetrics, 2010). The samples were shipped to the laboratory and subjected to enzyme immunoassay (EIA) analysis following the manufacturer's protocol (Salimetrics, 2010). BP and HR were obtained from each child using a Philips SureSigns V53 Monitor with an appropriately sized cuff.

After the initial set of biomarkers were collected, the children in the experimental condition were met by the forensic interviewer and the service-trained facility dog and escorted to the interview room for their interview. Children in the control condition were met solely by the forensic interviewer and escorted to the interview room for their interview. After the completion of the FI (experimental and control conditions), the children were escorted back to the medical clinic for the second set of salivary biomarker collections and BP and HR measurements. If children did not have the service-trained facility dog present during the interview, they were given the opportunity to meet the dog after all data collection was complete.

Data analysis

Statistical analyses using the Statistical Package for the Social Sciences (SPSS), Version 21 for Windows and R were used, and a test was considered significant if the *p* value was ≤ 0.05. Univariate descriptive statistics were performed on all demographic variables and biomarkers.

Pearson's or Spearman's correlations were used to evaluate the possible relationship between biomarkers. Student's *t*-tests or Wilcoxon rank tests were run to assess if changes in biomarkers were linked to the dog's presence. Paired *t*-test or Wilcoxon test (when the assumption of normality was violated) were also used to highlight if the distributions of each biomarker varied before and after the interview for both AAI and control conditions. Although the data included measurements on biomarkers before and after the interview event, differencing was used to reduce the repeated response to a single response. A repeated measures analysis in this case was not necessary, as parameters of interest are location parameters of the differenced data.

Regression analyses were performed to estimate the relationship between each biomarker after the interview (the dependent variable) and other potentially explanatory variables including the biomarker measures before the interview, the dog's presence or not, the kind of offense suspected, and whether or not the child made a disclosure

during the interview. In addition, explanatory variables in the model suggested by Lippert, Cross, Jones, and Walsh (2009) explaining child disclosure, including child gender, child age, whether the child initially disclosed the abuse, and whether caregivers support the disclosure were used. Regression models were run on the complete cases depending on the variables included in the aforesaid models. Listwise deletion was used, meaning that when cases had missing values on some variables used in an analysis, the case was dropped

Results

A total of 51 children were interviewed for sexual abuse allegations. The experimental condition (service-trained facility dog present-AAI) included 29 children and the others were assigned control condition (service-trained facility dog not present- standard forensic interview). The total sample of child participants was between 4 and 16 years old (M = 9.10, SD = 3.46) of which 22 were male and 29 were female. Additional child participants' demographic and characteristics can be found in Table 1.

Allegations of sexual abuse

In order to give a clear picture of the allegations of sexual abuse the following information is provided. Thirty-two children (60%) had a disclosure, which is an allegation of abuse made by the child during the FI indicating a type of sexual abuse occurred. The type of abuse disclosed included sexual contact (40.8%), indecency (defined as lewd or offensive behavior) (12.2%), and aggravated assault (10.2%). More than one-quarter of the children in the study had contact with their alleged perpetrator on a daily (20%) or weekly (6%) basis. The children who disclosed allegations of sexual abuse (n = 17, 35.4%) indicated that the sexual abuse occurred multiple times. Of those children in the AAI condition 11 (64.7%) pet the dog during the disclosure.

Salivary biomarkers

Salivary biomarkers allow assessments of stress. Two sample *t*-tests were conducted to compare the biomarker means between the intervention and control condition. None of the salivary biomarkers

Table 1. Demographics and characteristics of participants.

	Experimental condition (dog present)	Control condition (no dog present)
	Mean (SD)	*Mean (SD)*
Age	8.53 (2.98)	9.86 (3.98)
Age range/Years	4–15	4–16
	n/%	*n/%*
Gender		
Male	9/31%	7/31.8%
Female	20/69%	15/68.2%
Race		
American Indian or Alaska Native	1/3.4%	0/0
White or European American	11/37.9%	12/54.5%
Hispanic or Latino	2/6.9%	0/0
Black or African American	11/37.9%	8/36.4%
Multiracial	4/13.8%	2/9.1%
Living arrangements		
Biological parents	26/96.3%	19/90.5%
Other biological relative(s)	1/3.7%	0/0
Other guardian	0/0	1/4.8%
Other	1/3.7%	1/4.8%
Dog present in household		
Yes	15/51.7%	14/63.6%
No	14/51.7%	8/36.4%
Siblings in household		
Yes	24/82.8%	21/95.5%
No	5/17.2%	1/4.5%

salivary cortisol, sAA, and IgA showed a significant difference by experimental condition (service-trained facility dog present-AAI) vs. control condition; all *p*-values were greater than .05.

Differences between HR, BP, and salivary biomarkers (before and after) the interview, the kind of offense, the occurrence of disclosure, as well as the frequency of abuse were tested. The experimental (AAI) and control conditions were analyzed separately. Diagnostic plots for normality were constructed. For those variables showing normal distributions, paired *t*-tests were used; otherwise, Wilcoxon tests were used. Heart rate (HR) dropped significantly in the AAI condition (*p* =

0.01); results for all tests are given in Table 2. To better assist with biomarker data, visualization R plots have been created and can be found in Figure 1.

Multivariate analyses

We used expert-directed stepwise regression to investigate the effect of AAI on the model including age, sex, disclosure, type of offense, whether there was caregiver support, and interactions of each of these variables with dog presence were explored. Of interest is the effect of AAI, and the interaction of each of the explanatory variables, with dog presence. Main effects of other variables will not be reported. For HR

Table 2. Tests for changes in biomarkers during intervention event.

| AAI-Dog present?	Paired variables	Time drawn	Mean	Standard Deviation	Test	p-value
Yes	Cortisol Mean	Before	0.185	0.16	Wilcoxon	0.1336
		After	0.1372	0.07		
	IgA mean	Before	118.7	77.58		0.4061
		After	103.1	46.30		
	Alpha-amylase	Before	77.52	52.70		0.4505
		After	64.01	44.19		
	HR	Before	83.52	9.19	Student	0.0086*
		After	79.52	12.36		
	BP systolic	Before	108.2	10.15	Wilcoxon	0.3879
		After	109.6	12.15		
	BP diastolic	Before	68.65	9.14		0.1009
		After	66.81	10.52		
No	Cortisol Mean	Before	0.5206	1.60	Wilcoxon	0.7022
		After	0.2321	0.30		
	IgA mean	Before	147.6	100.96		0.1055
		After	161.9	85.31		
	Alpha-amylase	Before	91.26	79.8434	Student	0.366
		After	86.75	92.89		
	HR	Before	80.09	13.69		0.4986
		After	79.23	10.81		
	BP systolic	Before	110.4	8.55		0.3538
		After	109.1	10.37		
	BP diastolic	Before	66.36	6.65		0.9223
		After	66.18	8.79		

*p ≤ .05
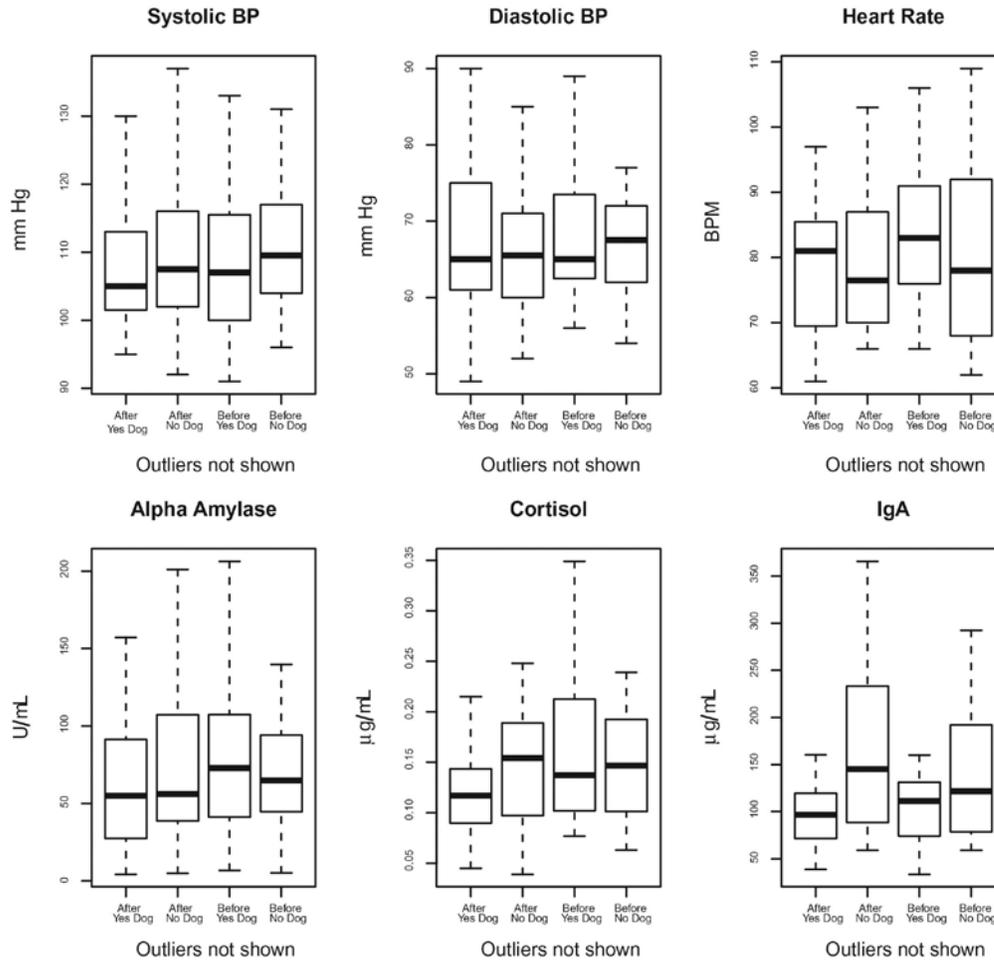
Figure 1. Box plots of response variable.

and cortisol, no interactions were significant, and, in fact, none were selected for consideration by the expert-guided stepwise procedure.

For systolic blood pressure (sbp), children in the AAI conditions sbp decreased more for those subjects reporting any kind of sexual offense (p = 0.04), with those reporting indecency showing the greatest effect, over that attributable to the AAI condition and abuse type separately. For diastolic blood pressure (dbp), older children in the AAI condition showed statistically significant reductions in dbp (p = 0.00) relative to that explainable by age and AAI condition alone.

For sAA, children in the AAI who disclosed an offense had values statistically significantly higher (p = 0.01) than those attributable to AAI condition and type alone, with indecency being the highest. Furthermore, children in the AAI condition who disclosed an offense had

Table 3. *P*-values for variables selected in regression models for dog and interactions with dog. Blanks indicate variables not selected for model.

	Systolic BP	Diastolic BP	Alpha-amylase	IgA
AAI	0.03285*	0.04381*	0.13649	0.15845
Offense Type- Indecency	0.03725*		0.00094*	0.00123*
Disclosure			0.00926*	0.0379*
Gender-Male	0.1121			0.00529*

* $p \leq .05$

a statistically lower value of sAA levels than explained only with AAI and disclosure status separately ($p = 0.99$).

For IgA, in the AAI condition children who suffered an offense had statistically significant increases ($p = 0.00$) with indecency having the largest effect, as compared with values attributable to AAI and type of offense separately. Furthermore, male children in the AAI condition had a statistically significantly higher value of IgA ($p = 0.01$) relative to what would be attributable to gender and AAI separately. Children in the AAI condition who disclosed an offense had a statistically significant increase in IgA ($p = 0.04$) relative to that attributable to disclosure and AAI separately. All models are summarized in Table 3.

Discussion

AAI during FI for allegation of CSA has an impact on a child's stress for some children (e.g., certain types of abuse and acts) and under specific conditions (e.g., petting the dog). Like previous studies, AAI during FIs for sexual abuse allegations had an impact on children's stress (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015). Children in the experimental condition (service-trained facility dog present-AAI), showed significantly lower HR values after the interview than before. Those in the control condition (service-trained facility dog not present- standard forensic interview) showed no significant change. These finding are consistent with recent research using an AAI during FIs for allegations of CSA (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015).

During the interview, the children who petted the dog at least once had significantly higher HR values before the interview; this may

indicate that they were more stressed before the interview began, which may have led to a greater want or need to pet the dog during the interview. While this premise is interesting to consider, more research is needed. Of the children in the AAI condition who had a disclosure, petting the dog may have provided them comfort when disclosing the details of the sexual abuse; again more research is needed to support this notion. Children who reported a sexual offense had an initial baseline HR on average of 81.3 beats per minute and experienced further HR reduction with the presence of the facility dog.

Regarding BP, there were significant changes in the AAI condition, depending upon the occurrence of a disclosure during the interview, as well as the frequency of the abuse that occurred. For cortisol, significantly non-monotone changes were found for the AAI condition, and this was based on the frequency of abuse. Children in the AAI condition also showed significantly lower values for IgA after interview.

Limitations

As with any study, there are limitations that must be considered. This study was exploratory in nature and the sample size was relatively small although large enough based upon our power assessment. Future research should aim to recruit more participants, in order to increase the statistical power within their models. In addition, this study took place in one CAC in Virginia and there were two forensic interviewers who conducted the interviews. A single service-trained facility dog was used and the facility dog's breed (Labrador/Golden Retriever mix) and size (midsize) could be seen as a limitation for some. The facility dog's breed could also be seen as a limitation for some children especially for those who may be used to interacting with smaller and/or short-haired dogs. In addition, the facility dog may have caused stress to the children in the intervention group due to the dog's size, breed, and the child's previous experience with the dogs. Therefore, the results of this study must be viewed carefully, and based on these limitations the results cannot be generalized.

Conclusion and practical implications

This study investigated how the presence of a service-trained facility dog may serve as a mode of lowering stress experienced by children during a FI for allegations of sexual abuse. Results supported

that children in the AAI condition had significant decreases in stress biomarkers after the interview compared to those in the control condition. The service-trained facility dog was handled by the forensic interviewer themselves, rather than by a third-party handler as is in previous research (Krause-Parello & Friedmann, 2014; Krause-Parello & Gulick, 2015). Through the use of this method of dog handling, we can more confidently explain how the changes in biomarker data may, or may not, be attributed to the presence of the dog itself, rather than the presence of an additional individual (dog handler) in the FI. However, the explanatory power of the presence of the dog itself needs to be further investigated, as therapy dogs require a handler that up until this point has been someone other than the forensic interviewer.

A disclosure during the FI is a vital component of the process (Lippert et al., 2009). Therefore, it is important for researchers to investigate ways in which the FI setting and methods might affect disclosure (Lippert et al., 2009). As having a dog in the FI reduced stress indicators in the children who participated in this study, it brings up an interesting question for future work. It is suggested that it may be important for child welfare personnel to better understand the FI setting characteristics that may or may not influence disclosure. It is suggested that a logical next step regarding the current findings is to examine if a facility dog increases the likelihood of a child to disclose and/or enhance the accuracy of recalling sexually abusive events.

Future research may benefit from a multi-site approach to allow for any differences that may occur based upon the temperament of the dog, or the technique of the interviewer. The results of this study suggest that the use of a service-trained facility dog is helpful to decrease a child's stress level. Research should continue in a direction to better pinpoint how stress processes function, how to improve child friendly FI setting characteristics, and what direct role facility dogs may play in the FI process for allegation of sexual abuse. Overall, we hope this study serves as an impetus for future research in this area. The presence of child abuse and neglect within the United States is being reported at staggeringly high rates, and the creation of helpful and effective methods to help these children is needed.

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