Creating a Family

Support • Train • Strengthen

Foster • Adoptive • Kinship

Building Competencies in Prenatal Substance Exposure

An Evaluation of a Specialized Training Program

December 2024

UNC | SCHOOL OF SOCIAL WORK

Building Competencies in Prenatal Substance Exposure

An Evaluation of a Specialized Training Program

December 2024

Acknowledgment of Funding and Collaboration

This work was funded by Dogwood Health Trust and conducted by the University of North Carolina at Chapel Hill, School of Social Work, in collaboration with Creating a Family (CAF). CAF's support and partnership were instrumental in evaluating the training program and its impact on child welfare professionals.

Suggested citation: Dyson, S., Ansong, D., & Brevard, K., Gilmore, J., Moser, S., Megown, C. (2024). Building competencies in prenatal substance exposure: An evaluation of a specialized training program. Creating a Family, UNC-Chapel Hill School of Social Work

dogwood health trust

Table of Contents

Acronyms

PSE	Prenatal Substance Exposure
CAF	Creating a Family
CWP	Child Welfare Professionals
UNC-SW	University of North Carolina, School of Social Work
DSS	Department of Social Services
MLM	Multi-level Modeling
EBCI	Eastern Band of Cherokee Indians

Executive Summary

This evaluation assessed the effectiveness of a specialized training program aimed at increasing child welfare professionals' (CWP) knowledge of prenatal substance exposure (PSE) and enhancing their confidence in supporting affected children and resource families (e.g., foster, kindship and adoptive). The training reached 406 participants across 10 North Carolina counties and the Eastern Band of Cherokee Indians (EBCI). Results demonstrated substantial knowledge gains and modest improvements in confidence, with no significant differences between training mode (in-person vs virtual). Individual variability in outcomes underscored the program's flexibility in meeting diverse professional needs across counties. Recommendations include scaling the training to underserved areas, integrating it into ongoing professional development, and emphasizing practical strategies to better equip CWPs to support children and resource families impacted by PSE.

Summary of Key Findings

- **Knowledge Gained.** Participants reported a considerable increase in knowledge after the PSE training.
- **Slight Increase in Confidence.** Participants experienced a slight improvement in their confidence following the PSE training.
- **No County-Level Differences.** Taking training from different counties had negligible implications for participants' experience with knowledge increase and confidence improvement.

Recommendations

- **Expand Training Opportunities.** Scale the program to reach underserved areas to address regional disparities and unmet needs.
- **Adopt a Flexible Training Mode.** Continue offering both virtual and in-person formats to accommodate learner needs and logistical constraints.
- **Integrate Training into Professional Development.** Embed this program into mandatory professional development for CWPs, supplemented with refresher courses or modules to sustain knowledge over time.
- **Focus on Practical Application.** Enhance the use of case-based scenarios and interactive exercises, incorporating real-world insights from professionals and families to deepen practical learning.

Section 1: Background

Evaluation Purpose

The purpose of this evaluation was to assess the effectiveness of a specialized PSE training program designed to increase Child Welfare Professionals' (CWP's) competencies in addressing the needs of impacted children and resource families. Specifically, the evaluation focused on measuring competency building, knowledge retention, and confidence among child welfare professionals. Findings aim to inform key stakeholders, including CWPs, leadership within the Department of Health and Human Services in North Carolina, and local family advocacy groups, while supporting the scaling and refinement of the training to improve outcomes for resource families statewide.

Evaluation Questions

This evaluation was guided by the three overarching evaluation questions, designed to explore the effectiveness of the prenatal substance exposure (PSE) training program and assess participants' knowledge acquisition and confidence in their ability to utilize the acquired knowledge:

1. **Does participation in PSE training improve CWP's knowledge of prenatal substance exposure's impact on children and resource families?**

2. **Does PSE training enhance CWP's confidence in their ability to support children and resource families affected by prenatal substance exposure?**

3. **After participation in the PSE training, do any observed changes in knowledge and confidence differ by the training mode (i.e., in person vs. virtual)?**

Empirical Foundation

Prenatal substance exposure (PSE), defined as fetal exposure to drugs, alcohol, or multiple substances during pregnancy, has significantly increased over the past decade, particularly concerning alcohol, opioid, and marijuana use (Salameh & Hall, 2019; Viteri et al., 2015). Opioid use among pregnant women in the U.S., for instance, has increased 333% in the past 15 years (Haight et al., 2018). PSE is associated with a range of adverse health outcomes for children, including developmental delays, cognitive impairments, and behavioral and emotional challenges that can persist throughout their lives (Matteson et al., 2019). It is critical to identify PSE early as adverse outcomes like these can persist across the lifespan if left unrecognized (Streissguth et al., 2004; Coles & Black, 2006).

The prevalence of substance use during pregnancy spans all socioeconomic and racial groups, though families from economically disadvantaged backgrounds and communities of color are disproportionately impacted (Shonkoff et al., 2021; Maguire-Jack et al., 2019). Children exposed to substances prenatally face heightened risks of entering the foster care system due to complex challenges such as parental substance dependency, economic hardship, and limited access to supportive resources (Joseph et al., 2022; Petrenko et al., 2016). Current estimates show that among the foster care population, 18.8% of infants and children have been diagnosed with fetal alcohol spectrum disorder (FASD) and as much as 30.5% of children diagnosed with FASD face an increased likelihood of being placed in foster care (Engesether et al., 2024).

Once placed in foster care, children with PSE face increased placement disruptions, remain in the system longer, and if reunified, face an increased risk to system reentry (Smith et al., 2007). A recent study found that infants identified with PSE were more quickly removed from home and more likely to be in a permanent non-parent home at the age of 3, twice as high as the rate of system involved children without PSE (Reddy et al., 2023). Addressing the unique needs of impacted children and supporting their families is critical to fostering family stability and improving long-term outcomes.

Despite growing awareness of PSE and its impacts, evidence indicates a gap in knowledge among child welfare professionals, including social workers (Morehouse et al., 2023). Research demonstrates that case managers' perceptions of substance use, and associated risks significantly influence their decision-making and, ultimately, case outcomes (Seay & McRell, 2023). This evaluation aims to contribute to the growing body of knowledge on PSE by assessing how a focused PSE training program can enhance child welfare professionals' knowledge, understanding, and confidence. This work supports current efforts for improved service delivery and encourages broader adoption of PSE-informed practices in child welfare (Seiger et al., 2021).

Section 2: Planning and Implementation

The PSE training program was planned, implemented, and evaluated in three phases. Phase I entailed extensive stakeholder engagement to tailor the program. Phase II involved the development of the necessary evaluation protocol. Phase III wrapped with the delivery and testing of the training program.

Phase I: DSS Partner Collaboration

Phase one focused on engaging Departments of Social Services (DSS) partners through structured listening sessions, including a focus group with three counties and a one county interview. These sessions were designed to capture insights from DSS leadership to ensure the PSE training program and its delivery were adequately contextualized. Thus, feedback from these stakeholder engagement sessions informed the training delivery, content, and accessibility.

Key discussion areas included:

- Training Format and Delivery: Agency leaders and staff provided input on preferred formats, including synchronous versus asynchronous delivery, interactive versus non-interactive sessions, and virtual versus in-person training. Agency leaders made the decision as to whether their group would participate virtually or in-person. Individual participants did not get to choose their own format. They also discussed session timing, optimal duration, frequency, and alignment with existing DSS schedules.
- Target Audience and Participation: The sessions gathered information on which DSS staff would benefit most from this training, such as child protective services, foster care, and prevention staff. Agency leaders discussed staff demographics, team structures, mandatory or voluntary training, and participation incentives. All participating counties, except for Buncombe County, agreed to make the training mandatory for all staff. All counties faced restrictions on offering monetary incentives. No monetary incentives were offered for any participating counties.
- Content Customization and Resource Utilization: Agency leaders and staff provided input on preferred resource types, including multimedia content, tip sheets, comprehensive handbooks, and case scenarios, to provide for various learning styles.
- Ongoing Support and Evaluation: Agency leaders and staff discussed follow-up mechanisms to evaluate the training's impact over time, including a three-month post-survey to assess knowledge retention. They also highlighted prior training gaps

and the need for continuous education (CE). Few staff reported prior PSE training and those who did noted it was limited to drug-exposed infants only.

By integrating this input, Phase I ensured that the resulting training was aligned with the needs and operational realities of child welfare professionals.

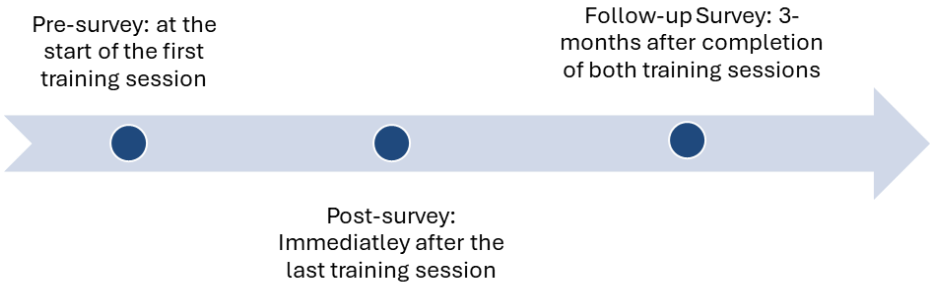
Phase II: Evaluation Protocol Development

To evaluate the implementation and effectiveness of the PSE training, the evaluation team worked collaboratively with the CAF team to develop evaluation methods to align with the PSE training content and delivery mode that emerged from the Phase I engagement. Following the selection of an evaluation design strategy (i.e., stepped-wedge design), a structured survey protocol was designed to assess CWPs knowledge and confidence in supporting resource families impacted by PSE. The survey was administered online in three stages: baseline knowledge, immediate knowledge gains, and long-term retention at three months post-training. Key objectives included:

- Assessing baseline knowledge of prenatal substance exposure
- Measuring self-efficacy, particularly confidence in applying PSE knowledge to support resource families.

The survey timeline is illustrated in *Figure 1* below:

Figure 1. Survey administration timeline



See *Section 3: Evaluation Methods* for details about the evaluation methods and tools utilized to address the evaluation questions.

Phase III: PSE Training Implementation and Testing

The training program was implemented as part of a stepped-wedge design across 10 counties in North Carolina and EBCI, see *Figure 2* below, accommodating logistical and

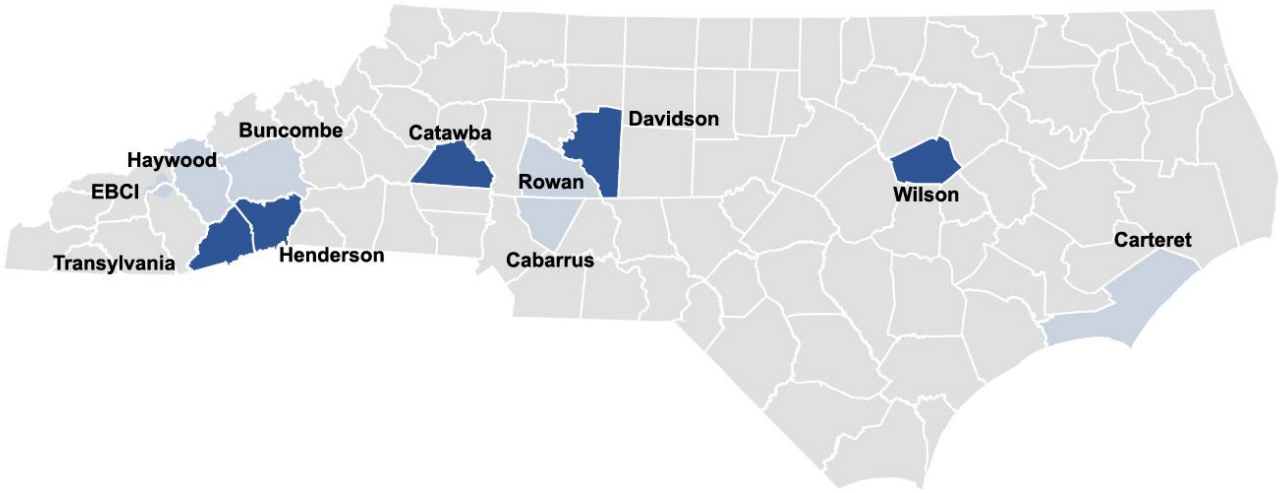
resource constraints. Participating counties were divided into two cohorts and further stratified by training modality (virtual or in-person delivery). The training consisted of two sessions delivered over two days, incorporating a media-rich, interactive format with expert and lived-experience interviews, research-based information, and case-based scenarios. The sessions included:

- Session 1: Foundational knowledge and group discussions
- Session 2: Case-based scenarios and application exercises.

In addition, participants were introduced to ongoing resources to support continued learning. Make-up sessions were offered for participants unable to attend one of the two sessions. These were conducted online and could include participants from multiple counties. Participation in the training was mandatory for all but Buncombe County, as determined by each county DSS, which were recruited based on established relationships with CAF.

While the program was implemented as planned, external challenges were encountered. Hurricane Helene disrupted data collection in Western North Carolina counties, significantly impacting 3-month follow-up survey response rates. Additional outreach efforts were made to address these disruptions to maximize data collection.

Figure 2. North Carolina Counties Involved in the Project, by Cohort



*Dark blue represents cohort 1, light blue represents cohort 2

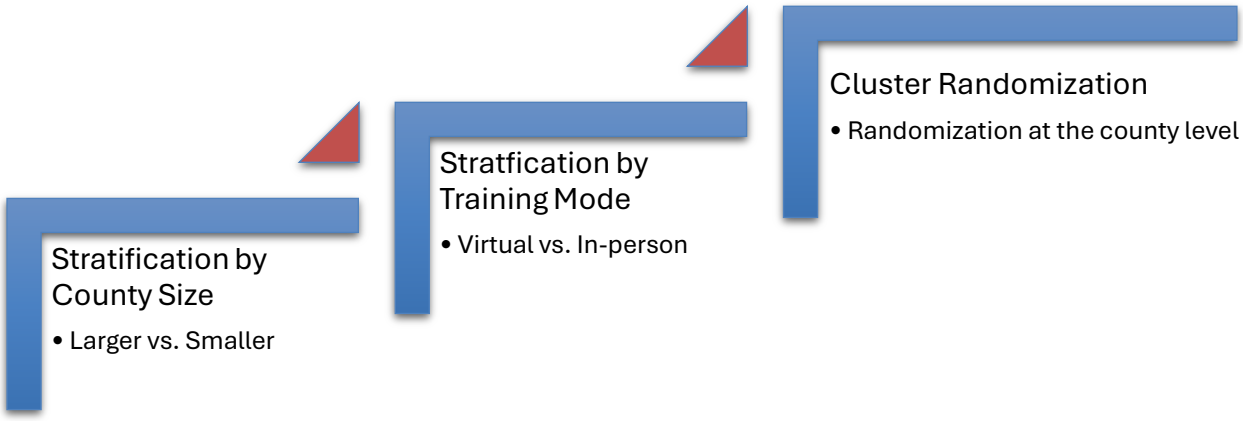
** The territory for the Eastern Band of Cherokee Indians (EBCI) not illustrated in the map covers multiple counties, including Cherokee, Graham, Haywood, Jackson, and Swain.

Section 3: Evaluation Methods

Evaluation Design

A cluster randomized stepped-wedge design strategy was adapted and implemented, which entailed sequential rollout of the training and data collection. This adapted evaluation design accounted for county size and proximity and training delivery mode (i.e., in person and virtual) as illustrated in **Figure *3*** below. This design was chosen to accommodate CAF's capacity while allowing for more robust comparisons. Counties were divided into two clusters based on size and stratified by delivery method. The clusters were randomly assigned to a sequential training rollout schedule.

Figure 3. Three-stage cluster randomization for robust comparisons



Questionnaire Development and Testing

Three questionnaires (one each for the pretest, posttest, and follow-up) were developed and used to gather data evaluation data on training participants (see Appendix for instruments). Besides featuring questions on respondents' socio-demographics and experiences, the instruments included scales to capture training participants' (a) knowledge of prenatal substance exposure's impact on children and resource families, and (b) confidence in their ability to support children and resource families affected by prenatal substance exposure. Each questionnaire included a mix of Likert-scale and multiple-choice questions.

The questionnaire was piloted with 10 child welfare professionals recruited from social work forums to evaluate clarity, flow, and comprehensiveness. Feedback from the pilot phase led to several revisions, refining question clarity and adjusting the sequence for

better respondent engagement. The pilot confirmed the survey length was appropriate for capturing the necessary data without overburdening participants.

The pilot participants, mostly female (80%) and aged 41 on average, included a diverse group, with 30% identifying as Black or African American and 70% as White or Caucasian. The majority held a bachelor's degree (90%) and had an average of 10 years of experience, with 60% having previously attended prenatal substance exposure training.

Survey Administration

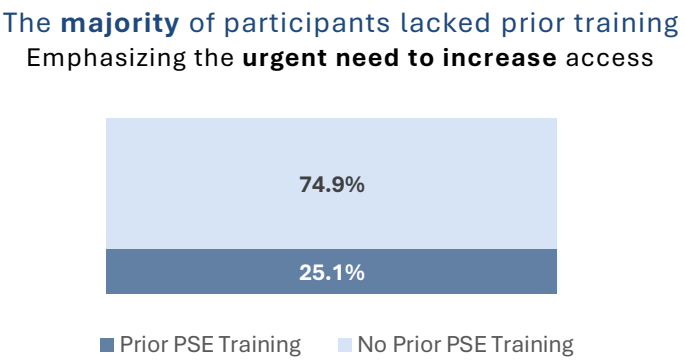
The survey was administered in three stages: baseline knowledge, immediate knowledge gains, and long-term retention at three months post-training. Pre- and post-training assessments, along with a three-month follow-up survey, were administered online through Qualtrics to both in-person and virtual training groups. Informed consent was obtained at the start of the survey.

Data collection occurred between June and November 2024 and utilized a combination of pre, post, and a 3-month follow-up survey. The data collection timeline was extended to accommodate counties impacted by Hurricane Helene.

A total of 427 CWP took the PSE training. The response rate for the pre-survey was 95.6% (*n*=406). The immediate post-survey response rate was 82.0% (*n*=334) and the 3-month follow-up survey response rate was 16.2% (*n*=66). CAF sent reminder emails to all participants to help increase response rates for all three measurement occasions. In addition to reminder emails, CAF delivered non-monetary incentives in the form of food for the 3-month follow-up survey. CAF anonymized all data by removing personal identifiers before providing the dataset to the evaluation team, ensuring participant confidentiality.

Participants

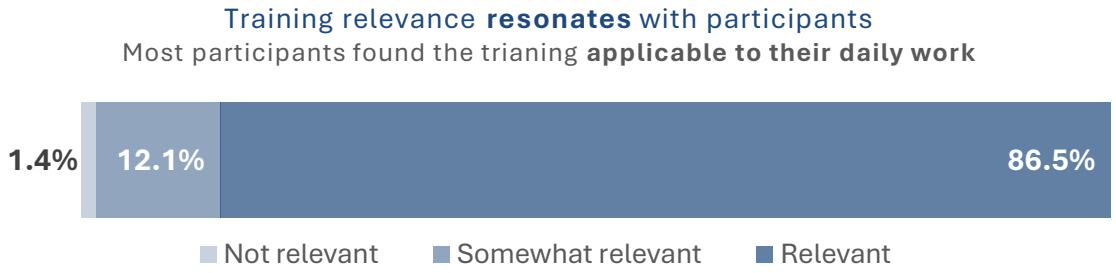
A total of 406 participants engaged in the training. Participants were predominantly female (87%), White (63%), and held a bachelor's degree (63%). Participants were evenly split between prevention services and investigative service roles, with an average of 1-3 years of experience in child welfare.



Notably, only 25.1% of participants reported prior training on PSE, which highlights the increased need for training in the field. The training was delivered primarily in-person,

although 30.4% of participants attended virtual sessions. Representation varied across counties, with Catawba contributing the highest number of participants (27%), followed by Cabarrus (16%), and Rowan (12%).

Most participants (86%) indicated that PSE training was relevant to their day-to-day work. A small percentage of participants (12.1%) found it to be somewhat relevant and only 1.4% found PSE training not relevant to their daily work.



Data Analysis

All data analyses were conducted using Stata, version 18. Multi-level modeling techniques (MLM) were used to assess improvement in two continuous outcomes (i.e., knowledge and confidence). The MLM strategy aligns with the cluster randomization stepped-wedge design and addresses hierarchical relationships, where participants were nested within counties and counties within cohorts. By partitioning variance at county and other levels, MLM enables a nuanced understanding of how the training contributed to outcome changes, while isolating the changes driven by county level factors. Although the design accounted for three measurement occasions, the MLM focused on two-point points because of the 3-month follow-up response rate of 16.2%. Data for the MLM were restructured into a long format, with measurement occasions (Time 1 and 2) nested in persons (training participants), and further nested in counties.

Paired samples t-tests were used to conduct supplemental analysis to ascertain post-training changes in the (a) ease with which participants could assess relevant resources, and (b) awareness about prenatal substance exposure among children involved in the child welfare system.

Section 4: Findings

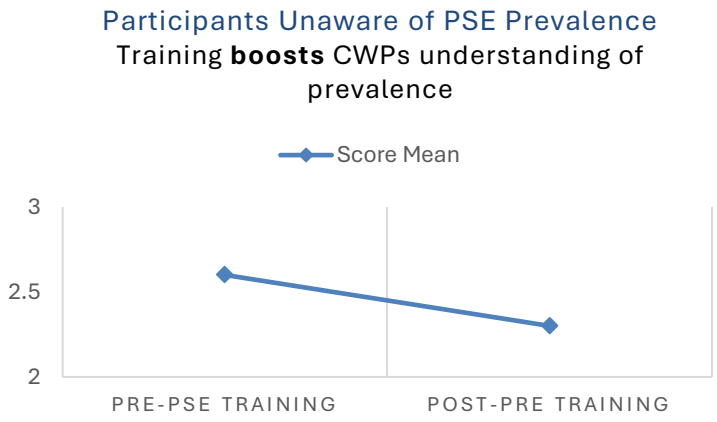
Sample Description

The full sample included 427 participants with a mean age of 41.1 years (SD=11.4). The majority identified as female (82.9%) and White (62.8%), while 30.5% identified as Black. Most participants held a bachelor's degree (63.1%). Over half of the participants (52.9%) had more than 10 years of professional experience in child welfare.

For the in-person training group (n=276), participants were similar in age (41.8, SD=11.6) and 87% were female. This group had a similar racial composition to the full sample, with 31.2% identifying as White and 60.9% as Black. Educational attainment was comparable, with 60.9% holding a bachelor's degree. Most in-person participants (54%) also reported over 10 years of experience.

The virtual training group (n=130) had a slightly younger mean age of 39.6 (SD=10.8), with 87.7% identifying as female and White (65.4%), while 29.2% of participants identified as Black in this group. Educational attainment was slightly higher among this group, with 67.7% having a bachelor's degree. A majority (59.2%) reported over 10 years of experience in child welfare, similar to the full sample.

Findings on Changes in Prevalence Awareness and Resource Access



Awareness of PSE Prevalence Improves after PSE Training. On the whole, the extent to which participants reported that they were unaware of PSE prevalence improved, as evidence by the decline in the average unawareness score from pre-training (M=2.6, SD=0.07) to post-training (M=2.3, SD=0.09): t(df=311) = 2.9, p<.01.

Resource Access Challenges Improve after PSE Training. Participants reported improvement in their ability to access relevant resources, with the average difficulty level decreasing from 3.3 (SD=0.04) to 2.9 (SD=0.07): t(df=311) = 5.1, p<.001.

Findings on Changes in Knowledge and Confidences

Knowledge Increases after PSE Training. Participants' knowledge of prenatal substance exposure's impact on children and resource families increased by an average of 3.60 units after going through the PSE training, controlling for all other variables. This effect is statistically significant (b=3.60, SE=0.34, p < .001). When translated into effect size, the results suggest a large intervention effect on knowledge increase (Cohen's d: ~0.8)

The county-level random effects confirm negligible variability in pre-training knowledge levels between counties (i.e., county-level intercept variance <0.01, SE<0.01). Specifically, before the PSE training, the participating counties did not differ significantly in their knowledge of prenatal substance exposure's impact on children and families. Likewise, the pre-training knowledge did not vary meaningfully between individuals (i.e., person-level intercept variance <0.01, SE < 0.01). These negligible individual-level and county-level variabilities suggest a fair amount of similar knowledge levels across the board before the training, further pointing to the influence of the PSE training on participants' knowledge levels.

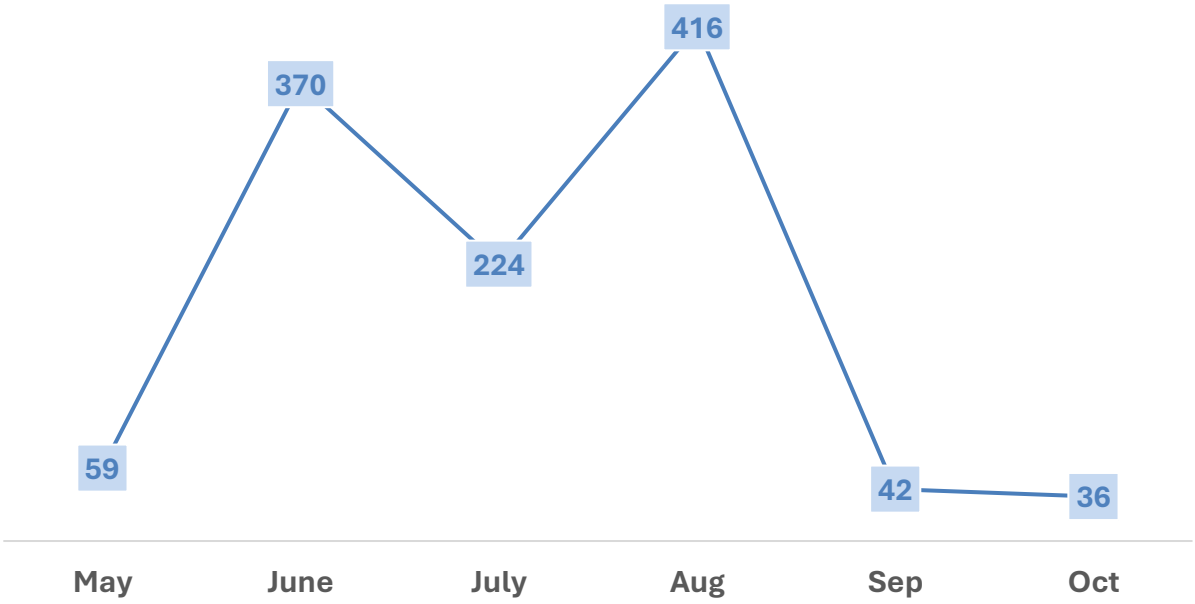
Modest Confidence Boost after PSE Training. Participants' confidence in their ability to support children and resource families affected by prenatal substance exposure increased by an average of 0.09 units after participating in the PSE training program, controlling for all other variables (b=0.09, SE= 0.04, p<0.05). This improvement in confidence is statistically significant but smaller than for knowledge gain. Translating the results into effect size suggests a small intervention effect on confidence (Cohen's d: 0.2 – 0.5).

It emerged from the county-level random effects that the variability in pre-training confidence levels between counties (i.e., county-level intercept variance <0.01, SE<0.01) and between individuals (i.e., person-level intercept variance <0.01, SE < 0.01) did not

differ significantly. In other words, individuals and counties were similar prior to the training, signaling stronger confidence in the finding that the PSE training contributed to the observed marginal post-training improvements in participants' confidence levels.

Being equipped with resources to assist resource families may have contributed to increased levels of confidence. Participants (n=184) identified the inclusion of resources as having significantly supported their learning. Resources identified included: provision of checklists (48.9%), handouts (25.6%), the resource library (15.5%), and parent resources (10.0%). Access to the resources were made available on CAF's website, which experienced an increase in traffic to the specific page that solely housed the resource library, as shown in **Figure 4** below.

Figure 4. Resource library webpage views, May through October 2024 [1]



Quantitative findings further support these observations. A comparison of pre- and post-training survey questions indicates statistically significant improvements in participants' perceptions of resource availability. Participants were less likely to agree with the statement, "Resources to support prenatally exposed children and caregivers are difficult

[1] CAF website data was provided by CAF through Google Analytics and reflects publicly available webpage views

to identify" following the training (M=3.3, SD=0.04 pre-training; M=2.9, SD=0.07 post-training), with a significant mean difference, $t(311) = -5.1$, $p < 0.001$.

Outcome Differences by PSE Training Modality (Virtual vs. In-Person Mode) are Negligible. On average, participants who received the PSE training virtual gained *0.12 fewer units of knowledge* compared to the in-person PSE training participants, although this small difference was not statistically significant (b=−0.12, SE = 0.96, p=.902). Similarly, if assessed in terms of the rate of changes from *pre-training to post-training* (i.e., the interaction between mode and time), the rate of knowledge gained from the pre- to post-training period for virtual participants is *0.09 units lower* than the rate of the in-person participants. However, this finding is not statistically significant (b=−0.09, SE = 0.62, p = .880).

Similar marginal (nonsignificant) differences were found between the two training modalities on the issue of confidence. Specifically, the virtual participants' confidence in their ability to support children and families is *higher by 0.12 units* compared to in-person participants, but this difference is not statistically significant (b=0.12, SE = 0.12, p=0.298). When assessed as rate of change, the increase in confidence from pre-training to post-training for the virtual participants is *0.10 units lower* than the rate for the in-person participants. Again, this interaction between modality and time was not statistically significant (b=−0.10, SE=0.08, p=.224).

Limitations

This evaluation has several limitations that should be acknowledged when interpreting the findings. First, there are threats to internal validity, particularly related to the potential selection bias. While efforts were made to ensure homogeneity between cohorts through clustering and stratification based on county size and delivery method, these measures cannot entirely eliminate the possibility of pre-existing differences between participants that may influence outcomes. This limitation reduces our ability to establish the causal treatment effects of the PSE training.

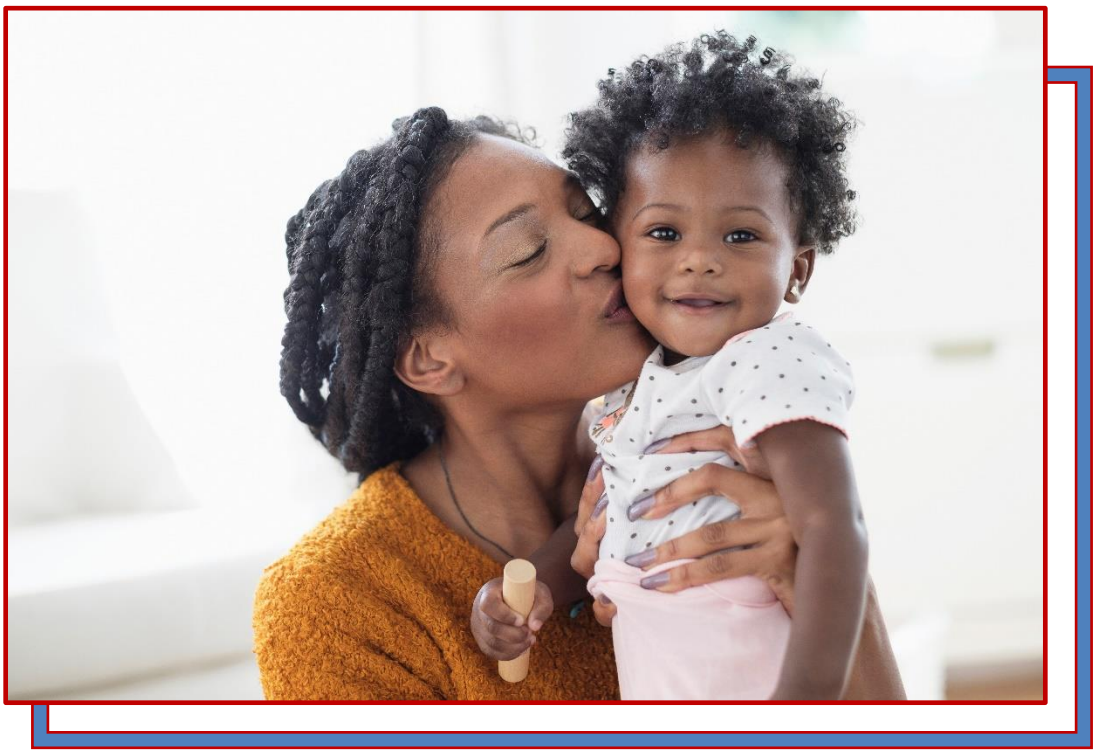
Second, attrition resulted in lower response rates for some measurement occasions (e.g., post-training surveys), which may introduce bias and limit the generalizability of the findings. Although the response rates were sufficient for analysis, the reduced participation in the 3-month follow-up survey affects the robustness of the comparisons over time.

Third, this evaluation relied on self-reported data collected through surveys, which is inherently subject to self-report bias. Participants may have provided socially desirable responses or inaccurately assessed their own knowledge and confidence, potentially skewing the findings. Additionally, repeated exposure to similar survey items across pre-,

post-, and follow-up measurements may have introduced testing effects, where changes in responses may partially reflect familiarity with the survey items rather than true changes in knowledge or confidence.

Finally, common limitations associated with clustered randomized stepped-wedge design include potential contamination effects between cohorts and the inability to fully account for unmeasured confounding variables at the cluster or individual levels.

Despite these challenges, the study's multi-level modeling design helped to mitigate some of these limitations, offering valuable insights into the implementation and outcomes of the PSE training program.



Section 5: Recommendations

Recommendations for Future Programing

This evaluation highlights several actionable recommendations. The findings demonstrate that the training effectively increased participants' knowledge regardless of delivery mode or county, underscoring its broad applicability. The following recommendations are suggested to enhance training accessibility, application, and sustainability, ensuring that CWPs are well-equipped to support children and resource families impacted by PSE:

1) **Expand Training Opportunities:** Scale the program to reach a broader audience, particularly given the limited prior exposure to PSE training across CWPs.
2) **Adopt a Flexible Training Delivery Model:** Continue offering both virtual and in-person formats to accommodate diverse learner preferences and logistical constraints, as no significant differences were observed in knowledge gains based on delivery mode.
3) **Integrate Training into Ongoing Professional Development:** Embed this program into mandatory professional development to ensure all CWPs are equipped with the necessary knowledge and skills.
4) **Sustain Knowledge Gains Over Time:** Supplement the initial training course with refresher courses or follow-up modules to sustain gains in knowledge over time.
5) **Focus on Practical Application:** Enhance the use of case-based scenarios and interactive exercises, incorporating lived-experience from professionals and families to deepen practical learning.

These recommendations aim to ensure the training program's effectiveness while promoting its adoption and scalability to benefit child welfare professionals and the children and resource families they serve.

Recommendations for Future Research and Evaluation

Areas for future research and evaluation should seek to strengthen the understanding and implementation of PSE training programs. To mitigate threats to internal validity, future study designs such as randomized controlled trials could provide stronger causal evidence of training effects. Additionally, investigating factors leading to attrition, particularly for post-training and follow-up measurements. will be crucial to informing strategies to improve participant retention and ultimately, overall results.

Developing objective measures to complement self-reported data represents another opportunity. Future evaluations could develop and incorporate validated assessments or observational evaluations to provide more accurate measures of participant knowledge and confidence gains.

A broader range of counties and geographical locations would also help to enhance the generalizability of findings, ensuring PSE training programs address the diverse needs of CWPs and the resource families they serve across the state. There may be the potential to scale this program up to a state-wide training program, given its flexible training delivery modes.

Lastly, linking training outcomes to practice-based results offers a critical area for future exploration. Future research could assess how increases in knowledge and confidence impact CWPs practice, such as improving resource family support services, enhancing case-management strategies, or reducing placement disruptions in child welfare systems. This could help bridge the gap between training outcomes and measurable improvements in service delivery, advancing PSE training.

In conclusion, CAF should consider (a) scaling up the PSE training program to broaden the reach of CWPs across the state, (b) incorporating randomized controlled trials to investigate causal effects, and (c) exploring strategies to reduce attrition and prioritize linking training outcomes to measurable improvements in practice and outcomes.

References

Engesether, B., Hoffner, M., Johnson, E., Klug, M. G., Popova, S., & Burd, L. (2024). Prevalence of fetal alcohol spectrum disorder in foster care: A scoping review. Alcohol, clinical & experimental research, 48(8), 1443–1450. https://doi.org/10.1111/acer.15394

Coles, C.D., Black, M.M. (2006). Introduction to the Special Issue: Impact of Prenatal Substance Exposure on Children's Health, Development, School Performance, and Risk Behavior, *Journal of Pediatric Psychology*, 31(1), 1–4. https://doi.org/10.1093/jpepsy/jsj036

Haight, S. C., Ko, J. Y., Tong, V. T., Bohm, M. K., & Callaghan, W. M. (2018). Opioid use disorder documented at delivery hospitalization—United States, 1999-2014. *Morbidity and Mortality Weekly Report, 67*(31), 845–849. https://doi.org/10.15585/mmwr.mm6731a1

Joseph, J. J., Mela, M., & Pei, J. (2022). Aggressive behavior and violence in children and adolescents with FASD: A synthesizing review. *Clinical Psychology Review*, *94*, 102-155. https://doi.org/10.1016/j.cpr.2022.102155

Maguire-Jack, K., Lanier, P., & Lombardi, B. (2019). Investigating racial differences in clusters of Adverse Childhood Experiences. *American Journal of Orthopsychiatry*, *90*. https://doi.org/10.1037/ort0000405

Mattson, S. N., Bernes, G. A., & Doyle, L. R. (2019). Fetal alcohol spectrum disorders: Neurobehavioral deficits associated with prenatal alcohol exposure. *Alcoholism Clinical and Experimental Research*, 43(6), 1046–1042. https://doi.org/10.1111/acer.14040

Petrenko, C. L., Pandolfi no, M. E., & Roddenberry, R. (2016). The association between parental attributions of misbehavior and parenting practices in caregivers raising children with prenatal alcohol exposure: A mixed-methods study. *Research in Developmental Disabilities*, *59*, 255-267. https://doi.org/10.1016/j.ridd.2016.09.005

Reddy, J., Palmer, L., & Putnam-Hornstein, E. (2023). Three-Year Custody Outcomes Among Infants Investigated by Child Protection Systems for Prenatal Substance Exposure in California. Maternal and child health journal, 27(Suppl 1), 94–103. https://doi.org/10.1007/s10995-023-03690-9

Salameh, T. N., & Hall, L. A. (2019). Depression, anxiety, and substance use disorders and treatment receipt among pregnant women in the United States: A systematic review of trend and population-based studies. *Issues in Mental Health Nursing, 41*(1), 7–23. https://doi.org/10.1080/01612840.2019.1667460

Shonkoff, J. P., Slopen, N., & Williams, D. R. (2021). Early childhood adversity, toxic stress, and the impacts of racism on the foundations of health. *Annual Review of Public Health*, *42*(1), 115–134. https://doi.org/10.1146/annurev-publhealth-090419-101940

Smith, D. K., Johnson, A. B., Pears, K. C., Fisher, P. A., & DeGarmo, D. S. (2007). Child maltreatment and foster care: unpacking the effects of prenatal and postnatal parental

substance use. Child maltreatment, 12(2), 150–160. https://doi.org/10.1177/1077559507300129

Streissguth, A. P., Bookstein, F. L., Barr, H. M., Sampson, P. D., O'Malley, K., & Young, J. K. (2004). Risk factors for adverse life outcomes in fetal alcohol syndrome and fetal alcohol effects. *Journal of Developmental and Behavioral Pediatrics*, 25(4), 228–238.

Viteri, O. A., Soto, E. E., Bahado-Singh, R. O., Christensen, C. W., Chauhan, S. P., & Sibai, B. M. (2014). Fetal anomalies and long-term effects associated with substance abuse in pregnancy: A literature review. *American Journal of Perinatology*, 32(5), 405-416. https://doi.org/10.1055/s-0034-1393932

Appendices

Appendix A: Descriptive Statistics

	Full sample		Virtual mode		In-person mode	
	Mean(SD)	*n*	*Mean(SD)*	*n*	*Mean(SD)*	*n*
Knowledge change	3.63(5.221)	307	3.6(5.13)	215	3.7(54.41)	92
Age	41.07(11.37)	402	41.75(11.57)	273	39.62(10.82)	129
	Freq.(%)		*Freq.(%)*		*Freq.(%)*	
Cohort						
1st cohort	216(50.59)	427	135(48.91)	276	73(56.15)	130
2nd cohort	211(49.41)		141(51.09)		57(43.85)	
County						
Buncombe	27(6.65)		2(0.72)		25(19.23)	
Cabarrus	63(15.52)		9(3.26)		54(41.54)	
Carteret	24(5.91)		24(8.7)		0(0)	
Catawba	109(26.85)		109(39.49)		0(0)	
**EBCI	20(4.93)		20(7.25)		0(0)	
Davidson	26(6.4)		26(9.42)		0(0)	
Haywood	23(5.67)		4(1.45)		19(14.62)	
Henderson	20(4.93)		0(0)		20(15.38)	
Rowan	49(12.07)		49(17.75)		0(0)	
Transylvania	17(4.19)		5(1.81)		12(9.23)	
Wilson	28(6.9)		28(10.14)		0(0)	
Gender						
Female	354(82.90)	406	240(86.96)	276	114(87.69)	130
Male	52(12.17)		36(13.04)		16(12.31)	
Experience						
10 years +	226(52.93)	406	149(53.99)	276	77(59.23)	130
Below 10 years	180(42.15)		127(46.01)		53(40.77)	
Education level						
Up to high school	4(0.99)		2(0.72)		2(1.54)	
Bachelor/some	256(63.05)		168(60.87)		88(67.69)	
Postgraduate	146(35.96)		106(38.41)		40(30.77)	
Race						
Indian/Native	11(2.71)		10(3.62)		1(0.77)	
Black/AA	124(30.54)		86(31.16)		38(29.23)	
Hispanic/Spanish	8(1.97)		4(1.45)		4(3.08)	
White/Caucasian	255(62.81)		170(61.59)		85(65.38)	
Other	8(1.97)		6(2.17)		2(1.54)	

*n=427, **Eastern Band of Cherokee Indians

Appendix B: Multilevel Modeling Results

Table 2. Results of multilevel modeling of changes in knowledge and confidence after the PSE training.

Fixed effects	**Knowledge** ***b(SE)***	**Confidence** ***b(SE)***
Time (Intervention effect)	3.60 (0.34)***	0.09 (0.04)*
Virtual mode (ref: in person)	-0.12 (0.96)	0.12 (0.12)
Virtual mode*Time interaction	-0.09 (0.62)	-0.10 (0.08)
1st cohort (ref: 2nd Cohort)	0.15 (0.37)	0.09 (0.04)*
Age	0.02 (0.02)	0.00 (0.00)
Female (ref: male)	1.45 (0.57)*	-0.06 (0.06)
Decade experience (ref: less than a decade)	0.54 (0.46)	-0.13 (0.05)*
White Caucasian (ref: Non-White)	1.99 (0.39)***	-0.07 (0.04)
Postgraduate education (ref: No)	0.40 (0.39)	-0.09 (0.04)*
Intercept	5.05 (1.13)***	2.59 (0.13)***
Random Effects (Variance Components)		
County random effects		
Intercept	-7.97 (6.83)	-4.46 (4.76)
Time	-7.82 (185.44)	-11.16 (6.05)
Person random effects		
Intercept	-16.27 (698.87)	-1.85 (0.14)***
Time	0.89 (0.10)***	-12.89 (600.74)
Residual random effects	1.31 (0.04)***	-0.76 (0.04)***

*$p < .05$, $p < .01$, ***$p < .001$

Appendix C: Survey Instrument

Creating A Family (CAF) - Child Welfare Training Initial Survey
Informed Consent to Participate in Research

We're inviting you to take a survey for research. This survey is completely voluntary. There are no negative consequences if you don't want to take it. If you start the survey, you can always change your mind and stop at any time. The purpose of this survey is to collect information on the effectiveness of this child welfare worker training program aimed at addressing knowledge gaps regarding prenatal substance exposure among child welfare professionals. This evaluation seeks to improve outcomes for children exposed to drugs and alcohol during pregnancy, who are at increased risk for behavioral issues, learning challenges, and family separations. This evaluation aims to inform further improvements in supporting children and families affected by prenatal substance exposure. This survey will ask questions about your knowledge of prenatal substance exposure. The survey will take about 10 minutes to complete. We will collect the following identifying information: your name, personal email address, and work email address. This information is necessary to the evaluation design and allows us to contact you for future post-test follow-ups. Your deidentified data will be provided to researchers for analysis. Data collected will be stored, analyzed, and destroyed in accordance with the University of North Carolina's Institutional Review Board. We may share findings in publications or presentations. If we do, the results will be reported in aggregate with no individual results.

If you have questions about the research, complaints, or problems: Contact Jamie Gilmore at jamie@creatingafamily.org. Your participation is completely voluntary, and you can withdraw at any time. If you would like to take the survey, select your agreement to start.

- ☐ I agree to participate
- ☐ I do not agree to participate

Q1 Name _____

Q2 Age _____

Q3 Race/Ethnicity

- ☐ Black or African American
- ☐ White or Caucasian
- ☐ American Indian/Native American or Alaskan Native
- ☐ Spanish, Hispanic, or Latino origin
- ☐ Other
- ☐ Prefer not to say

Q4 Sex or Gender

- ☐ Male
- ☐ Female
- ☐ Non-binary / third gender
- ☐ Prefer not to say

Q5 Work email _____

Q6 Personal email _____

Q7 Department Name

- ☐ Adoption
- ☐ Assessment (including initial investigators, referrals, and home visits)
- ☐ Family Finding
- ☐ Licensing/Training
- ☐ Permanency planning
- ☐ Other _____

Q8 Department county

- ☐ Buncombe
- ☐ Cabarrus
- ☐ Carteret
- ☐ Catawba
- ☐ Cherokee
- ☐ Davidson
- ☐ Haywood
- ☐ Henderson
- ☐ Rowan
- ☐ Transylvania
- ☐ Wilson
- ☐ ECBI

Q9 Role in the department

- ☐ Adoption assistance
- ☐ Caseworker
- ☐ Foster care licensing
- ☐ Foster care, 18-21
- ☐ Investigator
- ☐ Prevention specialist / In home services
- ☐ Supervisor
- ☐ Other _____

Q10 Level of education

- ☐ Some high school, no diploma
- ☐ High school graduate, diploma or GED
- ☐ Some college, no degree
- ☐ Associate's degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

Q11 Years of experience

- ☐ 1-3
- ☐ 4-6
- ☐ 7-9
- ☐ 10-13
- ☐ 14-16
- ☐ 17-19
- ☐ 20+

Q12 Have you engaged in a prenatal substance exposure training program before?

- ☐ Yes
- ☐ No

Q13 Rate your knowledge of prenatal substance exposure

- ☐ Knowledgeable
- ☐ Somewhat knowledgeable
- ☐ No knowledge

Q15 How relevant is prenatal substance exposure training to your current work

- ☐ Relevant
- ☐ Somewhat relevant
- ☐ Not relevant

Q16 Please rate your agreement with the following statements, from strongly disagree to strongly agree

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
I know where to find resources for supporting prenatally exposed children and their caregivers					
I can identify strategies to support executive functioning deficits, slowing processing speed, and memory deficits in prenatally exposed individuals					
I have a clear understanding of the permanent brain-based impacts of prenatal substance exposure					
I am familiar with the advantages of seeking a diagnosis for a child who may have been affected by prenatal substance exposure					

Q17 Please rate your agreement with the following statements, from strongly disagree to strongly agree

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I am knowledgeable when it comes to identifying strategies to support soothing/sleeping issues, feeding/eating difficulties, sensory issues, and physical issues in infants and toddlers who may have been prenatally exposed					
I believe I have an increased awareness of the role attitudes, stigma, and bias play in supporting prenatally exposed children and caregivers					
Resources to support prenatally exposed children and caregivers are difficult to identify					

I am unaware of the prevalence of prenatal substance exposure among children involved in the child welfare system					
I am not confident in my ability to identify strategies to support hyperactivity, emotional dysregulation, lying, and stealing in young adults who may have been prenatally exposed					

Q18 Which of the following are diagnoses often made in conjunction with or instead of a diagnosis of prenatal substance exposure? Select all that apply.

- ☐ Autism Spectrum Disorder (ASD)
- ☐ Attention-Deficit/Hyperactivity Disorder (ADHD)
- ☐ Post Traumatic Stress Disorder (PTSD)
- ☐ Oppositional Defiant Disorder (ODD)
- ☐ Reactive Attachment Disorder (RAD)
- ☐ Obsessive-Compulsive Disorder (OCD)

Q19 From the list below, select the protective factors that minimize the effects of prenatal exposure as recognized by the CDC. Select all that apply.

- ☐ A stable, nurturing, and stimulating home environment
- ☐ Early diagnosis and access to social and educational services
- ☐ The absence of violence both in the home and in the community
- ☐ The child's resilience
- ☐ Placement in a group residential facility
- ☐ Attendance in a federally-funded preschool

Q20 All children who have been exposed to prenatal alcohol exposure have irregular facial features

- ☐ True
- ☐ False

Q21 Which has the potential for greater long-term effects on development

- ☐ Prenatal alcohol exposure
- ☐ Prenatal legal or illegal drug exposure

Q22 Which of the following are important considerations in preventing placement disruption? Select all that apply.

- ☐ Educate and prepare resource parents in advance
- ☐ Offer supportive strategies for challenging symptomatic behaviors
- ☐ Check-in frequently with resource parents
- ☐ Consider seeking a diagnosis for the child and advocate with other professional appropriate services and support
- ☐ Offer regular respite care for resource families before a placement reaches a crisis
- ☐ Medicating the child