# Building Support for Foster Caregivers with Pyramidal Training

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**Abstract**

Foster parents frequently cite inadequate training and a lack of social support as sources of stress when fostering a child, particularly when youth engage in challenging behaviors (Bergsund et al., 2020; Hebert & Kulkin, 2018). One potential way of mediating this is through pyramidal training, or the train-the-trainer model, which has significant evidence-base demonstrating its efficacy as a competency-based approach to training, particularly when paired with behavioral skills training (BST; Andzik & Cannella-Malone, 2017; Pančocha & Kingsdorf, 2021). Though not behavior analytic, the Trust-Based Relational Intervention (TBRI) has shown to significantly improve outcomes for foster families by teaching caregivers to identify and meet the needs of children who have experienced relational trauma (Crawley et al., 2019; Purvis et al., 2015). As such, this study investigated the effects of pyramidal training with BST on the (1) procedural integrity of foster parents' implementation of the TBRI corrective principle (i.e., differential reinforcement of alternative behavior [DRA]), (2) procedural integrity of foster parents' training another caregiver to implement DRA using BST, and (3) the procedural integrity of secondary caregivers' implementation of DRA. Results indicated that pyramidal training with BST is an effective intervention to build larger networks of support while enhancing the skills available to foster caregivers. Though this study did not evaluate the outcomes of TBRI pyramidal training on foster children, this initial investigation indicates the utility of interdisciplinary collaboration to improve the wellbeing of foster parents and the children in their homes.

Keywords: foster care, pyramidal training, behavior analysis, trust-based relational intervention

## Introduction

According to the US Children's Bureau (2020), the foster care system serves over a half million children annually. Children enter foster care for a variety of reasons, most commonly as a result of parental substance abuse, domestic violence, physical abuse, sexual abuse, emotional abuse, and/or neglect (Jankowski et al., 2019; Oswald et al., 2010; Papovich, 2020; Sharda, 2022; US Children's Bureau, 2020). Each of these experiences, as well as a child's subsequent removal from their family home, can be a source of complex trauma (Crawley et al., 2021; Leathers et al., 2019; Mitchell, 2017; Purvis et al., 2015; Purvis et al., 2013; Sharda; 2022; Zinn, 2020). Children who have experienced complex trauma are at risk for poor developmental outcomes and are more likely than their peers to display behavioral problems (Leathers et al., 2019; Lohaus et al., 2017; Sharda, 2022; Tabone, 2011), experience significant physical and mental health conditions (Bartlett & Rushovich, 2018; Engler et al., 2022; Jankowski et al., 2019; Papovich, 2019; Sharda, 2022; Shonkoff et al., 2021), and poor academic outcomes (Berardi & Morton, 2017; Clemens et al., 2018; Zinn, 2020) that can persist or worsen over their lifetime (Becker-Weidman 2009; Kisiel et al. 2009; Purvis et al., 2015).

Children and youth who have entered foster or residential care are a vulnerable population that often have a history of maltreatment (Lohaus et al. 2017; Lotty et al., 2020; Papovich, 2020; Sharda, 2022). Childhood maltreatment is associated with a range of emotional and behavioral problems (Lohaus et al., 2017). Maltreated children also display significantly more externalizing and internalizing symptoms and more discipline problems in school when compared to their same-aged peers without such experiences (Lohaus et al. 2017). Foster children often develop survival-based behaviors as a result of previous maltreatment in an effort to adapt to threatening environments experienced prior to entering foster care (Lotty et al., 2020). Although these behaviors may have previously served them well, they can become problematic by impeding their capacity

to function in a foster family, at school, or in relationships (Lotty et al., 2020). Children in foster care are five times more likely to be diagnosed with a behavioral or mental health disorder when compared to peers outside of the foster care system (Jankowski et al., 2019; Papovich, 2019). These challenging behaviors can range from being aggressive, to disobedient, and even dissociative (Lotty et al., 2020; Octoman & McLean, 2014). These behavior difficulties can be long-lasting and may even worsen while in foster care, complicating the relationship with foster parents and increasing the likelihood for multiple placements (Lotty et al., 2020; Vanderfaeillie et al., 2013). Significant mental health concerns among foster youth include attention deficit hyperactivity disorder, major depressive disorder, anxiety, suicidality, oppositional defiant disorder, conduct disorder, post-traumatic stress disorder (PTSD), and reactive attachment disorder (Engler et al., 2022; Forkey et al., 2015; Havlicek et al., 2013; Jankowski et al., 2019; Lohr & Jones, 2016; McMillen et al., 2005; Papovich, 2019).

The foster care system was designed to serve as an intervention to mediate children's developmental trauma-related difficulties through family-based care (Bergsund et al., 2020; Lotty et al., 2020). While foster caregivers often experience high levels of satisfaction, caregivers frequently describe their role as emotionally and psychologically demanding and report higher stress levels when compared to biological parents (Adams et al., 2018; Bergsund et al., 2020; Whenan et al., 2009). Caregiver stress places foster parents at risk for parental burnout, which may lead to the pre-mature termination of their caregiver role, (Whenan et al., 2009) increasing the risk of placement instability and further exacerbating children's developmental difficulties (Rubin et al., 2007). Foster parents require adequate support services in order to maintain their ability to provide care (Barnett et al., 2017; Leathers, 2006). To address the unique needs of foster families and enhance placement stability, interventions and trainings need to target the underlying trauma experienced by children with histories of maltreatment (Octoman & McLean, 2014; Purvis et al., 2015).

Interventions and trainings that address the trauma experienced by children with histories of maltreatment can be a vital component in reducing challenging behaviors among foster youth (Octoman & McLean, 2014; Purvis et al., 2015). Trust-Based Relational Intervention (TBRI) is an evidence-based, trauma-informed model of care for vulnerable children which aims to improve outcomes for vulnerable children by teaching caregivers to see the needs of children who have experienced trauma and helping caregivers do what is necessary to meet those needs (Crawley et al., 2019; Purvis et al., 2015; Purvis et al., 2013). At the core of applied behavior analysis (ABA), is the prioritization of socially significant problems, which requires behavior analysts to explore the application of science to larger societal issues (Rajaraman et al., 2022). Behavior analysts have the potential to make meaningful contributions to TIC, which may lead to both short-term and long-term improvements for individuals who have experienced trauma (Rajaraman et al., 2022). Given the success of TBRI in improving outcomes of foster families, it is worthwhile to consider a behavior analytic interpretation of the intervention, including teaching caregivers' specific skills consistent with the three TBRI principles.

Behavioral interventions that take into consideration the cultural differences, historical struggles, and systemic problems faced by the families (Pančocha & Kingsdorf, 2021) can be taught using behavior skills training (BST) in conjunction with a pyramidal training model. Combining BST and pyramidal training for caregivers can help reduce challenging behaviors, reduce levels of foster caregiver-related stress, and improve perceived levels of support and relationships with foster children. A pyramidal skills training model could also be implemented to evaluate its effects on caregiver acquisition of behavioral interventions (Andzik & Cannella-Malone, 2017; Pančocha & Kingsdorf, 2021). This could be achieved by an expert conducting training with primary caregivers, who are responsible for providing daily routine care for foster youth, who would then conduct training with a secondary caregiver (e.g., another parent, grandparent, or other adult caregiver). The following literature review guided the development of a training program for foster parents grounded in trauma informed care and behavior analytic practices.

## Literature Review

### Trauma Informed Care

Many children entering foster care have experienced complex traumatic experiences, which is associated with an increased risk of mental health and behavioral concerns (Bloch & Beyerlein, 2014; Greeson et al.,

2011; Leve et al., 2012). These concerns are further exacerbated when left unrecognized and untreated. Despite the prevalence of trauma among foster youth, the use of evidence-based trauma informed care (TIC) practices within the welfare system is a relatively recent phenomenon (Cook et al., 2005; Zhang et al., 2021). In the context of child welfare, TIC is defined as a system in which all adults responsible for promoting children's permanency, safety, and well-being develop and maintain an awareness of the impact of traumatic experiences on children, caregivers, and service providers, leading to the application of appropriate responses, training, practices, and policies to minimize risk of re-traumatization (Bloch & Beyerlein, 2014; Sullivan et al., 2016).

The National Child Traumatic Stress Network (NCTSN) was established by Congress in 2000 and aims to support the development and advancement of TIC interventions focusing on children within the welfare system (Agazzi et al., 2019; Bartlett et al., 2016; Barto et al., 2018; Howard et al., 2014; Purvis et al., 2015). A recent meta-analysis synthesized TIC interventions' effect on the wellbeing of children in the child welfare system (Zhang et al., 2021). The results indicated TIC interventions yield a moderate effect on child wellbeing and a large effect size when examined with specific child wellbeing indicators: PTSD symptom reduction, behavioral problem reduction, and other psychological wellbeing improvement. Overall, TIC interventions appear to improve all types of examined child emotional and behavioral wellbeing, with the effect on reducing behavioral problems appearing to be the most prominent.

Interventions must address the persistent and extreme behavioral issues often exhibited by children in the welfare system, but also acknowledge their history of trauma, maltreatment, and deprivation that is often overlooked (Purvis et al., 2015). Providing foster caregivers with effective trauma-informed interventions could potentially lead to improved skillsets among caregivers, reduced behavioral problems and trauma symptoms among foster youth, and ultimately improve placement stability (Purvis et al. 2015).

**Trust-Based Relational Intervention (TBRI)**

TBRI is an evidence-based, trauma-informed model of care for vulnerable children developed at the Texas Christian University Institute of Child Development (Crawley et al., 2021; Howard et al., 2014; Purvis et al., 2015; Purvis et al., 2013). TBRI is grounded in attachment theory and developmental neuroscience and works to repair the harm caused by relational trauma by engaging the same attachment, or rapport building process between children and caregivers, in the absence of trauma (Howard et al., 2014). Consistent with the three pillars of TIC (Bath, 2008), there are three sets of interacting principles: (a) empowerment—attention to physical needs; (b) connection—attention to attachment needs; and (c) correction—attention to behavioral needs (Howard et al., 2014; Purvis et al., 2015; Purvis et al., 2013). TBRI aims to improve outcomes for vulnerable children by teaching caregivers to see the needs of children who have experienced relational trauma and helping caregivers do what is necessary to meet those needs (Crawley et al., 2019; Purvis et al., 2015; Purvis et al., 2013). TBRI has demonstrated to be effective in a variety of settings, such as intensive home programs (McKenzie et al., 2014), therapeutic summer day camps (Purvis & Cross, 2006; Purvis et al., 2013), residential treatment centers (Purvis et al., 2012; Purvis et al., 2015), schools (Parris, et al., 2014), and through web-based training (Razuri, et al., 2015). Further, TBRI has been effective in reducing behavioral problems (Purvis et al., 2015), children's psychiatric problems, and parent stress levels (Howard et al. 2014). Though there are a variety of training approaches available to teach caregivers how to implement behavioral interventions, standardized, competency-based training could help caregivers implement behavioral interventions in hopes to decrease stress, increase support levels, and promote placement stability (Greeno et al., 2015; Lohaus et al., 2017; Parsons et al., 2012; Sarokoff & Sturmey, 2004). Behavioral skills training (BST) is a teaching package that utilizes several methodologies that, when combined, can create an effective technique for teaching a broad range of skills (Clayton & Headley, 2019).

**Behavior Skills Training**

Behavior skills training (BST) involves providing instruction, modeling, role-playing/rehearsal, and feedback (Sarokoff & Sturmey, 2004) and is supported by a considerable body of research demonstrating its effectiveness across individuals, behavioral-change procedures, and other skills (Dogan et al., 2017; Drifke et al., 2017; Hogan et al., 2015; Sarokoff & Sturmey, 2004; Schaefer & Andzik, 2021). Specifically, BST has support for use with caregivers (Schaefer & Andzik, 2021). For example, researchers have employed BST to train caregivers to implement a guided compliance procedure (Miles & Wilder, 2009), social skill strategies

(Dogan et al., 2017), and a prompt hierarchy for a differential reinforcement of alternative behavior procedure (Drifke et al., 2017). Although BST is a commonly used intervention within the behavior analytic field and has been demonstrated as an effective intervention for training staff and caregivers, there are no research studies to date examining foster parents' use of BST and, though it is likely to be effective for training purposes, it is important to address external validity issues associated with single case designs (Kazdin, 2011).

**Social Support and Pyramidal Training**

In addition to effectively training foster parents, it is also important for foster parents to have the ability to train others who interact with their foster child regularly. Foster caregiver couples are tasked with the responsibility of caring for children with unique needs and as a result, may experience a variety of stressors that non-foster caregiver couples typically do not encounter (Richardson et al., 2018). The challenges foster caregivers experience can increase parenting stress levels and possibly lead to struggles with the co-parenting relationship (Richardson et al., 2018). Social support is one factor with some evidence to combat these struggles and benefit foster parents (Cooley et al., 2015; Eaton & Caltabiano, 2009; Geiger et al., 2017; Sharda, 2022). Social support is a meta-construct, that consists of support networks, supportive behaviors (or enacted support), and subjective appraisals of support (perceived support; Sharda, 2022). Studies have shown that greater social support is positively associated with placement stability (Crum, 2010) and foster home retention (Denby et al., 1999; Randle et al., 2017; Sharda, 2022).

One way to systematically build social support for caregivers is through pyramidal training. Pyramidal training is a model in which a professional teaches skills to an individual or group who then teach those skills to other individuals (Parsons et al., 2013). Pyramidal training can be used to train caregivers of foster children and help build supportive networks to combat the struggles faced by providing care for children who have experienced trauma and maltreatment more effectively and efficiently. Pyramidal parent training involves a professional training conducted by an expert for a caregiver or group of caregivers who, in turn, train other caregivers, typically using BST (Andzik & Cannella-Malone, 2017; Pančocha & Kingsdorf, 2021).

The pyramidal training literature has demonstrated effectiveness in training a variety of skills to direct care staff, parents, and teachers (Andzik & Cannella-Malone, 2017; Page et al., 1982; Pence et al., 2014). For example, Kuhn et al. (2003) utilized a pyramidal training model to teach multiple family members of children with behavior disorders to implement individualized treatments, such as prompting and feedback. Experimenters taught three primary caregivers, who each then taught two other family members to implement the interventions. Results demonstrated pyramidal training as effective in increasing the caregiver treatments across three families.

However, when considering foster families, it is building social support alongside the implementation of evidence-based procedures that is critical. Providing care for foster youth poses unique challenges for foster parents. To address the diverse needs of families and maximize the social validity of behavior change in both caregivers and their children, it is important to consider the issue of cultural responsiveness (Pančocha & Kingsdorf, 2021). Culturally responsive practices recognize and incorporate the cultural experiences, perspectives, and characteristics of others (Gay, 2002). Culturally relevant interventions take into consideration the cultural differences, historical struggles, and systemic problems faced by the families (Pančocha & Kingsdorf, 2021). Pyramidal training targeting the behaviors of parents and children within their homes should be grounded in cultural responsiveness, utilize evidence-based practices that have been adapted for the context, take a client-centered approach, and be driven by local norms and values (Pančocha & Kingsdorf, 2021). This recognition of culture also aligns with principles of TIC (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). Given the lack of research on competency-based training with foster families, there is a significant need for behavior analytic research in this area, specifically the use of BST within the pyramidal training model to build social support.

**Summary**

Children who have experienced foster or residential care often have a history of maltreatment (Lohaus et al. 2017; Lotty et al., 2020; Papovich, 2020; Sharda, 2022), are at risk for poor developmental outcomes and are more likely than their peers to display behavioral problems, experience significant physical and mental health conditions and poor academic outcomes (Clemens et al., 2018; Engler et al., 2022; Leathers et al., 2019; Purvis et al., 2015; Sharda, 2022). Foster parents often report that child welfare agencies fail to provide

foster families with adequate financial assistance and appropriate support and training (Buehler et al., 2003; Cooley et al., 2017; Mancinelli et al., 2021; Randle et al., 2017). In order to meet the unique needs of foster families, interventions and trainings must address the underlying trauma experienced by children with histories of maltreatment (Octoman & McLean, 2014; Purvis et al., 2015). ABA prioritizes problems of social significance, requiring behavior analysts to generalize current knowledge and explore applications of the science to societal issues (Rajaraman et al., 2022). By implementing evidence-based, culturally responsive practices, behavior analysts have the potential to make meaningful contributions to TIC, which may lead to improvements for foster children who have experienced trauma.

### Purpose

Though there is evidence supporting the use of TBRI, no study has examined the use of TBRI within a pyramidal training model for foster families to develop a supportive system. Therefore, the purpose of this study is to evaluate the effects of TBRI using pyramidal training on the acquisition of TBRI principles in foster parents, procedural integrity of foster parents in teaching TBRI corrective principles to other caregivers, the caregiver and child relationships, and perceived caregiver stress.

### Research Questions and Hypotheses

The primary goal of this study is to evaluate the effects of a behavior analytic approach to the TBRI curriculum using pyramidal training. To address these goals, five research questions were addressed across two experiments.

- What are the effects of BST, implemented by a Board Certified Behavior Analyst (BCBA) clinician, on the fidelity of primary caregivers' implementation of the steps of BST as a method for teaching of TBRI corrective principles?
- What are the effects of BST, implemented by a trained primary caregiver, on the fidelity of TBRI corrective principles implemented by secondary caregivers?

The secondary goal of this study was to evaluate changes in problem behavior of foster

children, caregiver implementation of TBRI procedures and levels of caregiver-related stress. The specific research questions included:

- What are the effects of a behavior analytic approach to TBRI curriculum using a pyramidal training on caregivers' implementation of TBRI principles?
- What are the effects of a behavior analytic approach to TBRI curriculum using a pyramidal training on caregiver perceptions of caregiver-related stress?
- What are the effects of a behavior analytic approach to TBRI curriculum using a pyramidal training on caregivers' perceived relationships with foster children in their care?

## Methods

### Participants

In this study, Tier 1 participants in the pyramidal training model were referred to as primary caregivers and Tier 2 participants were referred to as secondary caregivers. Primary caregiver referred to the person who regularly provided the child with the majority of their care. A secondary caregiver was the person who lived in the home with the foster child and/or regularly provided routine care for the foster child (e.g., another parent, grandparent, or other adult caregiver). Three families were recruited for participation in this study from local non-profit agencies that provided caregiver support, enhanced education, and resource navigation to foster families. To be included in this study, the foster family had to be comprised of at least one primary caregiver, one secondary caregiver, and at least one foster child between the ages of 4 and 12 years old. Primary and secondary caregivers had to be 18 years of age or older, able to read English at a high school level, and have no prior training in TBRI, DRA, or BST procedures. Additionally, secondary caregivers had to live in the home and/or regularly provide routine care for the foster child in the home.

Dyad 1 included a 34-year-old male as the primary caregiver (P1) who had a bachelor's degree and 5 months of experience as foster parents at the time the study was conducted. The secondary caregiver was his partner, a 35-year-old male with a bachelor's degree and 5 months of experience as a foster parent (S1).

Dyad 2 included a 32-year-old female as the primary caregiver (P2) who had a master's degree and 10 years of experience as a foster parent. The secondary caregiver was a 37-year-old female who was a family friend (S2). She possessed a bachelor's degree and had no experience as a foster parent at the time that the study was conducted, but regularly provided care to the foster child in the family home. Finally, Dyad 3 included a 47-year-old female as the primary caregiver (P3) who had a bachelor's degree and 5 years of experience as a foster parent. The secondary caregiver was her partner, a 48-year-old male with a bachelor's degree who had 5 years of experience as a foster parent (S3).

**Informed Consent**

Following recruitment, the primary investigator (PI) scheduled a meeting with primary and secondary caregivers who met inclusion criteria. During this meeting, the PI reviewed the informed consent forms with primary and secondary caregivers. The consent forms consisted of the study title, purpose, procedures, risks to participation, benefits to participation, alternatives to participation, confidentiality procedures involved with this study, and information about compensation for participating in the study. Participants were ensured confidentiality through several procedures. First, all participants were provided coded titles (e.g., Participant P1) to ensure any personal and identifying information was protected and remained undisclosed. Additionally, all files were kept in secure locations. For example, all digital files were kept in a secure electronic cloud drive. Hard copies of the informed consent, data sheets, and surveys were kept in a locked cabinet. All participants were also informed that all related documents will be kept for five years prior to destruction in accordance with the Behavior Analyst Certification Board and the American Psychological Association codes of ethical research. Primary and secondary caregivers were provided with a $50 Amazon gift card for participating in the research study to its entirety. Caregivers were provided a hard copy of the consent forms to sign during first training session. All signed consent forms were collected by the PI prior to study onset.

**Setting and Materials**

All sessions were conducted in the family home in a room selected by participants (e.g., living room, dining room). Materials included a demographic questionnaire and researcher-created TBRI questionnaire. The TBRI questionnaire was a 17-item measure for primary caregivers to report on their home experiences and implementation of TBRI principles. The TBRI questionnaire was scored using a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Possible scores ranged from 17 to 85 with lower scores associated with less knowledge and implementation of TBRI principles and higher scores associated with more knowledge and implementation of TBRI principles. After the questionnaire was developed an expert reviewer familiar with both foster care and behavior analysis reviewed it for accuracy.

Next, the Parental Stress Scale (PSS; Berry & Jones, 1995) was administered, which was an 18-item measure for primary caregiver participants to report their perceived level of parenting-related stress. The PSS was scored using a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Possible scores ranged from 18 to 90 with higher scores indicating higher levels of parental stress and lower scores indicating lower levels of stress. The Child-Parent Relationship Scale – Short Form (CPRS-SF; Pianta, 1992) was also administered, which was a 15-item measure for primary caregivers to report perceptions of their relationship with their foster child. The CPRS-SF was scored on a 5-point Likert scale ranging from 1 (definitely does not apply) to 5 (definitely applies). These scores were then summed into groups of items corresponding to conflict and closeness subscales. The 8-item conflict subscale assessed the degree to which a caregiver felt their relationship with their child was characterized by negativity and conflict. The 7-item closeness scale measured the extent to which a parent felt that the relationship with their child was characterized by warmth, affection, and open communication. Higher scores on the closeness subscale indicated a closer relationship between caregiver and child, whereas higher scores on the conflict subscale indicated a more conflicting relationship.

In addition to these assessments, TBRI training materials were developed based on Hunsley (2021). DRA instructions were created with reference to Catania (2006), Legray et al. (2013), and Mace et al. (2010) whereas BST instructions were developed based on the steps outlined in Sarokoff and Sturmey (2004). Several researcher-created data sheets were used including a DRA task analysis, BST task analysis, and procedural integrity checklist. The DRA task analysis consisted of three steps based on descriptions of DRA (Catania, 2006). The BST task analysis measured the integrity of the BST procedure by assessing adherence to the four steps outlined in Sarokoff and Sturmey (2004): (1) providing written and oral descriptions of the

procedures; (2) demonstrating the procedures; (3) roleplaying the procedures; and (4) providing feedback of the procedures. A video camera for recording purposes and child-specific stimuli (e.g., picture communication cards) were used during sessions. Finally, a researcher-created social validity survey was administered at the conclusion of the study to evaluate the degree to which participants found the training to be acceptable. Primary caregivers were given a 10-item survey and secondary caregivers were given a 6-item survey rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Possible scores for primary caregivers ranged from 10 to 50 and for secondary caregivers ranged from 6 to 30 with lower scores indicating lower levels of training acceptability and higher scores indicating higher levels of training acceptability.

**Experimental Design**

A single case experimental design was employed to evaluate the effects of this training model. Specifically, a concurrent multiple baseline across participants design was used wherein the data for each participant was collected simultaneously (Carr, 2005). To evaluate the effects of training on primary caregivers' implementation of DRA each participant was exposed to baseline, training, and maintenance phases. The same design was employed to assess primary caregivers' accuracy in implementing BST across baseline, training, maintenance, and generalization phases. Similarly, a concurrent multiple baseline across participants design was used to evaluate secondary caregivers' implementation of DRA in baseline, training, and generalization phases. When using this type of experimental design, a functional relationship is demonstrated when behavior change corresponds to the introduction of the independent variable for each data path, demonstrating repeatability and verifying the change in responding is due to the intervention (Carr, 2005; Christ, 2007).

The multiple baseline is an appropriate design when the target response is irreversible or a withdrawal of the independent variable would be unethical (Gast et al., 2018). The concurrent multiple baseline design was appropriate for this experiment as participants were required to respond independently to the intervention package and the skills trained could not be unlearned (Christ, 2007). Training was introduced once steady state responding was achieved in baseline for three consecutive sessions. Steady state responding was defined as a data path that was not more than 5% above or below the mean of the last three data points. For training, steady state responding was defined as scoring 100% accuracy across three consecutive sessions. Post-training was introduced after caregivers reached a criterion of 100% accuracy with each step across three consecutive opportunities.

**Dependent Variables and Response Measurement**

There were several dependent variables of interest in this study for primary caregivers including any changes in responding from pre-training to post-training administrations of the TBRI questionnaire, PSS (Berry & Jones, 1995), and CPRS-SF (Pianta, 1992). Additionally, primary and secondary caregivers' DRA procedural integrity was measured using the DRA task analysis, reporting this as a percentage of steps completed correctly. Finally, primary caregivers' correct implementation of BST to train DRA procedures was measured using the BST task analysis, reporting this as a percentage of steps completed correctly.

**Interobserver Agreement and Procedural Integrity**

A doctoral student in ABA was trained and collected data via video recordings of sessions for interobserver agreement (IOA) and procedural integrity. IOA and procedural integrity data were collected for 30% of sessions across phases and participants. IOA was calculated using the item-by-item method where the number of agreements between the two observers was divided by the number of agreements plus disagreements and multiplied by 100 to report percentage of agreement (Cooper et al., 2020). IOA was 100%. Procedural integrity was calculated by summing the number of steps the researcher completed correctly divided by the total number of steps and multiplied by 100 to report a percentage (Cooper et al., 2020). Procedural integrity was 100%.

**Social Validity**

Following completion of the study, participants were given a social validity survey to assess their level of agreement with statements related to study procedures. The survey consisted of 10 items for primary caregivers and 6 items for secondary caregivers scored on a 5-point Likert-type scale. The mean score for primary caregivers was 4.70 (range = 4-5) and for secondary caregivers was 4.56 (range = 4-5) indicating high levels of training acceptability.

## Procedures

**Primary caregivers.** Prior to baseline, primary caregivers completed the demographic questionnaire, TBRI questionnaire, PSS (Berry & Jones, 1995), and CPRS-SF (Pianta, 1992). Baseline for DRA sessions began with the researcher providing the primary caregiver with the DRA instructions to read. Without receiving any additional training, the primary caregivers were asked to implement the DRA procedures with the researcher acting as the confederate. Baseline for BST was conducted concurrently to avoid any potential learning as a result of BST being used to teach DRA. Baseline for BST sessions began with the researcher providing the primary caregiver with the BST instructions to read. Without receiving any additional training, the primary caregivers were asked to implement the BST procedures with the researcher to train the researcher to implement DRA.

Training was introduced once baseline responding for DRA and BST were stable. The researcher reviewed the TBRI® Playbook (Hunsley, 2021) one time with primary caregivers, describing the three principles of TBRI and provided examples, as appropriate. Primary caregivers were given the opportunity to ask the researcher questions. BST was then used to train primary caregivers on DRA procedures. After the DRA mastery criterion was achieved, a maintenance condition identical to baseline was implemented two weeks later.

Following DRA mastery, primary caregivers were trained to correctly implement BST procedures to teach secondary caregivers to implement DRA. Once primary caregivers meet the mastery criteria, training ended and a maintenance phase identical to baseline was implemented. Generalization of BST was assessed when primary caregivers implemented BST when training secondary caregivers. The BST generalization phase was identical to baseline. At the conclusion of experimental sessions, primary caregivers completed the TBRI questionnaire, PSS (Berry & Jones, 1995), and CPRS-SF (Pianta, 1992) again as well as the social validity survey.

**Secondary caregivers.** Prior to baseline, secondary caregivers completed the demographic questionnaire. Baseline for DRA sessions began with the primary caregiver providing the secondary caregiver with the DRA instructions to read. Without receiving any additional training, the secondary caregivers were asked to implement the DRA procedures with the primary caregiver acting as the confederate. Training was introduced once baseline responding was stable, which consisted of the primary caregiver using BST with secondary caregivers to train the use of DRA. After secondary caregivers met the mastery criterion, the DRA generalization phase was implemented with the researcher acting as the confederate. This condition was identical to baseline. At the conclusion of experimental sessions, secondary caregivers completed the social validity survey.

# Results

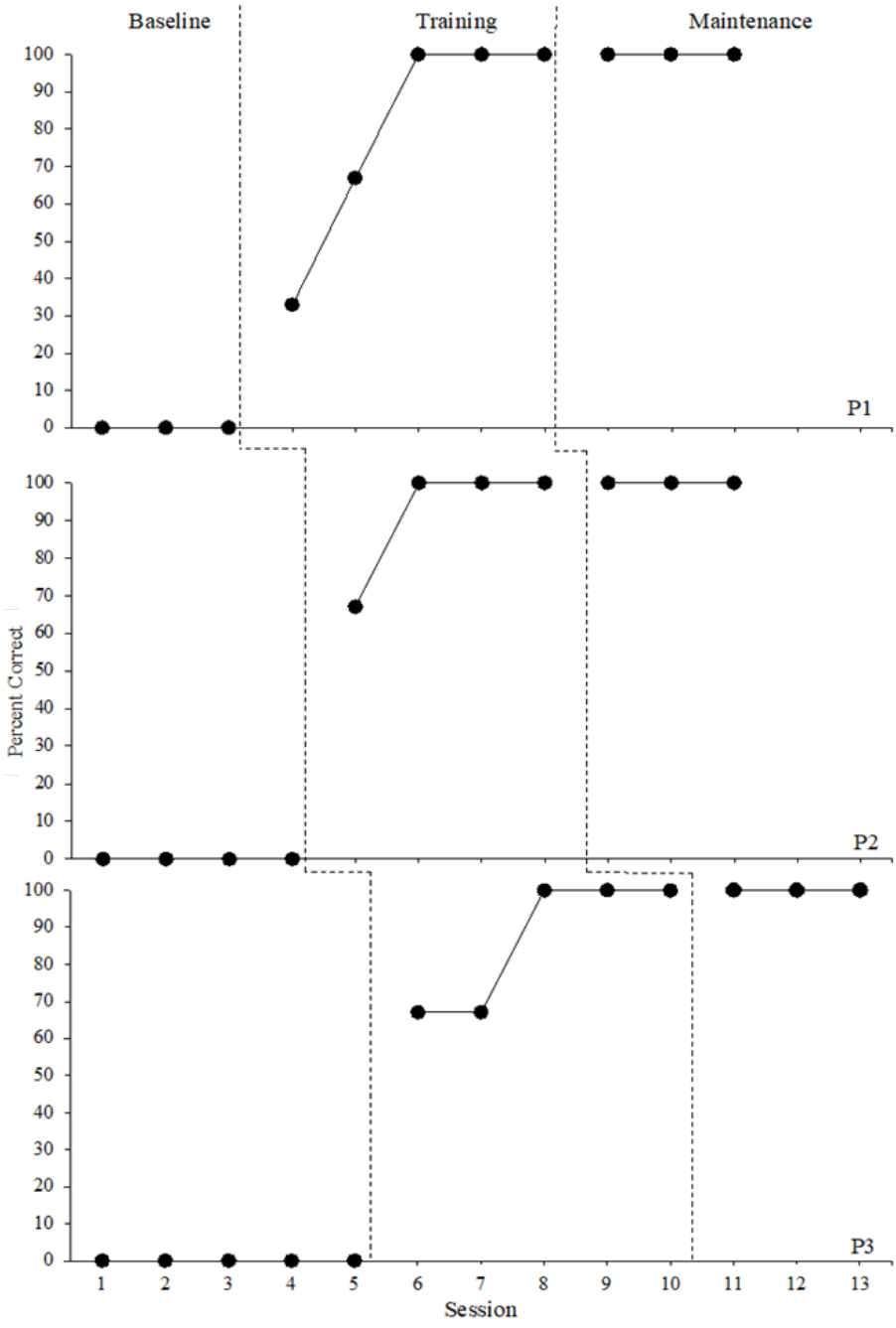
## Primary Caregiver Implementation of DRA

Figure 1 displays the results for the primary caregivers, specifically the percentage of correct responding across baseline, training, and maintenance phases. The first panel in Figure 1 displays the data for P1. During the baseline condition, P1 was unable able to implement any of the steps of DRA correctly, scoring 0% across all baseline sessions. During training sessions, P1 increased responding to an average 80% (range = 33%-100%) across 5 trials, successfully demonstrating correct implementation of all three steps of a DRA procedure. P1 also scored 100% across each maintenance probe.

The second panel in Figure 1 displays the data for P2. During the baseline condition, P2 was unable able to implement any of the steps of DRA correctly, scoring 0% across all baseline sessions. During training sessions, P2 increased responding to an average 91.75% (range = 67%-100%) across 4 trials, successfully demonstrating correct implementation of all three steps of a DRA procedure. P2 also scored 100% across each maintenance probe.

The third panel in Figure 1 displays the data for P3. During the baseline condition, P3 was unable able to implement any of the steps of DRA and scored 0% across all baseline sessions. During training sessions, P3 increased responding to an average 86.8% (r range = 67%-100%) across 5 trials, successfully demonstrating correct implementation of all three steps of a DRA procedure. P3 also scored 100% across each maintenance probe.

Figure 1. *Primary Caregiver Implementation of DRA*



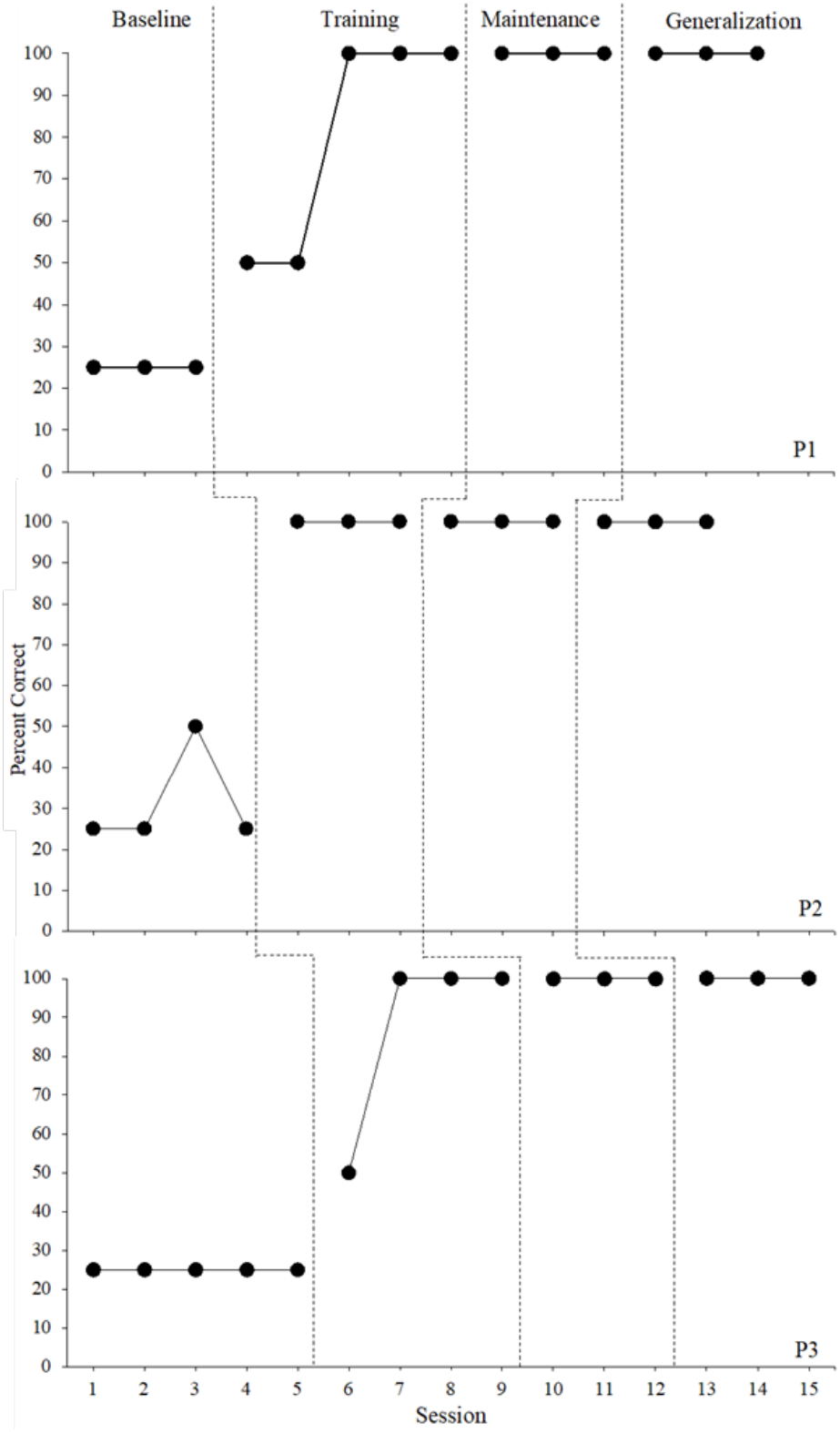

**Primary Caregiver Implementation of BST**

Figure 2 displays the results for primary caregivers, specifically the percentage of correct responding across baseline, training, maintenance, and generalization phases. The first panel in Figure 2 displays the data for P1. During baseline sessions, P1 demonstrated an average of 25% accuracy. During training sessions, P1 increased responding to an average of 80% (range = 50%-100%), successfully demonstrating correct implementation of all four steps of BST in 5 trials. During the BST maintenance phase, P1 demonstrated 100% accuracy across all maintenance sessions. P1 also scored 100% across each generalization session.

The second panel in Figure 2 displays the data for P2. During baseline sessions, P2 demonstrated an average of 31.25% accuracy (range = 25%-50%). During training sessions, P2 increased responding to an average of 100%, successfully demonstrating correct implementation of all four steps of BST in 3 trials. During the BST maintenance phase, P2 demonstrated 100% accuracy across all maintenance sessions. P2 also scored 100% across each generalization session.

The third panel in Figure 2 displays the data for P3. During baseline sessions, P3 demonstrated an average of 25% accuracy. During training sessions, P3 increased responding to an average of 87.5% (range = 50%-100%), successfully demonstrating correct implementation of all four steps of BST in 4 trials. During the BST maintenance phase, P3 demonstrated 100% accuracy across all maintenance sessions. P3 also scored 100% across each generalization session.

Figure 2. *Primary Caregiver Implementation of BST*



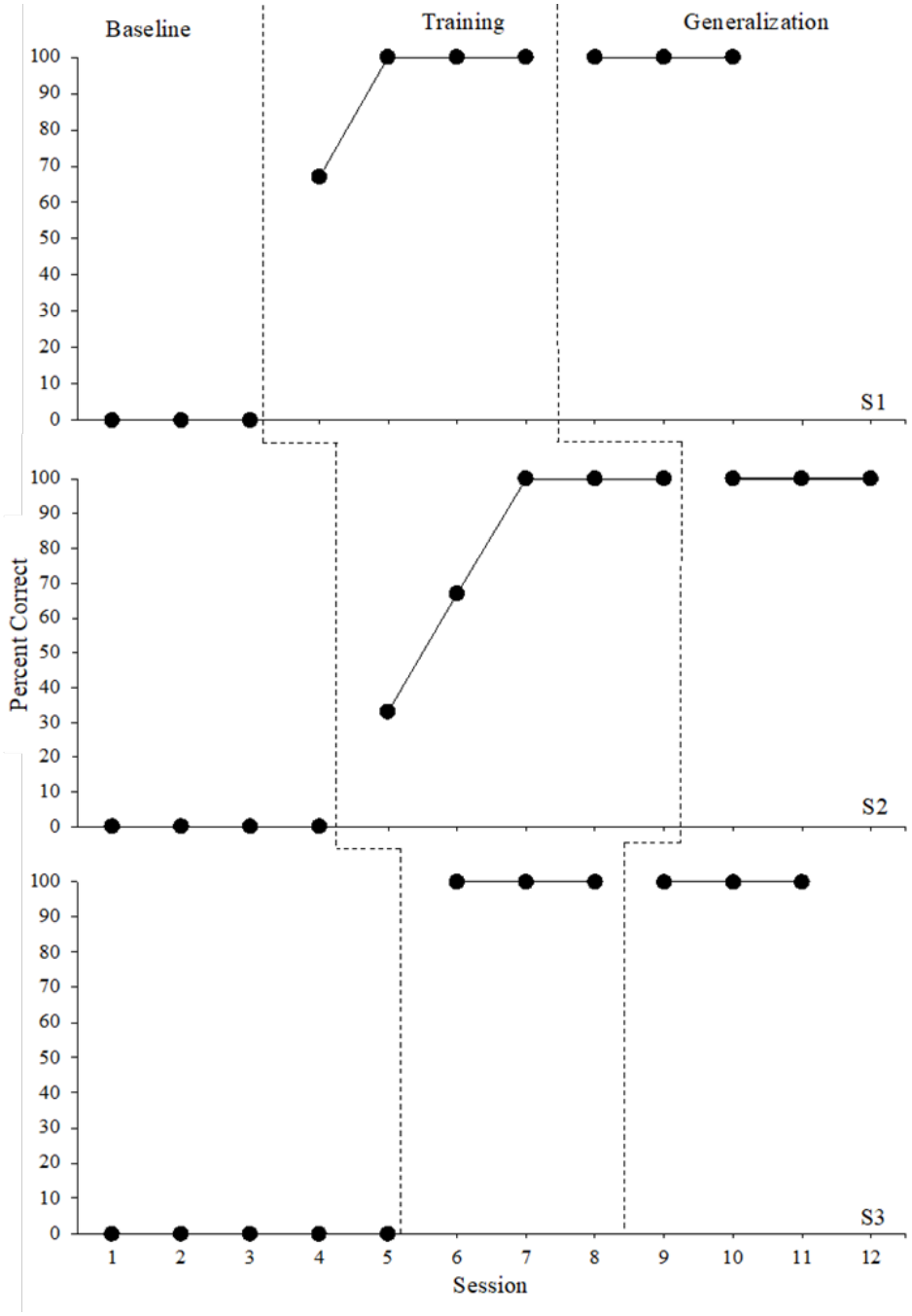

**Secondary Caregiver Implementation of DRA**

Figure 3 displays the results for the secondary caregivers, specifically the percentage of correct responding across baseline, training, and generalization phases. The first panel in Figure 3 displays the data for S1. During the baseline condition, S1 was unable able to implement any of the steps of DRA correctly, scoring 0% across all baseline sessions. During training sessions, S1 increased responding to an average of 91.75% (range = 67%-100%), successfully demonstrating correct implementation of all three steps of a DRA procedure in 4 trials. S1 also scored 100% accuracy across each generalization probe.

The second panel in Figure 3 displays the data for S2. During the baseline condition, S2 was unable to implement any of the steps of DRA correctly, scoring 0% across all baseline sessions. During training sessions, S2 increased responding to an average of 80% (range = 33%-100%), successfully demonstrating correct implementation of all three steps of a DRA procedure in 5 trials. S2 also scored 100% across each generalization probe.

The third panel in Figure 3 displays the data for S3. During the baseline condition, S3 was unable able to implement any of the steps of DRA correctly, scoring 0% across all baseline sessions. During training sessions, S3 increased responding to an average of 100%, successfully demonstrating correct implementation of all three steps of a DRA procedure in 3 trials. S3 also scored 100% across each generalization probe.

Figure 3. *Primary Caregiver Implementation of BST*




## Effect Sizes

A Tau-U effect size (Parker et al., 2011) was calculated to estimate the intervention effect for primary and secondary caregiver outcomes. Identification of a baseline trend was assessed before conducting phase contrasts and determining the weighted average (Vannest & Ninci, 2015). Tau-U effect size scores were interpreted as <0.20 = small, 0.20 to 0.60 = moderate, 0.60 to 0.80 = large, and >0.80 = very large (Vannest & Ninci, 2015) using a 95% confidence interval (CI). For primary caregivers' implementation of DRA, a very large effect was identified (Tau-U = 1, p = 0.0000, CI = 0.5225<>1). For primary caregivers' implementation of BST, a very large effect was also identified (Tau-U = 1, p = 0.0001, CI = 0.4986<>1). Finally, for secondary caregivers' implementation of DRA, a very large effect was identified (Tau-U = 1, p = 0.0001, CI = 0.4986<>1).

## Pre/Post Assessments

At the first administration, P1 obtained a score of 73 on the TBRI questionnaire, which increased to 78 at the conclusion of the study. P2 obtained a score of 69 during the first administration, increasing to 81 at the conclusion of the study. P3 obtained a 62 at the first administration, increasing to 75 at the conclusion of the study. The average score for the TBRI questionnaire pre-assessment was 68 (*SD* = 5.568) whereas the average score at post-assessment was 78 (*SD* = 3.00). At the first administration of the PSS (Berry & Jones, 1995), P1 obtained a score of 58, which decreased to 45 at the conclusion of the study. P2 obtained a score of 56 during the first administration, decreasing to 52 at the conclusion of the study. P3 obtained a 66 at the first administration, decreasing to 58 at the conclusion of the study. The average score for the PSS pre-assessment was 60 (*SD* = 5.292), whereas the average score at post-assessment was 51.67 (*SD* = 6.506).

At the first administration, P1 obtained a score of 21 on the CPRS-SF (Pianta, 1992) conflict assessment, which decreased to 15 at the conclusion of the study. P2 obtained a score of 11 during the first administration, decreasing to 9 at the conclusion of the study. P3 obtained a score of 12 at the first administration, decreasing to 10 at the conclusion of the study. The average score for the pre-assessment was 14.67 (*SD* = 5.508)

whereas the average score at post-assessment was 11.33 (*SD* = 3.215). At the first administration, P1 obtained a score of 34 on the CPRS-SF (Pianta, 1992) closeness assessment, which increased slightly to 35 at the conclusion of the study. P2 obtained a score of 32 at the first administration, which increased to 34 at the conclusion of the study. P3 obtained a score of 32 at the first administration, which increased slightly to 33 at the conclusion of the study. The average score for the pre-assessment was 32.67 (*SD* = 1.55) whereas the average score at post-assessment was 34 (*SD* = 1.00).

## Discussion

This study evaluated the effects of pyramidal training with BST to teach foster caregivers about TBRI and how to implement the DRA component (i.e., correcting principle). Results indicated this competency-based approach to training was highly effective, producing significant, very large effect sizes. Not only was DRA taught to mastery, but the skill also generalized to teaching untrained partners (i.e., secondary caregivers), and all participants maintained this skill over time. These findings are consistent with previous studies evaluating pyramidal training outcomes with caregivers (Conklin & Wallace, 2019; Kuhn et al., 2003; Pančocha & Kingsdorf, 2021). However, this study is novel in that there is no research examining the use of TBRI within a pyramidal training model to support foster families. This speaks to the significant need for interdisciplinary collaboration, including behavior analytic interventions, to meet the needs of foster children and their foster parents.

Across the US, there is considerable variability in the quality and availability of on-going trainings offered to foster parents (Hebert & Kulkin, 2018; Vanderwill et al., 2021). Foster parents require adequate support services to maintain their ability to provide care (Barnett et al., 2017; Leathers, 2006) alongside social support, which has been demonstrated as a protective factor (Cooley et al., 2015; Eaton & Caltabiano, 2009; Geiger et al., 2017; Sharda, 2022). Pyramidal training with BST may be one way to systematically build social support for foster caregivers, particularly given this model has been demonstrated as culturally responsive, can be adapted for the context, and takes a client-centered approach (Pančocha & Kingsdorf, 2021). When paired with evidence-based curricula like TBRI, that has been tailored to address the challenges faced by children in foster care, it is possible to further enhance outcomes. This reinforces the notion that all professional fields engaging with the foster care system afford tremendous value and should work cooperatively to design curricula, interventions, and trainings that support vulnerable children and their caregivers.

Further, the study also demonstrated slight improvements in primary caregivers' self-reported knowledge and implementation of TBRI principles, perceived levels of stress, and perceived conflict and closeness in the relationship with their foster children. The short duration of the study overall may have played a role with the limited change in perceived stress and relationship conflict and closeness with additional time needed for change to be reflected on assessment measures. However, even slight changes in perceived stress and conflict have the potential to avoid placement breakdown and the number of placements foster children experience (Hebert & Kulkin, 2018). When considered in light of social validity outcomes, it is clear caregivers found the intervention highly acceptable, noting strong agreement with the importance of training and increased levels of support as a result of having another caregiver implementing the same strategies. Taken together, there is evidence to support the use of pyramidal training with BST to teach foster caregivers to implement DRA and a variety of other behavior management strategies that are sensitive to the needs of children exposed to adverse experiences.

## Limitations and Future Directions

Several limitations were identified during the study. The first is the lack of child outcome data. This was due to the research team's inability to obtain informed consent to allow foster children to participate in the study based on state regulations. Evaluating the behavior of foster children should be done to confirm that caregivers are able to effectively implement interventions that result in sustainable behavior change. Future research could extend this study by measuring both challenging and prosocial behaviors of foster children in addition to foster caregiver outcomes. Similarly, the effects of caregiver-implemented DRA procedures on children's behavior after pyramidal training were not assessed. Future studies should determine if caregivers' implementation of TBRI principles and DRA procedures following pyramidal training could lead to decreases in challenging behavior and increase in prosocial behavior with foster children in their care given enhanced social support.

Another limitation was the short duration between the end of training and onset of maintenance sessions for primary caregivers' implementation of DRA procedures. The average time between training sessions and maintenance sessions was 18.66 days (range = 14-22). Future research could extend this study by conducting a long-term follow up phase to evaluate the durability of the intervention for both primary and secondary caregiver participants. A further limitation is using a competency-based approach to training for just one aspect of TBRI. Future research could extend the study to teach caregivers other behavior analytic interventions (e.g., social stories, rapport building, visual schedules) consistent with each of the three principles of TBRI.

An additional limitation was associated with the demographic information obtained. The demographic questionnaire asked how long the participants were foster parents but failed to specifically ask how long foster parents had been caring for their current foster child or children. Future research should evaluate if the duration of time a child has been in the care of the foster parent would have an impact on their implementation of TBRI principles, perceived stress levels, and their perceived relationship with their foster child. Finally, all three primary caregivers reported low levels of stress on the PSS (Berry & Jones, 1995). As a result, it was unlikely that lower levels of stress could be reported from primary caregivers when assessed again after training. Although it is positive to note that foster parents did report a slight decrease in perceived level of parenting-related stress and none of the primary caregivers reported an increase in stress levels, future research should examine these procedures among caregivers experiencing higher levels of perceived stress to determine effects.

Future research should also consider evaluating each of the components of BST using a component analysis. While there has been previous research component analysis evaluating the necessary steps of BST (Ward-Horner & Sturmey, 2010; Ward-Horner & Sturmey, 2012), there have been mixed findings. Modeling and performance feedback have been found to be the most significant components of skill acquisition in several (e.g., LaBrot et al., 2018; Ward-Horner & Sturmey, 2010; Ward-Horner & Sturmey, 2012). However, Parsons et al. (2012) found that providing written instructions is a necessary component of BST. In the present study, written instructions were provided to both primary and secondary caregiver participants independently during all baseline sessions and was found to be ineffective for primary caregivers to implement a DRA and BST procedures and for secondary to implement a DRA procedure. These findings suggest that further research on the active components in BST is needed in order to streamline the training process among foster caregivers.

## Conclusion

Based on preliminary evidence, pyramidal training with BST can be used to effectively train foster caregivers to implement behavior analytic procedures, like DRA, and disseminate this training with high procedural integrity to enhance social support. Though the study did not evaluate the outcomes of training on foster children, this initial investigation took an interdisciplinary approach to improve the wellbeing of foster caregivers and the children in their homes. Considerably more collaboration is needed to identify the most effective and efficient ways of supporting foster families as they navigate the effects of trauma.

## Glossary

*Applied Behavior Analysis (ABA)*, defined as the science in which tactics derived from the principles of behavior are applied to improve socially significant behavior and experimentation is used to identify the variables responsible for the improvement in behavior (Cooper et al., 2020).

*Behavior Skills Training (BST)*, defined as a training method consisting of a teacher training a learner by completing four steps, which include: describing the skill, providing a visual model of the skill, role playing of the skill, and providing feedback of the skill (Sarokoff & Sturmey, 2004).

*Differential Reinforcement of Alternative Behaviors (DRA),* defined as a behavioral intervention where an individual provides reinforcement for an alternative desirable, or replacement behavior that differs from a targeted problem behavior in an effort to increase the behavior in frequency, duration, or magnitude of the alternative behavior (Catania, 2006).

*Pyramidal Training*, defined as a method of training in which a professional teaches a skill, or set of skills, to one or a group of individuals, who then go on to teach those skills to another set of individuals (Parsons et al., 2013).

*Trauma Informed Care (TIC)*, defined as a system in which all adults responsible for promoting children's permanency, safety, and well-being develop and maintain an awareness of the impact of traumatic experiences on children, caregivers, and service providers, leading to the application of appropriate responses, training, practices, and policies to minimize risk of re-traumatization (Bloch & Beyerlein, 2014; Sullivan et al., 2016).

*Trust-Based Relational Intervention (TBRI)*, defined as an evidence-based, trauma-informed model of care for vulnerable children developed at the Texas Christian University Institute of Child Development (Crawley et al., 2021; Howard et al., 2014; Purvis et al., 2015; Purvis et al., 2013).

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