AN INVESTIGATION OF CHANGE MECHANISMS USING PSYCHOPHYSIOLOGICAL DATA: CHILD-CENTERED PLAY THERAPY WITH CHILDREN EXPOSED TO ADVERSE CHILDHOOD EXPERIENCES

by

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ABSTRACT

Children who endure complex trauma and multiple adverse childhood experiences (ACEs) suffer with various physical, social, and mental health-related consequences, such as increased rates of depression, posttraumatic stress disorder (PTSD), attention deficit/hyperactivity disorder (ADHD), cardiometabolic disorders, substance abuse disorders, ischemic heart disease, and suicidality. Child-Centered Play Therapy (CCPT) is a promising evidence-based child mental health intervention, and researchers have demonstrated the efficacy of CCPT for improving empathy, social competence, behavior problems, and self-regulation among children with multiple ACE exposures. In the current study, the researcher examined the co-regulatory process and relational mechanisms of CCPT with children with histories of complex trauma and early adversities, using child-counselor physiological synchrony values within and across play therapy sessions. Participants were children ($N = 4$; boys, $n = 2$; girls, $n = 2$) ages 5-8 who endured four or more ACEs. The researcher utilized a time series design to examine change processes in CCPT, using intensive longitudinal data (e.g., thousands of physiological data points per session). Children received between 10-14 twice weekly 30-minute CCPT sessions in the school setting. The child participants and counselor wore Empatica© E4 wristbands during play therapy sessions to continuously measure heart rate, as well as sympathetic and parasympathetic heart rate variability (HRV) biomarkers. The researcher computed Surrogate Synchrony (SUSY) analyses and found consistent, large child-counselor heart rate synchrony levels across play therapy sessions. The researcher presents the implications of this research for mental health counselors, play therapists, and counselor educators working with children impacted by complex trauma.
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CHAPTER ONE: INTRODUCTION

Over two-thirds of children experience at least one traumatic event before turning 16 years-old; and roughly one in seven (approximately 10.5 million) children endure serious maltreatment, abuse, or neglect each year (Centers for Disease Control and Prevention, 2022). Children who endure complex trauma experience prolonged and repeated chronic traumatic events during childhood (Cook et al., 2005; Kliethermes et al., 2014; van der Kolk, 2005; van der Kolk et al., 2009). Children with complex trauma experience serious adversities or maltreatment within the contexts of interpersonal relationships, often endured within relationships with caregivers (Kliethermes et al., 2014; van der Kolk, 2005). When a person endures such abuse, neglect, or betrayal, they carry relational wounds and suffer biological, developmental, and psychological disturbances that extend beyond post-traumatic stress disorder (PTSD) symptoms (Ford et al., 2018; Ford et al., 2022; van der Kolk, 2020). Children with complex trauma frequently struggle with establishing safe and trusting relationships across the lifespan (Beaton & Thielking, 2019; Kliethermes et al., 2014), and may avoid intimacy because there is an “expectancy of betrayal” (Ford et al., 2022, p. 629). Additionally, when children suffer complex trauma, they also experience major developmental consequences because the child’s brain is sensitive to these chronic and prolonged stressors (Kliethermes et al., 2014).

Children with complex trauma may experience various developmental issues across multiple domains such as: (a) attentional and behavioral dysregulation, (b) emotional dysregulation, and (c) self and relational dysregulation (Ford et al., 2022; Ford et al., 2018; van der Kolk et al., 2009). Attentional and behavioral developmental problems include risk-taking behaviors, maladaptive self-soothing strategies, or self-harming behaviors (Ford et al., 2018).
Additionally, children may often fixate on potential environmental dangers and struggle to maintain goal-directed behaviors (Ford et al., 2018; van der Kolk et al., 2009). Emotional dysregulation problems may manifest as extreme emotional shifts and diminished self-soothing capacities following intense emotional states. In terms of relational dysregulation, children may respond intensely to others experiencing distress, or struggle to tolerate other people’s intense emotional states. Children may experience self-loathing and view themselves as permanently damaged or broken (Ford et al., 2022).

Researchers frequently utilize the Adverse Childhood Experiences scale (Felitti et al., 1998) to examine individuals’ compounded experiences of interpersonal and complex trauma. People with multiple ACEs experience compromised amygdala and hippocampus development, and these neurodevelopmental problems compromise individuals’ capacities for processing environmental contexts and differentiating threatening and safe situations (Koyama et al., 2022; Luby et al., 2019; Oshri et al., 2019). Following stress-inducing events, individuals with relational trauma and multiple ACEs struggle to downregulate (i.e., return to calm state following sympathetic nervous system activation via the parasympathetic nervous system), recover from stressors, and return to feeling safe (Ford et al., 2018; Porges, 2011). Rawn and Keller (2021) found that individuals with childhood household adversities struggled to downregulate after stressful events as evidenced by their prolonged heightened skin conductance responses (e.g., galvanic skin response; indicator of sympathetic nervous system response) during stress recovery periods. In addressing downregulatory difficulties, Porges (2021) suggested that individuals need experiences that strengthen the vagal brake, or the autonomic nervous system’s (ANS) capacities, for social engagement and smooth downregulation.
While most researchers focus on the impacts of these childhood adversities later in life, researchers have also examined the immediate impacts of early ACEs during childhood (Kerker et al., 2015). Kerker and colleagues (2015) examined the mental health and medical profiles of children \((N = 912; \text{boys}, 55.4\%; \text{girls}, 44.6\%; \text{aged} \ 18-71 \text{ months})\) and found that as children’s ACE scores increased by one, there was a 21% increased risk for having a chronic medical diagnosis, and were more likely to exhibit clinically significant behavioral problems (Kerker et al., 2015). Kerker’s et al. findings regarding the relationship between ACEs and behavioral problems is not surprising, as self-dysregulation (i.e., impulsive and reactive aggression) is common among child complex trauma survivors (van der Kolk et al., 2009). Pretty et al. (2013) also examined health-related outcomes among children with ACES and found that children with four or more ACEs demonstrated increased sympathetic nervous system activity and decreased stress recovery rates (i.e., slow parasympathetic activation following stressor). Because children with higher ACE scores present with higher sympathetic nervous system activation rates and decreased soothing following stressors, counselors should examine interventions that promote children’s regulatory capacities.

Recently, researchers have suggested that Child-Centered Play Therapy (CCPT) is an effective treatment for children with multiple ACEs and complex trauma-related regulatory difficulties (e.g., Conroy & Perryman, 2022; Haas & Ray, 2020; Parker et al., 2021; Ray et al., 2022; Schoonover & Perryman, 2023). CCPT is a manualized, developmentally appropriate child counseling intervention for children between ages 3 to 10 (Ray, 2011). CCPT practitioners utilize the attitudinal conditions (e.g., unconditional positive regard, congruence, and empathetic understanding) to establish warm, permissive, and growth-promoting relationships with children (Landreth, 2012; Ray, 2011). From a child-centered perspective, the therapeutic relationship is
the primary agent of therapeutic change (Axline, 1969; Landreth, 2012). Conroy and Perryman (2022) suggested that CCPT is a powerful intervention for strengthening children’s autonomic nervous system regulatory abilities because play therapists provide continual coregulatory support, and help the child develop understandings of their emotions so they may eventually engage in self-regulation. Conroy and Perryman (2022) noted that specific CCPT facilitative responses, such as encouragers and reflections of feeling, facilitate coregulation and later self-regulation. Conroy and Perryman concluded that future researchers should examine these potential neurobiological benefits using psychophysiological markers, such as heart rate variability and skin conductance responses. In a recent randomized controlled trial, Ray et al. (2022) found that CCPT was an effective intervention for improving empathy, social competence, and self-regulation among children with multiple ACEs. While the researchers highlighted the benefits of CCPT for children’s emotional and regulatory functioning, no researchers have examined the relational mechanisms of change in CCPT. Thus, the purpose of the current research study is to examine the process and relational mechanisms of therapeutic change in CCPT with children with histories of complex trauma and early adversities, using child-counselor physiological synchrony values within and across play therapy sessions.

**Purpose and Research Questions**

The purpose of this study was to examine the process and relational change mechanisms in CCPT with children exposed to complex trauma and early adversities. Additionally, the researcher aimed to examine changes in regulatory capacities among children exposed to multiple ACEs during the play therapy treatment. In this study, the researcher examined therapist-child attunement (measured through therapist-child physiological synchrony) because
CCPT counselors view the therapeutic relationship as the driving force of therapeutic change. The following research questions guided the investigation:

**Research Question 1**

What is the co-regulatory impact of CCPT treatment among individual child clients, as measured by child-counselor’s heart rate synchrony during individual play therapy sessions?

**Research Question 2**

Will the counselor and child clients experience statistically and practically significant levels of heart rate synchrony across sessions during CCPT treatment?

**Theoretical Framework**

In this study, the researcher’s theoretical framework was grounded in Child-Centered Play Therapy (CCPT; Axline, 1969; Landreth, 2012; Ray, 2011) and Polyvagal Theory (Dana, 2018; Porges, 2007; 2011; 2018). In the following sections, the researcher briefly describes these theoretical perspectives.

**Child-Centered Play Therapy**

CCPT is the foundational theoretical underpinning of this research study. Axline (1969) developed the CCPT while working alongside Rogers (1946; 1951; 1957) and applied the Person-Centered (PC) approach in child counseling contexts. Later, counseling and play therapy scholars (i.e., Guerney, 2001; Landreth, 2012; Ray, 2011) further expanded Axline’s (1969) principles, and developed the CCPT theory and formalized treatment model. From PC and CCPT perspectives, Rogers (1957, p. 1-2) asserted that the following six core conditions are necessary and sufficient for client’s growth and change:

1. Two persons are in psychological contact.
2. The first, whom we shall term the client, is in a state of incongruence, being vulnerable or anxious.

3. The second, who we shall term the therapist, is congruent and integrated in the relationship.

4. The therapist experiences unconditional positive regard for the client.

5. The therapist experiences an empathic understanding of the client's internal frame of reference and endeavors to communicate this experience to the client.

6. The communication to the client of the therapist's empathic understanding and unconditional positive regard is to a minimal degree achieved.

From a CCPT theoretical perspective, child counselors establish growth-promoting therapeutic relationships with children by experiencing and accurately communicating the attitudinal conditions (i.e., conditions 3-5; Rogers, 1957): (a) congruence, (b) unconditional positive regard, and (c) empathic understanding. Congruent counselors are genuine within therapeutic relationships, continually “living out” their authentic selves with children (Landreth, 2012, p. 66). A counselor’s experience of unconditional positive regard encompasses full, unearned, and unwavering acceptance of children’s experiences, behaviors, thoughts, and emotions (Jayne & Ray, 2015; Landreth, 2012). Counselors who experience empathic understanding strive to see the world through the child’s eyes and understand the child’s experience from the child’s internal frame of reference (Bratton et al., 2015; Landreth et al., Ray et al., 2011). Landreth (2012) described four healing messages that children should experience within CCPT relationships: (1) I am here, (2) I hear you, (3) I understand, and (4) I care. When counselors communicate the four healing messages, they are: (a) being fully present (e.g., physically, emotionally) in the therapeutic relationship; (b) attending to the child’s expressions
(both verbal and nonverbal); (c) communicating empathic understanding and positive regard; and (d) caring for the child and communicating that genuine care (Landreth, 2012).

**Polyvagal Theory**

Porges (2007; 2011; 2018) developed Polyvagal Theory, a theoretical framework for understanding people’s neurobiological growth, autonomic nervous system development, and central nervous system responses. On an unconscious level, people’s autonomic nervous systems surveille the environment for danger and safety cues, and this process is called *neuroception* (Porges, 2011). The autonomic nervous system responds to environmental cues through three major pathways in a hierarchical manner: (a) the dorsal vagus, (b) sympathetic nervous system, and (c) ventral vagus. The most primitive pathway is the dorsal vagal circuit, which triggers immobilization responses (i.e., freezing, playing dead). When the autonomic nervous system senses inescapable danger, neuroceptions of *life-threat* trigger immobilization responses. In play therapy, children experiencing dorsal vagally mediated immobilization responses may have difficulty speaking and/or daydream frequently (Dana, 2018).

The second pathway is the sympathetic nervous system which triggers mobilization responses (i.e., fight or flight). When the autonomic nervous system senses environmental threats, neuroceptions of *danger* signal the sympathetic nervous system for survival-motivated actions; however, children with complex trauma often have overactive sympathetic nervous system activity and over-sense danger, which in turn leads to children avoiding connections with others (Dana, 2018; Porges, 2011). In play therapy, children experiencing sympathetic nervous system overactivity may pace around the room, maintain physical distance from the therapist, fidget, and/or appear disorganized (Dana, 2018).
The third and most sophisticated autonomic nervous system pathway is the ventral vagal pathway, which allows for social engagement (Porges, 2011). Neuroceptions of safety signal the autonomic nervous system to inhibit the sympathetic nervous system and promote calm physiological states. The ventral vagal pathway is accessible when the person experiences relational safety with another person, allowing for social connection and co-regulation. Neuroceptions of safety are accessible through two conditions: (a) the elimination of danger signals and (b) the presence of safety cues (Dana, 2018). In the following subsections, the researcher describes how CCPT aligns with these polyvagal conditions for social engagement, as it relates to play therapy with children who experienced complex trauma.

**Elimination of Danger Signals.** Because they have endured relational wounds and/or unpredictable caregiver-child bonds, children with complex trauma histories often struggle with establishing safe relationships with caring adults (Beaton & Thielking, 2019; Dana, 2018; Ford et al., 2022; Kliethermes et al., 2014; van der Kolk et al., 2009). Children with complex trauma often over-perceive danger in the environment because their autonomic nervous systems are focused on maintaining safety and identifying potential threats (van der Kolk et al., 2009). Dana (2018) noted that counselors working with clients exposed to trauma should strive to provide predictability. In CCPT, counselors establish safe therapeutic relationships by being consistent with the child. Examples of therapeutic consistency include: (1) sitting in the same place at the beginning of each session; (2) starting the session in the same way (i.e., *welcome back to special playtime, you can play with all the toys in lots of ways you would like*); (3) setting consistent limits during and across sessions; and (4) experiencing and communicating congruence (i.e., the child can perceive that the therapist is “showing up” the same way, consistently and authentically; Landreth, 2012).
**Introduction of Safety Signals.** Children with multiple ACEs may struggle with experiencing relational safety following a danger stress response because they have fewer experiences of soothing via the social engagement system (Conroy & Perryman, 2022). From a Polyvagal perspective, Geller (2018) suggested that counselors can promote neuroceptions of safety through utilizing their therapeutic presence (i.e., *way of being*). Geller (2018) suggested two major characteristics of therapeutic presence, aligned with Polyvagal principles: grounding and immersion. Therapists are grounded when they are experiencing and communicating their true selves in therapy, consistent with CCPT counselors’ congruence (genuineness). Therapists engage in immersion when they fully enter the client’s world, which CCPT counselors practice through experiencing and communicating empathic understanding (Bratton et al., 2015; Landreth, 2012; Ray, 2011). From a CCPT theoretical perspective, for children to experience therapeutic growth and progress, children must experience the counselor’s acceptance, genuineness, and empathic understanding (Landreth, 2012; Ray, 2011). When children experience safety cues via the attitudinal conditions, the child can engage in co-regulation (bidirectional autonomic nervous system soothing) with the therapist (Geller, 2018).

**Operational Definitions**

The researcher utilized key terminology consistent with complex trauma, early childhood adversity, play therapy, and polyvagal theory literature. In this section, the researcher provides operational definitions of key terms that she utilized throughout the study.

**Play Therapy**

The Association for Play Therapy (APT) defined play therapy as: “the systematic use of a theoretical model to establish an interpersonal process wherein trained play therapists use the
therapeutic powers of play to help clients prevent or resolve psychosocial difficulties and achieve
optimal growth and development” (APT, 2020, para 1.).

**Child-Centered Play Therapy (CCPT)**

CCPT is a developmentally responsive and manualized child counseling intervention for
children ages 3 to 10 that is grounded in the person-centered philosophy (Ray, 2011). CCPT is
identified as having *promising research evidence* by the California Evidence-Based
Clearinghouse for Child Welfare (CEBC) for children “similar to child welfare populations”
presenting with anxiety, disruptive behaviors, and family violence exposures (CEBC, 2022, para 4). The Title IV-E Prevention Services Clearinghouse (2023) and the Results First Clearinghouse
(NREPP, 2023) also designate CCPT as a *promising* evidence-based child mental health
intervention. CCPT is a nondirective play therapy/child counseling approach. In CCPT,
counselors experience and communicate empathic understanding, acceptance, and genuineness.
Landreth (2012) described CCPT as:

>a complete therapeutic system, not just the application of a few rapport-building

>techniques and is based on a deep and abiding belief in the capacity and resiliency of

>children to be constructively self-directing. (Landreth, 2012, p. 53)

**Adverse Childhood Experiences (ACEs)**

Felitti et al. (1998) developed the original ACEs and assessed individual’s childhood adversities across three categories: (1) abuse (i.e., physical, psychological, sexual), (2) neglect
(i.e., physical and emotional), and early household dysfunctions (i.e., domestic violence, chronic
mental illness or suicidality, household member substance abuse, household member
incarceration, parental separation/divorce). Koita et al. (2018) developed the *Pediatric ACEs and
Related Life Events Screener* (PEARLS). The PEARLS includes the original 10 ACEs and seven
additional experiences related to (1) neighborhood violence, (2) discrimination, (3) housing instability, (4) food insecurity, (5) parental physical illness or disability, (6) foster care or migration related caregiver-child separation, and (7) caregiver death.

**Polyvagal Theory**

Stephen Porges (2011) developed the Polyvagal Theory, a theoretical framework for a framework for understanding autonomic nervous system development and how the central nervous system responds to the environment. Within Polyvagal Theory, Porges (2007; 2011) outlined three organizing principles of this framework: (1) Hierarchical ANS responses; (2) neuroception; and (3) co-regulation.

**Autonomic Nervous System**

The autonomic nervous system is a division of the peripheral nervous system, and controls and regulates involuntary functions and reflexes (e.g., blood pressure, body temperature, food digestion) contributing to homeostasis (McCorry, 2007).

**Sympathetic Nervous System**

The sympathetic nervous system (SNS) is the autonomic nervous system branch that prepares the body to defend, respond, or avoid danger (Cardinali, 2018). To promote survival, the SNS triggers physiological changes (e.g., body temperature, blood pressure, heart rate) consistent with what is needed to meet environmental/stress-related demands.

**Parasympathetic Nervous System**

The parasympathetic nervous system (PNS) is the branch of the autonomic nervous system that restores rest and homeostasis following stressful situations. To promote equilibrium and calmness following a SNS response, the PNS will trigger restorative physiological changes (e.g., slow breathing, decrease heart rate, regulate digestive processes).
Heart Rate Variability (HRV)

HRV is a measure of the “fluctuation in the time intervals between adjacent heartbeats” (Shaffer & Ginsberg, 2017, p. 1). High frequency HRV indicates vagally-mediated autonomic shifts and researchers recognize high frequency HRV bands as a PNS indicator (Berntson et al., 2007).

Nonverbal and Physiological Synchrony

Tschacher and Meier (2020) defined nonverbal synchrony as “the social coupling of two (or more) individuals in the here-and-now of a communication context that emerges alongside, and in addition to, their verbal exchanges” (p. 558). Physiological synchrony is defined as bidirectional connections in bodily processes between two individuals in contact.

In counseling contexts, researchers assert that nonverbal and physiological synchrony are markers of the therapeutic alliance (Koole & Tschacher, 2016; Tschacher & Meier, 2020)

Methods

In the following sections, the researcher outlined the following methodological components of this study: (1) research design, (2) participants and recruitment procedures, (3) instrumentation, (4) analytic plan.

Research Design

The researcher utilized a time series design (Box et al., 2016) to examine change processes in CCPT with children with multiple ACEs exposures, using intensive longitudinal data (e.g., thousands of physiological data points per session). Researchers have reported a need for increased multivariate time series research studies in psychotherapy research focused on treatment-specific process variables associated with therapeutic change over time (Gottman et al., 1996). Since the EBP movement, child counseling scholars have focused on measuring post-
treatment mental health, social emotional, and behavioral outcomes (e.g., externalizing problems, depressive symptoms); however, researchers who employ pretest-posttest research designs fail to rival theoretical hypotheses or shed light on the nature of therapeutic change processes (i.e., *what part(s) of this treatment approach is facilitating therapeutic change over time*). Additionally, researchers are not examining *how* children experience treatment and the therapists’ presence during the therapy process. The researcher utilized a time series design to examine processes and changes in the child-counselor therapeutic alliance (measured by child-counselor physiological synchrony) across sessions, and whether child-counselor synchrony predicted children’s sympathetic-parasympathetic nervous system balance (as measured by low frequency – high frequency HRV ratios [LF/HF]) over time.

**Participants and Recruitment Procedures**

The researcher obtained University of Central Florida’s Institutional Review Board (IRB) approval and Orange County Public Schools Research and Evaluation department approval prior to data collection (see Appendix C). The researcher recruited child participants (ages 5-8) from a Title-I elementary school in the Southeast United States, using a purposive sampling strategy via school counselor referrals. The elementary school counselor referred children with four or more ACEs (as measured by the PEARLS; Koita et al., 2018). To participate in the research study, children met the following inclusion criteria: (1) between ages 5-8 during the intervention; (2) experienced four or more ACEs (as indicated by school counselor’s PEARLS assessment scores); and (3) caregivers/guardians provided informed consent for child’s engagement in play therapy and data collection procedures.
Instrumentation

The researcher utilized three instruments in the research study, including: (1) child demographic form; (2) the Pediatric ACEs and Related Life Events Screener (PEARLS; Koita et al., 2018), and (3) Empatica E4 wristbands (Empatica, 2020). In this section, the researcher briefly describes the instruments (detailed descriptions found in Chapter Two).

Child Demographic Form

The researcher collected participants’ demographic information during meetings with caregivers and the school counselor. The researcher developed this demographic form and included questions related to the child’s age, race, ethnicity, gender identity, socioeconomic status, family background, and mental health (see Appendix A).

Pediatric ACEs and Related Life Events Screener (PEARLS)

The researcher gathered information regarding participants’ ACE exposures using the PEARLS (Koita et al., 2018). The PEARLS includes the original 10 ACE items (Felitti et al., 1998) and seven additional items related to (1) neighborhood violence, (2) discrimination, (3) housing instability, (4) food insecurity, (5) parental physical illness or disability, (6) foster care or migration related caregiver-child separation, and (7) caregiver death. The first 10 items capture experiences of abuse (physical, psychological, and sexual), neglect (physical and emotional), and household dysfunction (parent divorce/separation, substance abuse, mental illness, incarceration, and domestic violence). The 17 PEARLS items are dichotomous, worded in questions, such as “have they ever been separated from their caregiver due to foster care or immigration” (Koita et al., 2018; item # 15). Respondents indicate items that match the child’s experience by checking “yes.” The respondent will score the PEARLS by summing the “yes”
items. In this study, the school counselor completed the PEARLS assessment (based on caregiver reports) for each child and referred children with scores of four or more (see Appendix B).

**Empatica E4 Devices**

The researcher used Empatica © E4 wristbands (Empatica, 2020) to measure participants’ and the therapist’s psychophysiological activity during play therapy sessions. The E4 wristbands are unobtrusive, and participants wear them like a smartwatch on their non-dominant wrists. Because the device is non-intrusive, Shuurmans et al. (2020) noted that the Empatica E4 device was especially suitable for clinical researchers working with vulnerable populations, such as youth with trauma histories. In this study, the researcher utilized E4 wristband data to examine heart rate and biomarkers associated with sympathetic and parasympathetic nervous system activity. The E4’s photoplethysmography sensor captures blood volume pulse, which the researcher used to compute HRV indices. The researcher used HRV data to measure sympathetic and parasympathetic nervous system activity (Milstein et al., 2020; Shaffer et al., 2014).

**Intervention**

Child participants received up to 16 play therapy sessions (twice weekly) based on schedule and number of child absences. The researcher facilitated play therapy sessions with participants in the elementary school setting in the dedicated and confidential play therapy space. Before each play therapy session, the researcher set up the child’s Empatica © E4 wristband (Empatica, 2020) for the child to wear on their nondominant wrist for a 5-minute duration in the classroom setting, for the purpose of gathering sufficient baseline data. The researcher also collected her own baseline data twice per week for the purpose of baseline level determinations. After collecting baseline Empatica data, the participants received 30-minute CCPT sessions.
while wearing the E4 wristbands. During the play therapy sessions, the researcher maintained a nondirective approach, consistent with the *Child-Centered Play Therapy Treatment Manual* (Ray, 2011). The researcher focused on the therapeutic relationship, experiencing and communicating empathic understanding, unconditional acceptance, and genuineness. The sessions were video recorded for the purpose of session content (e.g., start of session; significant events) and physiological data. After each session, the researcher helped the child remove the E4 device and uploaded the physiological recordings to the secured cloud storage (E4 Connect; Empatica, 2022).

**Data Analysis**

**Research Question 1**

*What is the co-regulatory impact of CCPT treatment among individual child clients, as measured by child-counselor’s heart rate synchrony during individual play therapy sessions?*

To examine the presence of heart rate synchrony between the child and counselor during play therapy sessions, the researcher applied the SUSY (Tschacher & Meier, 2020; https://CRAN.R-project.org/package=SUSY) statistical software in R Studio Version 2022.12.0+353. Using Surrogate Synchrony in R Statistical software, the researcher computed cross-correlations between the therapist’s and child’s heart rate data (BPM) across shared time segments (i.e., each session; Tschacher & Meier, 2020). The SUSY algorithm cuts time series segments and computes cross-correlations across designated windows (Tschacher & Meier, 2020). The researcher applied the SUSY algorithm to generate control variables (via random sequence shuffling), which allowed the researcher to identify if correlations were greater than values anticipated by chance alone (Kleinbub et al., 2020; Ramseyer & Tschacher, 2010). The
researcher utilized the non-absolute effect sizes to determine the level of physiological synchrony within sessions and across sessions (Tschacher & Haken, 2019).

**Research Question 2**

*Will the counselor and child clients experience statistically and practically significant levels of heart rate synchrony across sessions during CCPT treatment?*

The researcher conducted a single sample t-test to determine if the mean non-absolute effect size ($ES_{noabs}$) for child-counselor heart rate synchrony significantly deviated from zero, aligning with previous researchers who used the SUSY algorithm (Coutinho et al., 2020; Tschacher & Meier, 2020; Wilson et al., 2018). The researcher utilized IBM Statistical Package for the Social Sciences (SPSS; Version 29) to analyze the synchrony effect size data from 41 play therapy sessions. The researcher reported the study results in Chapter Four.

**Ethical Considerations**

Prior to participant recruitment and data collection, the researcher reviewed ethical considerations associated with the study with the UCF IRB, OCPS research department, and the dissertation committee. The researcher identified and addressed the following ethical considerations:

1. The researcher obtained UCF IRB and OCPS approval before data collection
2. The researcher obtained informed consent from caregivers/guardians and ongoing verbal assent from child participants
3. The researcher protected participants’ confidentiality by de-identifying all assessments and physiological data recordings (organized by participant numbers rather than names).
4. The researcher protected participants’ information by storing all data on a password protected hard drive.
Limitations

The researcher identified several limitations of this research investigation. First, the researcher utilized intensive longitudinal data with a small sample size (four children). While the small sample size limited generalizability, the true exploratory purpose of this study was to examine the process and theoretically grounded change mechanism (the relationship) of CCPT; thus, the researcher did not aim to make causal or generalized inferences based on the findings. Additionally, researchers conducting time series analyses estimate sampling adequacy in terms of observations rather than the number of participants. Researchers suggested that time series analyses should include at least 50 observations per participant (Yaffee, 2012), and the current researcher collected thousands of physiological observations per child. For each 30-minute play therapy session, the researcher analyzed 3,600 heart rate variability observations. The lack of control or comparison groups was another limitation; however, the SUSY algorithm allowed the researcher to compare the true observed segment-wise cross correlations to surrogate controls (hundreds per session). Future researchers may examine other therapeutic approaches (e.g., directive play therapy, general talk therapy, trauma-focused cognitive behavior therapy [TF-CBT]) to determine whether there are differences in physiological synchrony based on therapeutic approach.

Significance for Counselors and Counselor Educators

Since the beginning of the evidence-based psychotherapy (EBP) movement, clinicians have been urged to utilize therapeutic approaches deemed effective based on research studies involving specific treatment outcome data (e.g., externalizing behaviors, depressive symptom reductions). David and colleagues (2011, p. 90) asserted that the current EBP evaluation practices ignore “whether any evidence exists to support the proposed theoretical underpinnings
of these techniques (i.e., theory about psychological mechanisms of change).” Moldovan and Pintea (2015) suggested the need for increased research focused on the mechanisms of therapeutic change and provided three major reasons for these investigations. As researchers gain deeper understandings of specific interventions and their associated change mechanisms, counselor educators can: (1) further improve treatments to increase overall efficacy; (2) gain clinical understandings related to specific mental health disorders and what aspects of treatment are most helpful; and (3) expand understandings of mechanisms of change present across various therapeutic approaches (i.e., common factors; Moldovan & Pintea, 2015).

There are numerous implications of the current research study for counselor educators. According to CACREP (2016) standard 2.F.3.e, counselor educators should develop curricula that addresses “biological, neurological, and physiological factors that affect human development, functioning, and behavior.” Counselor educators developing child counseling and play therapy curriculum may utilize the researcher’s findings to address the neurobiological impacts of play therapy among children exposed to multiple ACEs and complex trauma.

According to the ACA Code of Ethics, counselor educators have a responsibility to deliver course curricula that includes the most recent professional knowledge and counseling research (ACA, 2014, Standard F.7.b). Counselor educators may utilize the current research study and findings to discuss the psychophysiological impacts of play therapy for children exposed to trauma or multiple ACEs.

In addition to implications for curricula development and clinical intervention research practices, counselor educators and supervisors may incorporate these findings into their work with supervisees and practicum/internship-level counselors-in-training. Through this study, the researcher established that clinicians and child clients may experience significant levels of
physiological linkage, starting as early as the initial counseling sessions. Supervisors and counselor educators may support counselors-in-training through continually emphasizing self-care during preparation programs, and modeling strategies such as mindfulness exercises.

**Chapter One Summary**

In Chapter One, the researcher discussed and summarized research related to the current investigation, including: (1) the impacts of complex trauma during childhood, (2) the mental health, developmental, and neurobiological consequences of ACEs, and (3) the use of CCPT as a developmentally responsive intervention to promote children’s regulatory capacities. Although children with multiple ACEs experience significant difficulties related to vagal modulation and smooth autonomic nervous system regulation, no researchers have examined the therapeutic change process using real-time physiological measures during play therapy to examine children’s regulatory capacities across CCPT treatment. The researcher focused on filling this gap in the child counseling literature by employing a time series methodology to examine moment-to-moment and relational therapeutic change processes with children who endured multiple ACEs.
CHAPTER TWO: LITERATURE REVIEW

In this chapter, the researcher reviews previous research and scholarship on (1) childhood trauma and Adverse Childhood Experiences (ACEs), (2) play therapy, (3) trauma play therapy, and (4) psychophysiological activity related to childhood trauma and play. First, the researcher describes the effects of childhood trauma and adverse childhood experiences. Next, the researcher introduces the history and theoretical foundations of play therapy and Child-Centered Play Therapy (CCPT; Axline, 1969; Landreth, 2012; Ray, 2011). Following the play therapy foundations overview, the researcher reviews and critiques the current play therapy outcome research studies. The researcher focused on previous play therapy scholarship investigating the powers of play for children with trauma exposures and ACEs. The researcher reviewed research related to children’s psychophysiological activity following traumatic experiences, as well as sympathetic nervous system activity during children’s play. To conclude this chapter, the researcher synthesized the key literature and identified critical gaps in child counseling and play therapy research to provide rationale for the current research investigation.

Childhood Trauma

In the United States, nearly 70% of children survive at least one traumatic event before their 16th birthday. These traumatic events may include, but are not limited to physical abuse, sexual assault, neglect, and family violence exposure (Substance Abuse & Mental Health Services Administration [SAMHSA], 2022). The American Psychological Association (APA, 2022) defined traumas as disturbing events that cause terror, dissociation, powerlessness, or other troublesome feelings with lasting negative impacts on a person’s thoughts, attitudes, behaviors, or other areas of daily living. The National Child Traumatic Stress Network (NCTSN;
2022) defined traumatic experiences as alarming, threatening, or violent events that threaten a child’s life or physical well-being. According to the NCTSN (2022), childhood traumatic events can include various threatening and disturbing experiences, such as natural disasters, neglect, sexual assault, sudden caregiver loss, war and terrorism experiences, community violence, and life-threatening medical experiences. Following a traumatic experience, as many as 15% of children develop posttraumatic stress disorder (PTSD; Department of Veteran Affairs, 2022). Children may suffer with PTSD symptoms following an isolated traumatic incident. On the other hand, complex trauma occurs when children endure compounded, repeated, and chronic traumatic events throughout childhood (van der Kolk, 2005).

**Complex Trauma**

In the current investigation, the researcher focused on children exposed to complex trauma. While there is high public understanding of PTSD and the impacts of devastating trauma exposures, there is less attention and understanding related to complex trauma (Mahoney & Markel, 2016). Complex trauma is unique from single-episode trauma exposures (Cook et al., 2005; van der Kolk et al., 2015). Complex trauma exposures are interpersonal and most often take place within children’s caregiving relationships (van der Kolk, 2005). Because complex trauma often occurs within interpersonal contexts, these experiences significantly undermine children’s abilities to connect with others and form trusting and safe relationships across the lifespan (Kliethermes et al., 2014). Complex trauma is also unique in terms of timing and development. Complex trauma always occurs during childhood, when individuals’ brain development is most sensitive to the impacts of chronic and prolonged trauma (Kliethermes et al., 2014).
Child psychiatrists began differentiating complex trauma from isolated trauma exposures because the American Psychiatric Association (1994) failed to capture the developmental consequences of complex trauma in the *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition, DSM-IV) PTSD diagnostic criteria (Cook et al., 2005; van der Kolk, 2005). van der Kolk (2005) asserted that the American Psychiatric Association must develop a new diagnosis to capture the complex emotional and neurobiological effects of complex trauma and proposed the *Developmental Trauma Disorder* (DTD) diagnosis. In 2009, van der Kolk and colleagues (2009) released a formal proposal for the DSM-V for this diagnosis. In this document, van der Kolk et al. (2009) outlined the NCTSN consensus-proposed DTD diagnostic criteria, and described the criteria as the “most clinically significant symptoms exhibited by many children and adolescents following complex trauma” (p. 5). van der Kolk and colleagues (2009) described seven unique symptoms of DTD associated with complex trauma exposures, including: (a) exposure; (b) affective and physiological dysregulation; (c) attentional and behavioral dysregulation; and (d) self and relational dysregulation (van der Kolk et al., 2009, p. 6-7).

**Exposure**

In the proposed criteria A, the committee described complex trauma exposures as repeated or multiple adverse events during childhood, including: (a) witnessing or directly experiencing severe and prolonged interpersonal violence, (b) caregiver separation, (c) continuous emotional abuse, and (d) lack of consistent caregiver protection (van der Kolk et al., 2009).

**Affective and Physiological Dysregulation**

van der Kolk and colleagues (2009) described four “affective and physiological dysregulation” symptoms that children experience following complex trauma exposures (p. 6). First, children exposed to complex trauma may struggle to endure and recover from intense...
affectual conditions, such as fear or extreme shame. When children experience compromised regulatory capacities in response to these affect states, they may exhibit intense and continuous tantrums or become immobilized. Additionally, individuals with complex trauma may experience extreme emotional shifts and diminished self-soothing capacities following intense emotional states. Second, children may suffer from bodily regulation issues. For example, many children struggle with eating and sleeping during the aftermath of complex trauma. Additionally, van der Kolk et al. (2009) reported that children may exhibit hyper-reactivity and digestion issues. Importantly, the committee noted that children often experience these bodily regulation disruptions during minimally stressful events, such as transitioning between activities or routines. Third, children may exhibit a significant decrease in sensory, emotional, or bodily state awareness. van der Kolk et al. (2009) explained that children who manifest these symptoms demonstrate physical analgesia (i.e., inability to feel/respond to pain), depersonalization (i.e., feeling detached from one’s body and experiences), and diminished awareness of their environment. Last, children exposed to complex trauma may struggle to describe their emotional or physiological states to others. van der Kolk et al. (2009) explained that children who struggle with describing bodily or emotional states often manifest problems related to labeling their feelings, expressing their desires, and communicating their basic bodily needs (e.g., feeling hungry, needing to use the bathroom).

**Attentional and Behavioral Dysregulation**

van der Kolk et al. (2009) outlined five symptoms related to the proposed attentional and behavioral dysregulation criteria. First, children exposed to complex trauma experience “preoccupation with threat, or impaired capacity to perceive threat, including misreading of safety and danger cues” (p. 11). For example, a child who has experienced chronic and
prolonged complex trauma may frequently perceive danger in non-threatening environments. Second, children may struggle with self-protective abilities and engage in risk-taking behaviors. Children with compromised self-protection capacities may exhibit developmentally inappropriate impulsive behaviors, such as setting fires and seeking sexual contact. Third, van der Kolk et al. (2009) noted that children with complex trauma histories struggle with self-soothing and attempt to self-regulate through maladaptive behaviors. Maladaptive self-soothing strategies include self-injurious behaviors, chronic masturbation, and substance abuse. Children may engage in self-injurious behaviors (e.g., skin-picking, burning, head banging, cutting) on a regular basis, or in response to stressful events. van der Kolk et al. (2009) noted that children with complex trauma suffered with self-mutilation three-times more frequently than children with non-complex trauma.

**Self and Relational Dysregulation**

van der Kolk and colleagues (2009) described another complex trauma-specific symptom dimension: “self and relational dysregulation” (p. 12). First, children who endure complex trauma may experience intense worry related to caregivers’ wellbeing and loved ones’ safety. Children struggling with self and relational dysregulation may also suffer with negative self-concepts, continual self-loathing, and helplessness. When children experience prolonged complex trauma, they may exhibit lower self-worth levels, or they may feel as though they are damaged or broken (van der Kolk et al., 2009). Additionally, children exposed to complex trauma may exhibit difficulties related to trusting others and forming close relationships with peers and other trustworthy adults in their lives. For example, complex trauma survivors often struggle with empathy and sometimes feel detached from others (i.e., attunement difficulties). Another self and relational dysregulation symptom is reactivity and aggression toward others.
Children experiencing this form of reactivity exhibit impulsive and reactive aggression rather than instrumental aggression (i.e., coercive; van der Kolk et al., 2009).

Because children with complex trauma histories experience multilayered relational, behavioral, developmental, and psychological difficulties, the researcher considered the above outlined areas regarding complex trauma when assessing students’ fit for this study. Researchers frequently utilize the Adverse Childhood Experiences scale (Felitti et al., 1998) to examine individuals’ compounded experiences of interpersonal and complex trauma. Thus, in the following section, the researcher reviewed ACE-related scholarship and research relevant to the current investigation.

**Adverse Childhood Experiences**

Through the groundbreaking CDC-Kaiser Permanente ACE study, Felitti and colleagues (1998) first discovered the deleterious impacts of ten household experiences/conditions, which are known as the original ACEs. Felitti et al. examined whether individuals’ \(N = 8,056; \) women, \(n = 4,197 \) [52%]; men, \(n = 3,859 \) [48%]; predominantly White, \(n = 6,432 \) [79.8%]) adversities during childhood predicted health risks and chronic diseases (assessed through standardized medical evaluations). To assess participants’ childhood adversities, the researchers created the ACE Questionnaire, a 10-item measure comprised of three categories: abuse, neglect, and household dysfunction. The abuse category included three items assessing individuals’ exposures to three forms of abuse: (1) physical abuse, (2) psychological abuse, and (3) sexual abuse. The neglect category included two items of child maltreatment: (1) physical neglect and (2) emotional neglect. The household dysfunction category included five items related to the childhood household environment, covering: (1) domestic violence, (2) household member chronic mental illness or suicidality, (3) household member substance abuse, (4) household
member incarceration, and (5) parental loss/death (Felitti et al., 1998). Researchers have discovered graded relationships between individuals’ number of ACEs and serious health issues such as diabetes, cancer, heart disease, substance use disorders, depression, and suicide attempts (Campbell et al., 2019; Felitti et al., 1998; Fuller-Thompson et al., 2016; Lee et al., 2020). Felitti et al. (1998) found that an ACE score of four or higher placed an individual at high risk for leading causes of death in the United States (e.g., ischemic heart disease, stroke). Additionally, compared to individuals with zero ACEs, individuals with four or more ACEs were 12 times more likely to attempt suicide (Felitti et al., 1998). Later, Brown et al. (2009) conducted an ACE study to investigate whether individuals’ ($N = 17,337$; age 18 and older) ACE scores predicted premature death. Brown et al. found that individuals with ACE scores of six or higher died approximately 20 years earlier than individuals with no ACE exposures. Therefore, it is critical to address ACEs in childhood to mitigate the deleterious effects of childhood traumatic events/complex trauma.

**ACEs and Health During Childhood**

Felitti et al. (1998) and Brown et al. (2009) provided foundational information regarding the lasting, deleterious health and mental health impacts of early childhood adversities and complex trauma. These studies examined the health profiles of adults. In recent years, researchers examined immediate health-related impacts of ACEs through research with children and adolescents (Kerker et al., 2015). Kerker et al. (2015) examined the relationships between ACE scores, mental health status, and chronic health conditions among children ($N = 912$; boys, 55.4%; girls, 44.6%; aged 18-71 months) in the child welfare system. Kerker et al. revealed that as children’s ACE scores increased by one, there was a 32% increased likelihood for scoring in the clinical range for problem behaviors (as measured by Child Behavior Checklist [CBCL])
scores; Achenbach & Rescorla, 2000). Additionally, as children’s ACE scores increased by one point, there was a 21% increased likelihood for having a chronic medical condition (Kerker et al., 2015).

Pretty et al. (2013) investigated the relationship between children’s ($N = 1,324$; girls, 55%; mean age = 11.8 years-old). ACE scores and early risk factors for developing cardiovascular disease during adulthood. The researchers measured children’s cardiovascular disease risk-level using four indicators: (1) blood pressure, (2) body mass index, (3) waist circumference, and (4) heart rate. Pretty et al. (2013) found that children in the high-risk ACE category (four or more ACEs) were significantly more likely to have higher heart rates, body mass index scores, and waist circumference measurements ($p < .01$). Pretty and colleagues’ findings related to increased heart rate levels suggested that as ACE exposures increased, children experienced increased sympathetic nervous system (SNS) activity. Additionally, increased ACE exposures increased children’s risks for clinical obesity, as measured by waist circumference and body mass index scores. Thus, Pretty et al. (2013) provided evidence that the health-risk factors associated with ACE exposures are observable among middle school aged children.

Walker et al. (2021) examined whether children’s ($N = 40,075$; female, 51.3%; mean age = 10 years old) ACE exposures predicted parent-reported Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms. The researchers measured nine ACEs (as measured by the National Survey of Children’s Health [NSCH] ACE Questionnaire), including: (1) racial discrimination, (2) poverty, (3) parental incarceration, (4) parental separation/divorce, (5) household member mental illness and suicidality, (6) household domestic abuse, (7) neighborhood violence, (8) household substance abuse, and (9) caregiver death. Walker et al.
(2021) found that children with ACE scores of 3 or higher were 3.4% more likely to have ADHD. Elmore and Crouch (2020) examined the predictive relationship between children’s ($N = 39,929$; female, $n = 19,405$ [48.6%]; male, $n = 20,523$ [51.4%]; ages 0-17) ACEs exposures (as measured by the 9-item NSCH ACE Questionnaire) and anxiety and depression diagnoses. Children with four or more ACE exposures were more likely to experience anxiety (adjusted odds ratio [adj. OR] = 1.7) and depression (adj. OR = 2.2). Children’s experiences of economic difficulties/poverty were the strongest predictor of anxiety (adj. OR = 1.8), and domestic violence was the strongest predictor of depression (adj. OR = 2.2; Elmore & Crouch, 2020).

**ACEs and Neurobiological Development**

Child trauma scholars have asserted that complex trauma causes developmental disruptions within brain structures related to the stress response system (Kliethermes et al., 2014; Wilson et al., 2011). When exposed to chronic and recurring trauma, the brain develops in a survival-focused manner, focusing on structures responsible for avoiding harm and responding to danger (e.g., amygdala; brainstem) and neglecting areas involved in complex cognitive activity and learning (e.g., prefrontal cortex; Kliethermes et al., 2014; Teicher et al., 2016). Luby et al. (2019) investigated the relationship between ACEs, caregiver support, and brain development among a developmental cohort ($N = 211$ children; male, $n = 107$ [50.7%]). The researchers examined brain structure using a 3-T Siemens TIM TRIO Magnetic Resonance Imaging Acquisition (MRI scanner). Luby and colleagues (2019) discovered that higher preschool ACE exposures were associated with decreased hippocampus and amygdala volumes during adolescence. When children experience damage or compromised development within the amygdala and hippocampus regions, they struggle with processing their environmental contexts and differentiating threatening and safe situations (i.e., issues related to stress response system).
Jimenez et al. (2021) investigated the relationship between adolescents’ (N = 90; females, n = 45 [50%]; males, n = 45 [50%]; ages, 12-17 years-old) ACE exposures and stress-response specific physiological indicators. The participants were adolescents at high risk for adult obesity and diabetes. To measure participants’ stress physiology, the researchers collected heart rate, diastolic blood pressure (i.e., artery pressure during heart rests between beats), and systolic blood pressure (i.e., artery pressure during heart beats) using a Dinamap Pro 100V2 non-invasive cuff monitor. The researchers collected the physiological data while participants engaged in the Trier Social Stress Test (TSST), a stress-inducing task involving speech-delivery and mathematic problem solving (Jimenez et al., 2021). At baseline (before TSST), the participants with ACE exposures had similar heart rate and blood pressure responses to participants with no ACEs. Jimenez and colleagues found that participants with ACE histories were statistically significantly more likely to have increased heart rate and diastolic blood pressure during the TSST compared to children with no ACEs. Based on their findings, Jimenez et al. (2021) suggested that children’s sympathetic stress responses following ACE exposures may explain the association between ACE scores and cardiometabolic conditions. Based on these findings, the authors highlighted the need for trauma-informed interventions for youth with ACE exposures to address their high stress reactivity levels.

**Complex Trauma and ACE-Responsive Counseling**

Cook and colleagues (2005) established guidelines for complex trauma specific mental health interventions and outlined six core therapeutic components: (1) safety (e.g., internal, relational, and environmental safety); (2) self-regulation (e.g., increased self-regulatory capacities; (3) self-reflective information processing (e.g., decision-making, planning, and self-reflective abilities); (4) traumatic experiences integration (e.g., meaning-making, processing
traumatic experiences, growth in present-oriented behaviors); (5) relational engagement (e.g., engagement in therapeutic relationship; strengthened interpersonal skills with others); and (6) positive affect enhancement (e.g., increased self-efficacy, self-esteem, creativity, and positive self-regard). Based on Cook’s (2005) complex trauma treatment guidelines, Burton and Choo (2019) recommended utilizing Child-Centered Play Therapy (CCPT) while working with children exposed to ACEs. Burton and Choo explained that child-centered counselors work to establish consistent and safe therapeutic relationships, which is fundamental for working with children exposed to ACEs. Because children with complex trauma and multiple ACEs experience inconsistency and unpredictability within familial relationships, counselors should utilize humanistic treatment approaches. Through experiencing a consistent, caring therapeutic relationship, children feel new senses of safety that can extend to other future relationships. Burton and Choo (2019) further explained that counselors who utilize CCPT provide a safe relationship, which promotes the development of self-regulatory capacities. When children feel safe in therapeutic bonds, they can co-regulate with the therapist and learn to self-regulate later in the therapeutic relationship (Dana, 2018). In the following section, the researcher outlined and described the CCPT therapeutic philosophy and approach, which is the theoretical foundation of the current research study.

**Foundations of Child-Centered Play Therapy**

CCPT is the theoretical foundation of this research study. Virginia Axline (1969) developed non-directive play therapy (now known as CCPT) based upon Carl Rogers’ (1946; 1951; 1957) person-centered psychotherapy approach. In this section, the researcher reviewed the following: (a) person-centered counseling approach; (b) theoretical framework of CCPT; and (c) CCPT attitudinal conditions and facilitative responses.
Person-Centered Counseling

Virginia Axline (1969) developed CCPT based on Carl Rogers’ Client-Centered theory for counseling with adults. Carl Rogers (1946; 1951; 1957) developed the Client-Centered (or Person-Centered) approach to counseling and psychotherapy. Rogers (1957) asserted that six core conditions are necessary and sufficient for therapeutic change: (a) psychological contact between the therapist and client; (b) the client is incongruent; (c) the therapist is congruent; (d) the therapist experiences unconditional positive regard; (e) the therapist experiences empathic understanding; and (f) the therapist communicates their unconditional positive regard and empathy to the client. In essence, the client-centered counselor establishes a therapeutic alliance by experiencing and communicating the three attitudinal conditions – unconditional positive regard, empathy, and congruence (genuineness). Congruent counselors are genuine with their clients (i.e., there is a match between their inner and outer experience during sessions). Counselors experience unconditional positive regard (or prizing) when they accept and care for the client, and this acceptance is full and condition-free. Last, empathetic understanding refers to the experience of “temporarily living in the other’s life, moving about in it delicately without judgements” (1980, p. 142). While empathy is a way of being, Rogers (1957) emphasized the need to communicate this understanding to the client.

When counselors experience and communicate the three attitudinal conditions through non-directive therapy, Rogers (1957) theorized that the client will begin developing an internal locus of evaluation. When clients enter counseling in a state of incongruence, their self is conditional. A conditional self is inconsistent with internalized conditions of worth (result of conditional positive regard from important others, such as parents or role models). When a person is in a state of congruence (i.e., when one’s self-concept is consistent with their
experiences), the self-actualizing tendency is activated. The self-actualizing tendency is the growth force that enables individuals to examine attitudes, explore their relationship to reality, and strive toward reaching their full potential (Rogers, 1946).

**Child-Centered Play Therapy**

Virginia Axline (1969) pioneered the non-directive client-centered play therapy approach, now known as Child-Centered Play Therapy (CCPT). Axline (1969) provided a theoretical framework for therapists to apply Roger’s (1957) therapeutic conditions with children. Axline (1969) noted that children need to “play out” experiences and feelings that adult clients “talk out” in traditional non-directive therapy (p. 9). Axline and Rogers (1945) described the non-directive child therapist’s role as “the permissive person who is willing to grant children a large measure of free expression and individual choice” (p. 140). Axline (1969) believed the following eight principles characterized the ideal environment and relationship for children to grow and heal. Axline stressed that the eight principles are interdependent; therefore, the therapist cannot simply maintain some of the principles (i.e., “therapist cannot be accepting without being permissive;” p. 89).

1. **The Therapist Establishes a Warm Relationship with the Child.** Axline (1969) emphasized that therapists must establish a warm and friendly relationship with children, which begins at the earliest stages of the therapeutic relationship. Early in the therapeutic process, non-directive play therapists must establish rapport grounded in the principles of person-centered therapy and non-directive play therapy.

2. **The Therapist Fully Accepts the Child.** Axline (1969) believed that therapists must fully accept children “exactly as they are” (p. 86). Therapists communicate unearned acceptance through consistent patience, warmth, and avoidance of praise or criticism.
Axline further explained that therapists must maintain connection with children as they are expressing intense feelings through play, such as violence or aggression. When children express these intense emotions, therapists must demonstrate and communicate acceptance through verbal and non-verbal responses.

3. **Therapist Establishes Feelings of Permissiveness.** When the therapist establishes a permissive therapeutic relationship, the child experiences freedom to fully express their feelings in the playroom (Axline, 1969, p. 90). The therapist communicates permissiveness through their words (e.g., *you can play with all the toys in lots of ways you like*) and nonverbal expressions (e.g., voice tone, body language).

4. **Therapist Recognizes and Reflects the Child’s Feelings.** Play therapists recognize and reflect feelings to help children understand and accept their own emotional experiences. Axline (1969) carefully differentiated reflection and interpretation within play therapy contexts. When a child is playing with a puppet who is lost and looking for his mother, the therapist avoids personalized reflections (e.g., *you are really scared*). Instead, the therapist maintains the child’s metaphor and reflects feelings within the play context (e.g., *the puppy is worried*).

5. **Therapist Respects the Child’s Ability to Solve Problems and Make Choices.** Non-directive play therapists do not impose standards or expectations because children must learn to take responsibility for themselves. When therapists respect and accept children’s choices and efforts in the playroom, children gain self-confidence, self-respect, and self-esteem (Axline, 1969).

6. **Therapist Avoids Directing and Allows the Child to Lead.** Axline believed that play therapists should avoid asking children probing questions and maintain non-directive
orientations. Moreover, the play therapist should avoid implicitly directing the child’s play or behaviors through praise. For example, if a therapist praises a child for *doing such a great job coloring in the lines*, the child may believe that they must always color in the lines to earn the therapist’s approval.

7. **Therapist Does Not Try to Hurry the Child Along.** Axline (1969) emphasized that children express feelings in front of the play therapist only when they are ready. Therefore, play therapists honor the child’s process and intentions, and do not attempt to move the play therapy process along based on adults’ expectations.

8. **Therapist Establishes Necessary Limits.** Axline (1969) defined necessary limitations as “those limits that are necessary to anchor therapy to the world of reality and to make the child aware of his responsibility in the relationship” (p. 128.) Play therapists set limitations to: (a) ensure the child’s safety, (b) avoid damaging play materials, (c) physically protect the therapist, and (d) preserve the therapeutic relationship. Play therapists should avoid setting limitations before they are necessary. Rogers (1946) highlighted the importance of setting limits on children’s behaviors rather than their feelings: “the child may not be permitted to break a window or leave the room, but he is free to feel like breaking a window, and the feeling is fully accepted” (p. 416). Therefore, the play therapist should strive to non-judgmentally communicate the child’s desire, feeling, or attitude (i.e., *You would really like to hit the window*) before setting the limit (i.e., *...but the window is not for hitting*). Further, the therapist can honor the child’s attitude, feeling, or desire by offering alternatives (i.e., *You can choose to hit the bop bag or the [another appropriate/safe alternative]*).
Attitudinal Conditions

While play therapists communicate with children using their natural language (play), play is not the primary healing agent in CCPT. CCPT therapists believe that the relationship between the child and counselor is the primary therapeutic change and healing agent. Like Person-Centered practitioners, CCPT play therapists rely on the attitudinal conditions to establish warm and permissive relationships with children. Over the past decade, researchers explored how child-centered practitioners experience, convey, and demonstrate unconditional positive regard, congruence, and empathetic understanding to children during play therapy sessions (Jayne & Ray, 2014; Jayne & Ray, 2015).

Therapists who experience unconditional positive regard fully accept children’s experiences and trust their clients’ self-actualizing potential (Ray & Landreth, 2015). Ray (2011, p. 67) and Ray and Landreth (2015, p. 6) described unconditional positive regard as “a natural antidote” for children’s internalized conditions of worth. Jayne and Ray (2015) defined unconditional positive regard as “valuing and accepting all aspects of the child’s experience, feelings, thoughts, behavior, and play” (p. 93). Jayne and Ray (2015) noted that therapists who experienced unconditional positive regard resisted rescuing children when they faced challenges in the playroom; and that play therapists who experience unconditional positive regard exhibit the following behaviors: (a) follow the child’s directions; (b) accept child’s corrections and criticisms; (c) accept the child’s play disruptions; and (d) reflect the intentions of children’s questions. If the child asks the therapist to be a doctor and give the baby doll a check-up, the therapist can follow the child’s directions by responding, show me how you want me to give a check-up. If the child says, you’re doing it wrong, the therapist can express acceptance of criticism by saying I didn’t get that right, or you didn’t like the way I did that. Therapists can
communicate acceptance of children’s play disruptions with verbal statements, such as *you decided you’re done with that.*

In describing congruence in play therapy, Landreth (2012) noted the importance of “realness,” and the therapist “living out” their genuine self in relationship with the child (p. 66). Ray (2011) described congruence as an “advanced practice concept” that is strongly intertwined with therapists’ self-awareness (p. 71). The therapist must experience congruence to fully communicate empathy and unconditional positive regard to children (Ray & Landreth, 2015). Jayne and Ray’s (2015) participants defined congruence experiences with children during play therapy sessions using various descriptors, such as “genuine,” “in the moment,” “having self-awareness,” and “being myself” (p. 92). When play therapists experienced higher congruence levels, Jayne and Ray (2015) found that the therapists provided smoother verbal and nonverbal facilitative responses, similar to their natural ways of being and communicating with others. When play therapists experienced lower congruence levels, they spoke robotically and appeared more rigid. Similarly, Jayne and Ray (2014) noted that therapists’ incongruence was most apparent when observing play therapists’ tones (e.g., robotic, formulated) and body language (e.g., slow, inflexible). When congruent play therapists accept their own feelings and reactions, they may verbally express relevant feelings and reactions to the child.

Play therapists experience and communicate empathic understanding as they strive to see the world through the child’s eyes (Bratton et al., 2015). When practitioners experience empathic understanding during play therapy sessions, they match children’s affect, energy levels, facial expressions, and body language (Jayne & Ray, 2015; Ray et al., 2014). The participants described empathic understanding as an experience involving synchrony, attunement, presence, and engagement. Play therapists may communicate empathic understanding while maintaining
the child’s metaphors (Jayne & Ray, 2015); for example, the therapist can respond to a puppet’s feelings with responses such as: *that one* [frog puppet] *is really scared.* According to Bratton et al. (2015), children who experience therapists’ empathic understanding can begin freely exploring their own experiences (including previously rejected experiences).

From a CCPT perspective, play therapists believe that the child and’s counselor’s relationship of genuineness, warmth, acceptance, and permissiveness is the primary agent of therapeutic change (Axline, 1969; Landreth, 2012). Landreth (2012) expanded upon Axline’s groundbreaking work and provided a model for facilitating play therapy sessions. In describing the basic dimensions of the play therapy relationship, Landreth (2012) provided the *Four Healing Messages:* (1) I am here, (2) I hear you, (3) I understand, and (4) I care. Play therapists who utilize CCPT strive to communicate (and truly experience) the four healing messages throughout the entire therapeutic process with children. Although the therapeutic relationship guides the play therapy process, CCPT therapists provide verbal and nonverbal facilitative responses (Landreth, 2012; Ray, 2011). CCPT practitioners utilize the following verbal skills to establish, communicate, and maintain the therapeutic relationship (Ray, 2011).

1. **Tracking Behaviors.** Play therapists use tracking skills to communicate interest in the child’s play (Landreth, 2012). When adults are simply “watching” children play, children may feel uncomfortable, disconnected from the therapist, or unsure if the therapist cares about what they are communicating through their natural language of play. Play therapists verbally respond to the child’s behavior (e.g., *You’re hitting that one, you put that one over there.*). Therapists avoid labeling an object or toy until the child verbally assigns a label.
2. **Reflecting Content.** Reflecting content involves paraphrasing the child’s verbal communication to help the child feel understood (Landreth, 2012; Ray, 2011). While reflections of content are similar to basic paraphrasing skills in adult psychotherapy, play therapists deliver shorter paraphrases with children to avoid overwhelming the child. For example, if a child says *this room has so many animals and my classroom has this giraffe, zebra, and fishes too... we have guitars at school too, just like this one over here*, the therapist may respond with a reflection of content: *there are lots of things in here like things at your school.*

3. **Reflecting Feeling.** When children share their feelings (verbally or through play), therapists reflect feelings to communicate their genuine acceptance and understanding of the child’s feelings. Children rarely verbally share their emotions with the therapist; therefore, CCPT practitioners must often attend to children’s emotional expressions through their play, affect, and behaviors. Play therapists reflect children’s emotions with full acceptance and non-judgement to help children become more accepting of their own feelings (Landreth, 2012). Reflections of feeling are also consistent with complex trauma and ACE-responsive counseling because children learn to name and understand their emotional experiences – leading to self-regulatory capacities (Gregoroski & Seedat, 2013). Dan Siegel coined this process “name it, to tame it” (Siegel & Bryson, 2011, p. 161).

4. **Self-Esteem Building Responses.** Play therapists use encouraging (also known as *self-esteem building* responses) to help children feel confident and capable, and develop their intrinsic motivation (Landreth, 2012; Ray, 2011). While delivering self-esteem building responses, CCPT practitioners avoid *praising* the child. For example, when a child
proudly presents a painting, the therapist avoids saying *wow, I love all the colors you used, you are quite an artist.* After receiving this praising response, the child may believe that they must create colorful paintings to earn the therapist’s external reinforcement, approval, and acceptance (Ray, 2011). Instead, the play therapist encourages the child’s efforts by using a self-esteem building response, such as *you worked so hard on this painting.* Through the self-esteem building response, the counselor promotes the child’s internal locus of evaluation (Ray, 2011). When a child develops an internal locus of evaluation, they can make their own decisions about what they value, relying less on adults’ opinions or evaluations (Holliman & Ray, 2011). Moreover, when a child develops an internal locus of evaluation, they experienced increased self-action and self-pride, and view themselves as worthwhile (Holliman & Ray, 2011; Landreth, 2012).

5. **Returning Responsibility and Facilitating Decision-Making.** Play therapists strive to support children’s sense of capability and self-direction. Landreth (2012) noted the following rule of thumb for returning responsibility to the child in play therapy: “when you do for children what [they] can do for [themselves], you teach children that [they] are weak” (p. 226). For example, if a child picks up a toy stethoscope and asks, *how do I use this thing,* the play therapist can return responsibility to the child by stating *you can decide how that thing is used.* By facilitating the child’s ability to decide, the therapist does not restrict the child to playing with the item in one way.

In summary, child-centered play therapists utilize facilitative responses to communicate the four healing messages: (a) *I am here;* (b) *I hear you;* (c) *I understand;* and (d) *I care.* Play therapists use facilitative responses to communicate the four healing messages and attitudinal conditions; however, less is known about the impact of these responses during play therapy.
sessions. Therefore, research is needed to understand how therapists’ use of facilitative responses impacts/promotes the play therapy process and treatment progress. Next, I review all play therapy meta-analytic studies and specific play therapy outcome studies, particularly those studies focused on children who have experienced trauma that have been published in the last five years.

**CCPT Research**

Child counselors have an ethical responsibility to deliver effective interventions (American Counseling Association [ACA], 2014, Standard A.1.c), and play therapists rely on outcome research to advocate for the use of play therapy as an empirically supported and developmentally appropriate child therapy approach (Bratton & Swan, 2017). Moreover, ethical counselors “devise counseling plans that offer reasonable promise of success and are consistent with the abilities, temperament, developmental level, and circumstances of clients” (ACA, 2014, Standard A.1.c). To date, a large body of child counseling and play therapy research is focused on CCPT. In fact, Yee et al. (2019) conducted a content analysis of recent play therapy literature and found that the largest proportion of theory-focused play therapy research articles (published between 2008 – 2017) focused on CCPT. In this section, I review CCPT meta-analytic reviews, followed by specific individual CCPT outcome studies that provide important context and rationale for the current study.

**Meta-analytic Reviews**

Lin and Bratton (2015) conducted a meta-analytic review (52 treatment-control outcome studies; \( N = 1,848 \); published between 1995 – 2010) to investigate the efficacy of CCPT and the relationship between treatment efficacy and study variables. The researchers found a moderate overall effect size \( (d = 0.47) \) for the CCPT treatment. Lin and Bratton (2015) calculated mean
effect sizes by child presenting concern, including total behavior problems \((d = .48)\), external behavioral problems \((d = .33)\), internalizing behavior problems \((d = .42)\), and self-efficacy \((d = .63)\). Studies that included younger child participants (mean age of 7 years or younger) produced a larger overall effect size \((d = .53)\), compared to studies with older children (mean age of 8 years or older; \(d = .21\)). Lin and Bratton generated effect sizes based on caregiver involvement and calculated a significantly greater effect size \((d = .59)\) for studies that included full parental involvement in CCPT treatment, compared with studies that reported partial or no parental involvement \((d = .33)\). Therefore, Lin and Bratton also shed light on the impact of caregiver involvement on play therapy treatment outcomes.

In counseling research, treatment setting is an important factor that may impact the therapeutic process and service delivery (Lenz, 2015). Ray et al. (2015) conducted a meta-analysis (23 between-group studies; \(N = 1106\); published between 1970 – 2011) to examine the efficacy of mental health professionals’ delivery of CCPT in elementary school settings. Ray and colleagues’ sample included studies with various outcome measures, including self-efficacy \((n = 9)\), externalizing problems \((n = 7)\), internalizing problems \((n = 9)\), total problems \((n = 12)\), academic dependent variables \((n = 6)\). Nine studies included a comparison group (i.e., comparing CCPT to alternative intervention) and 18 included a control group (i.e., comparing children who received CCPT with children receiving no intervention). Ray et al. (2015) calculated Cohen’s \(d\) effect sizes per outcome measure and found the following mean effects: internalizing behavior problems \((d = .21)\), externalizing behavior problems \((d = .34)\); total behavior problems \((d = .34)\); academic outcomes \((d = .36)\), and self-efficacy \((d = .29)\).

Most recently, Parker et al. (2021) conducted a meta-analysis (23 between-group studies; \(N = 908\); published between 1999 - 2018) to examine the efficacy of Child Centered Play
Therapy (CCPT) for reducing children’s disruptive behaviors. The total sample of participants included in the meta-analysis received individual CCPT \((n = 483)\), group CCPT \((n = 103)\), Child-Parent Relationship Therapy CPRT \((n = 116)\), Child-Centered Activity Therapy (CCAT; \(n = 56)\), and Child-Teacher Relationship Training (CTRT; \(n = 146)\). Seven of the between-group studies included a comparison group and 16 included a classic no-treatment control group. Parker et al. found medium and small Hedge’s \(g\) effect sizes for CCPT reducing child externalizing problems and aggressive behaviors, respectively. However, only four studies in this meta-analytic sample included aggressive behaviors as dependent variables. In the following section, I reviewed recent (> 5 years) play therapy outcome studies related to the current study.

**Individual CCPT Outcome Studies**

Ray et al. (2021) conducted a randomized controlled trial (RCT) to investigate the efficacy of CCPT for children who endured Adverse Childhood Experiences (ACEs). Ray et al. recruited participants \((N = 120; \text{boys, } n = 91 [75.8\%]; \text{girls, } n = 29 [24.2\%])\) from five Title-I elementary schools in the Southwest United States. The researchers utilized an expanded 25-item ACE questionnaire, and participants’ ACE scores ranged from 2 to 12 \((M = 4.20)\). Children in the treatment condition \((n = 57)\) received two 30-minute CCPT sessions per week for eight weeks, and the remaining children \((n = 55)\) were placed on a waitlist to receive CCPT. Ray et al. found that children with ACE exposures who received CCPT treatment experienced statistically and clinically significant improvements in empathy, social competence, and self-regulation, as measured by *Social Emotional Assets and Resilience Scales -- Parent* (SEARS-P; Merrell, 2011) mean pretest-posttest differences, compared to the waitlist control group. Additionally, children who received CCPT demonstrated improvements in total behavior problems (*Direct Observation Form* [DOF]; McConaughy & Achenbach, 2009). While Ray et al. highlighted benefits of CCPT
for children’s social, emotional, and behavioral functioning following adversity exposures, no researchers have examined whether children experience autonomic nervous system changes during and across play therapy sessions. Given that complex trauma and ACEs pose serious threats to children’s neurobiological development, researchers should also examine how child mental health interventions impact children’s autonomic nervous system activity levels during and across play therapy sessions.

Utilizing a single-case research design, Haas and Ray (2020) investigated impact of CCPT on children (N = 2; boy, n = 1; girl, n = 1; White, n = 2 [100%]; ages 8 and 9 years-old) with four or more ACE exposures. The researchers utilized the original 10-item ACE Questionnaire with an additional item related to foster care experiences (Haas & Ray, 2020). The first participant (boy, 8 years-old, White) endured eight ACE categories (emotional and physical neglect; household member substance abuse, mental illness, domestic violence, and incarceration; emotional abuse; caregiver separation). Participant 2 (girl, 9 years-old, White) endured eight ACEs (sexual abuse; physical and emotional neglect; household member incarceration, substance abuse, mental illness, and domestic violence; parent separation). The participants received 24 CCPT sessions (45 minutes) during a 12-week period. Participant 1 experienced significant improvements in PTSD symptoms (measured by Trauma Symptoms Checklist for Young Children [TSCYC]; Briere, 2005) after session 12. Participant 2 experienced reductions in PTSD symptoms (TSCYC; Briere, 2005) during the intervention phase, and the most significant improvements occurred from play therapy phase to follow-up phase (4 weeks post-CCPT treatment; Haas & Ray, 2020).

Haas and Ray (2020) provided clarity regarding children’s unique ACE exposures (e.g., sexual abuse, emotional neglect) that may impact the play therapy process. The two participants
presented with similar ACE exposure backgrounds, as they both endured emotional and physical neglect, and one form of abuse. Additionally, the two participants both experienced all major household dysfunction exposures described by Felitti et al. (1998), including: (a) caregiver separation/divorce, (b) household member incarceration, (c) household member mental illness, (d) household member substance abuse, and (e) domestic violence (Haas & Ray, 2020).

Participant 2 demonstrated significant improvements after completing the full 24 play therapy sessions, while participant 1 demonstrated similar gains after his 12th session. Although the participants shared similar ACE-exposure backgrounds, they demonstrated differences in therapeutic progress during the play therapy process. By highlighting these unique change processes, Haas and Ray (2020) also shed light on gaps in traditional pretest-posttest designs; that is, researchers who emphasize post-intervention outcomes fail to capture children’s unique trauma healing processes throughout counseling interventions. Because children’s trauma healing journeys are unique and time-sensitive, the researcher utilized a time-series design to examine how the therapeutic change process occurs with children exposed to multiple ACEs.

Burgin and Ray (2022) conducted an RCT to examine the effectiveness of CCPT for children with depressive symptoms. The researchers recruited children (N = 71; boys, n = 49 [69%]; girls, n = 22 [30.9%]; ages 5-9 years-old [M = 6.21]) from a Title-I school in the Southwest United States. Burgin and Ray recruited a racially and ethnically diverse sample of children: most children identified as Latinx (n = 20; 28.2%), followed by White (n = 19; 26.8%), multiracial (n = 15; 21.1%), Black (n = 14; 19.7%), and Asian (n = 3; 4.2%). The child participants in this study demonstrated clinical range depressive symptoms (as measured by DOF Sluggish Cognitive Tempo [SCT] subscale scores; McConaughy & Achenbach, 2009). Children in the experimental group received CCPT treatment twice weekly during an eight-week period.
The researchers randomly assigned children to the control group on a waitlist (to receive CCPT after the study), and these children did not receive any condition. Burgin and Ray (2022) found that children in the CCPT treatment group demonstrated statistically significant improvements in depression symptoms, as measured by Mood and Feelings Questionnaire (MFQ; Angold et al., 1987) and DOF SCT (McConaughy & Achenbach, 2009) mean pretest-posttest score differences, compared to the waitlist control group. These findings are relevant and important for child counselors serving children with complex trauma, as children with four or more ACEs are twice as likely to suffer with depression during adolescence (Elmore & Crouch, 2020). Therefore, counselors may utilize CCPT with children following multiple ACE exposures to buffer the psychological effects of these experiences and promote wellness across childhood and adolescence.

Taylor and Ray (2021) conducted an RCT to investigate the efficacy of CCPT for improving African American children’s social emotional wellbeing. Taylor and Ray recruited child participants \( N = 37; \) boys, \( n = 29 \) [78.4%]; girls, \( n = 8 \) [21.6%]; ages 5-10 years-old \( [M = 6.68\%]; \) Taylor & Ray, 2021\) from Title-I schools in the United States. Children in the treatment group received twice-weekly 30-minute CCPT sessions during an eight-week period. Children in the waitlist control condition did not receive play therapy or other counseling-related services during the eight-week study period. In terms of caregiver-rated outcomes, Taylor and Ray (2021) found that children in the CCPT group demonstrated statistically and practically significant improvements in social-emotional competencies (measured by Social Emotional Assets and Resilience Scale-Parent [SEARS-P; Merrell, 2011]) compared to children in the waitlist control group. Additionally, children who received CCPT demonstrated statistically significant improvements in parent-rated empathy (measured by Social Emotional Assets and Resilience
Scale—Teacher [SEARS-T] Empathy subscale), and children in the control group demonstrated decreased levels of empathy. In terms of teacher-reported changes, Taylor and Ray (2021) found that children who received CCPT treatment demonstrated practically significant improvements in social-emotional competencies compared with children in the control condition; yet, these findings lacked statistical significance (\(p = .116\)). However, the researchers found that children in the CCPT condition demonstrated practically and statistically significant improvements in teacher-rated responsibility levels (measured by SEARS-T Responsibility subscale scores; Merrell, 2011) compared to children in the waitlist control group. The researchers noted two significant limitations of this study. First, Taylor and Ray’s participants lacked gender diversity, as over three-quarters of participants identified as boys. The researchers also discussed limitations related to having one play therapist (who identified as African American) facilitate the sessions. The authors were unable to explore how the therapist-child racial backgrounds impacted the therapy process. Because the current researcher facilitated all play sessions, she considered these limitations during the data interpretation process (i.e., how therapists’ White racial identity may have influenced the therapeutic process).

In recent years, play therapy researchers began examining the effectiveness of play therapy for children with neurodevelopmental diversity. Schottelkorb and colleagues (2020) conducted an RCT to examine the efficacy of CCPT for children diagnosed with autism spectrum disorder (ASD). The researchers recruited participants \(N = 23\); boys, \(n = 19\) [83%]; girls, \(n = 4\) [17%]; ages 4-10 years-old) from elementary schools in the Northwest United States. The participant sample lacked racial representation, as most participants were White \(n = 22\); 96\%) and only one participant was Black (4\%). Children in the experimental group received intensive CCPT treatment (four sessions per week) over a six-week period. Children in the
waitlist control group did not receive a condition during the six-week period. Schottelkorb et al. (2020) found that children with ASD who received intensive CCPT treatment demonstrated statistically significant improvements in ASD core symptoms for social behaviors (as measured by Social Responsiveness Scale, Second Edition [SRS-2; Constantino, 2012]) compared to children in the waitlist control group. Additionally, parents whose children received CCPT reported increased relational play, eye contact, and appropriate play behaviors in the home. While the researcher is not focusing on children with ASD in the current investigation, Schottelkorb’s et al. findings may be relevant for children with complex trauma histories. Children who endure interpersonal trauma often feel threatened by direct eye contact because eye contact enhances emotional connections and mentalization (Steuwe et al., 2014). Additionally, children with ASD diagnoses endure higher ACE exposures than children who are not neurodivergent, and often experience peer-perpetrated maltreatment (i.e., higher rates of bullying; Hoover & Kaufman, 2019); therefore, the researcher screened for ASD and other neurodivergent identities.

Hough (2019) recently examined the impacts of CCPT for children diagnosed with Generalized Anxiety Disorder (GAD), specifically for ameliorating children’s autonomic nervous system activity (i.e., stress responses). The researcher employed a single-case research design (SCRD; \( N = 4 \)). Hough collected physiological data using Empatica E4 wearable wristbands, and utilized the following sensor measurements to examine autonomic nervous system activity during the CCPT treatment phases: (a) electrodermal activity (EDA; i.e., changes in sweat gland activity; perspiration); (b) heart rate; and (c) heart rate variability (HRV). Participants received 16, 45-minute play therapy sessions (two sessions per week) over an eight-week time period. Hough (2019) collected children’s physiological data during resting periods at
home, and fifteen minutes after each play therapy session during a resting state in a separate office. Hough (2019) found that CCPT treatment decreased harmful psychophysiological activity associated with GAD symptoms among the four participants. While Hough (2019) revealed promising evidence for the healing psychophysiological impacts of play therapy, the researcher did not collect psychophysiological data during the play sessions. Hough’s (2019) results and overall findings did not shed light on the specific elements (e.g., verbal responses, relationship elements) of play therapy that impact children’s ANS activity. Thus, the researcher examined how children experienced autonomic nervous system changes during play therapy sessions. In the following section, I reviewed polyvagal theory literature related to the current investigation.

**Polyvagal Theory and Play Therapy**

Stephen Porges (2007; 2011) developed the groundbreaking Polyvagal Theory, a framework for understanding autonomic nervous system development and how the central nervous system responds to the environment. Polyvagal theorists provided insights into the neurobiological impacts of the therapeutic relationship, and how counselor can communicate safety to clients with trauma histories (Porges, 2018). There are three major organizing principles of the Polyvagal Theory: (1) hierarchy, (2) neuroception, and (3) co-regulation (Dana, 2018). In this section, the researcher outlined the three organizing principles of Polyvagal Theory and described applications of this theory for play therapists working with children exposed to complex trauma and/or early childhood adversities.

**Hierarchy**

Polyvagal scholars recognize that when individuals experience activating sensations within their environment, their autonomic nervous systems activate and respond in predictable, hierarchical manners (Dana, 2018). There are three major pathways: (1) the dorsal vagus; (2) the
sympathetic nervous system; and (3) the ventral vagus (Dana, 2018; Porges, 2018). The dorsal vagal circuit is the most primitive structural pathway that triggers the *immobilization* defense system (Porges, 2011). Examples of mammalian immobilization defense system responses include feigning death/playing opossum, and dissociation during stressful and traumatic events. For children experiencing dorsal vagal shutdown responses in the playroom, they may often daydream, have flat affects, and struggle with speech (Dana, 2018).

The second pathway is the sympathetic nervous system which is initiates *mobilization* responses. With the sympathetic nervous system on board, adrenal activity enhances the person’s abilities to mobilize and react to threatening stimuli (e.g., fight-or-flight; Porges, 2011). When children experience protective mobilization responses, they move into action to protect themselves while also isolating and cutting themselves off from others (Dana, 2018). During sympathetic protective responses, children struggle with reading facial cues and over-sense danger in their environments (Dana, 2018). Similarly, children with complex trauma histories experience attentional dysregulation, which involves difficulties differentiating safety and threat and frequently perceiving danger in non-threatening environments (van der Kolk et al., 2009). In the play therapy room, children experiencing sympathetic nervous system activation often appear stiff and disorganized, or they may fidget and pace around the room. Dana (2018) noted that when clients experience flight mobilization responses, the therapist may experience “chaotic unfolding of the session” (p. 25).

The third autonomic nervous system response pathway is the ventral vagal pathway, which promotes social engagement (also known as social communication; Dana, 2018; Porges, 2011). Social engagement involves the myelinated vagus nerve (most sophisticated) and occurs when people experience safety in the presence of others. Social engagement behaviors include
appropriate facial expressions and listening (Porges, 2011). When the ventral vagus is activated, the social engagement system is present, and children seek out connections and co-regulatory opportunities (Dana, 2018). Through the vagal pathway, children can respond to environmental stimuli with ranging emotional expressions, such as excitement, joy, attentiveness, and passion (Dana, 2018).

In summary, the autonomic nervous system responds to environmental cues and activates in predictable, hierarchical manners (Dana, 2018). The three autonomic nervous system pathways (dorsal vagus, sympathetic nervous system, and ventral vagus) trigger distinct stress responses (Dana, 2018; Porges, 2018). In the playroom, child counselors may observe children’s stress response patterns and recognize characteristics of immobilization (e.g., dissociation, flat affect, non-responsiveness), mobilization (e.g., fidgeting, pacing, arguing, avoiding), or social engagement (e.g., diverse emotional expressions, connection-seeking, listening and responding). Children who endure ACES and other trauma exposures often exhibit behavioral patterns consistent with mobilization and immobilization responses (Daniel, 2019). In describing responses among children with medical trauma and PTSD, Daniel (2019) noted that common mobilization responses in the playroom include hyperarousal and being “quick to anger and slow to calm down” (p. 237). Children may also demonstrate immobilization responses, such as dissociation, during play therapy sessions (Daniel, 2019). Children with multiple ACEs struggle to move from mobilization responses toward social engagement because they have “fewer experiences of safety they can reference to mitigate the threat response” (Conroy & Perryman, 2022, p. 146). In the following section, the researcher outlined the second Polyvagal Theory organizing principle – neuroception.
Neuroception

While people often consciously perceive threats and risks in their environments, neural evaluation processes can also occur at unconscious levels (Porges, 2018). Within Polyvagal Theory, Porges (2011) introduced the term *neuroception* to describe these unconscious neural threat evaluation processes. Neuroception is a subconscious biological process and occurs through primitive brain structures (Porges, 2011). Through neuroception, a child’s autonomic nervous system surveilles the environment and searches for signals of danger, life-threat, and safety (Dana, 2018). Because neuroception does not involve conscious perception, children’s responses to these threats are triggered and initiated by the autonomic nervous system. Dana (2018) stated that “neuroception shapes the state, and then the state shapes the response” (p. 31).

Neuroceptions of danger occur when the autonomic nervous system detects threatening signals within the child’s environment (Porges, 2011). During neuroceptions of danger, the child is triggered, and the autonomic nervous system often regresses to the protective sympathetic pathway (mobilization). Through mobilization, the child responds to the neuroception of danger by taking action (fight or flight; Dana, 2018). After taking action and escaping the threat, the child may often return to feeling safe and seeking connection with the therapist (Dana, 2018). However, children may struggle to reach social engagement if the threat is unescapable and continuous (e.g., continually witnessing parental domestic violence). When threats are continual and children feel trapped, neuroceptions of life-threat activate and the child returns to the most primitive response pathway (immobilization; Dana, 2018; Porges, 2011).

Neuroceptions of safety signal the autonomic nervous system to inhibit the dorsal vagus and sympathetic nervous system, and allows for ventral vagal system activation (Dana, 2018). Through neuroceptions of safety, a child’s autonomic and physiological state is calmed, allowing
for social connectivity (Porges, 2011). Neuroceptions of safety can be subtle – for example, a play therapists’ smile can demonstrate warmth and signal neuroceptions of safety to the child. Once the neuroception of safety occurs, the child’s social engagement system allows the child to seek connection and relationship with the therapist (Dana, 2018). However, there are two necessary conditions for creating neuroceptions of safety: (1) resolution of danger and threat signals and (2) introduction of safety cues (Dana, 2018; Porges, 2011). While no researchers have empirically investigated neuroceptions within the play therapy treatment process, child-centered theory naturally supports this polyvagal theory organizing principle. In CCPT, the child must perceive the therapists’ core conditions (i.e., empathic understanding, genuineness, and acceptance) to experience progress during play therapy (Landreth, 2012; Ray et al., 2011). Therefore, in the following section, the researcher described how play therapy and CCPT practitioners can provide the foundations and necessary conditions for neuroceptions of safety.

**Play Therapy and Neuroceptions of Safety**

As previously noted, there are two necessary conditions for neuroceptions of safety: (1) elimination of danger cues and (2) introduction of safety signals (Dana, 2018). Porges (2021) asserted that play is the “neural exercise in which cues triggering neuroception alternate between danger and safety” (p. 141). For example, when babies play peek-a-boo with a caring adult, the baby’s autonomic nervous system adapts and learns to shift between mobilization and social engagement. When the adult covers their face and hides, the baby receives neuroceptions of danger; however, before mobilization responses fully activate, the adult shows their face and says “peek-a-boo.” Following initial “peek-a-boo” surprises, the baby experiences a sense of startle; however, when the adult smiles and demonstrates warmth following the interaction, the child experiences calmness (Porges, 2021). Gleason et al. (2021) investigated the benefits of 5-
year-old children’s \((N = 78)\) engagement in free play, and specifically examined autonomic nervous system regulation and vagal tone. The researchers revealed that children with more social free play experiences demonstrated higher levels of respiratory sinus arrhythmia, a marker for autonomic nervous system regulation and vagal tone. Gleason and colleagues concluded that children with more social free play opportunities experienced greater parasympathetic nervous system activation. While Gleason et al. (2021) discovered evidence for the relationship between children’s engagement in child-directed play, vagal tone, and healthy autonomic nervous system functioning, the researchers only collected play data for a week-long period. In addition, the children played in naturalistic environments; therefore, the children were playing in environments in which they were comfortable and not in ones similar to a therapeutic play therapy room.

Porges (2021) asserted that repeated experiences with reciprocal games like peek-a-boo strengthen the *vagal brake*, or the autonomic nervous system’s capacities for social engagement and smooth downregulation. Unfortunately, children who endure multiple ACEs often experience prolonged arousal because they have fewer experiences of soothing via the social engagement system following danger (Conroy & Perryman, 2022). Rawn and Keller (2021) found that individuals with childhood domestic violence exposures struggled to downregulate after stressful events, and exhibited higher sympathetic nervous system activity (as measured by prolonged skin conductance) following stressful events, as compared to individuals who did not experience this ACE-related event. Daniels (2019) stated that play therapists naturally work to support children’s capacities for working through emotionally difficult and threatening experiences and re-engaging in a shared calm state; thus, play therapists continually promote children’s regulatory capacities through vagal brake exercises. To effectively facilitate play
therapy (especially children exposed to complex trauma and ACEs), the child must experience safety in the environment and therapeutic relationship (Porges, 2011), which aligns with theoretical underpinnings of this study – child-centered theory.

**Co-regulation**

The third organizing principle of the Polyvagal Theory is co-regulation (Dana, 2018). Butler and Randall (2013) defined co-regulation as “a bidirectional linkage” between individuals’ emotional states that contributes to “emotional and physiological stability for both partners in a close relationship” (p. 203). According to Polyvagal Theory principles, children with complex trauma struggle with self-regulation because they lack consistent, safe, and predictable co-regulatory experiences with caregivers during childhood (Dana, 2018). While working with children with multiple ACE exposures, play therapists must provide consistent social engagement opportunities because the child must feel safe in the therapeutic relationship (Conroy & Perryman, 2022). The first therapeutic objective in CCPT is to “establish an atmosphere of safety for the child” (p. 176). In describing safety, Landreth further stated that:

The play therapist cannot make the child feel safe. The child discovers that in the developing relationship. A feeling of safety is also promoted by the consistency of the therapist (Landreth, 2012, p. 176).

Landreth (2012) also noted that CCPT practitioners establish safety through maintaining predictability throughout the play therapy relationship. For example, the therapist always begins the session by sitting in the same space, and remains sitting until the child invites them to play or move around; thus, children have freedom to connect and co-regulate when they are ready to engage the therapist (Landreth, 2012). Therefore, play therapists provide safety with children
exposed to ACEs through continual, safe, and predictable co-regulatory experiences, consistent with the Polyvagal co-regulation principle (Dana, 2018).

Geller (2018) asserted that counselors promote clients’ neuroceptions of safety and invite co-regulatory processes through their “therapeutic presence,” or way of being with the client (p. 108). From a Polyvagal perspective, therapeutic presence is an internal and relational experience. Internally, a therapeutically present counselor is both grounded (i.e., being true to oneself) and (b) immersed (i.e., entering the clients’ world). Similarly, child-centered counselors maintain genuineness (i.e., being real and true to self) and empathic understanding (i.e., entering the child’s world, striving to see the word through the child’s internal frame of reference; Landreth, 2012; Ray, 2011). From a Polyvagal perspective, Geller (2018) acknowledged that therapeutic presence is the growth-promoting therapeutic factor that promotes clients’ experience of feeling “heard, understood, and safe” (p. 109). From a child-centered perspective, play therapists use therapeutic presence to communicate the four healing messages “I am here, I hear you, I understand, and I care” (Landreth, 2012, p. 209-210).

Relationally, clients who experience counselors’ full therapeutic presence feel safe to fully engage in the therapeutic process, and the therapists’ and child’s nervous systems communicate and connect. Theoretically, Geller (2018) stated that when the child experiences relational safety through the counselor’s therapeutic presence, “a larger state of shared presence begins to emerge, and therapists’ and clients’ bodies and brains become in sync” (p. 109). Geller suggested that when the counselor fully experiences and communicates therapeutic presence with the client, mirror neurons are activated, and the therapist can empathetically understand the client. Iacoboni (2012) argued that mirror neurons are the building blocks for empathy. When a person’s mirror neuron system activates, their brain develops “an internal state that resonates
with that of another person” (Siegel, 2006, p. 254). Siegel proposed that when a person’s brain creates a state of resonance via the mirror neuron system, the person experiences physiological and affective shifts (i.e., synchrony of physiological and affective states). Stewart and colleagues (2016) suggested that when mirror neurons activate during play therapy sessions, therapists can accurately understand and attune to the child’s internal experiences and emotions. When mirror neurons activate, the play therapist may sense the child’s internal world through “intuition” and “true connection,” and these moments can help children “feel truly felt” (p. 7). Robinson (2011) proposed that play therapists must mirror children’s actions and body language to activate mirror neurons, resulting in true emotional attunement to the child’s emotional state. Similar to Robinson’s understanding, Jayne and Ray (2014) noted that play therapists who experienced empathic understanding regularly demonstrated “matching” during play therapy sessions; that is, therapists matched the children’s affective states (e.g., facial expressions) and body language (e.g., leaning in, following child’s movements).

When the therapist experiences and communicates (verbally and nonverbally) therapeutic presence, the therapist’s and child’s nervous systems bidirectionally connect. In this way, the therapist (who is internally grounded) can “serve as an emotional regulator for their clients” (Geller, 2018, p. 110). Polyvagal theorists believe that shared presence allows the therapist to become an external regulator, because the therapist and child’s physiological bodies and brains enter synchronous states. In recent years, psychology scholars have empirically investigated these nonverbally synchronous states (Tschacher & Meier, 2019).

**Client-Therapist Nonverbal Synchrony**

Tschacher and Meier (2019) explored client-counselor (therapist, \( n = 1 \); clients, \( n = 4 \)) physiological synchrony across 55 naturalistic counseling sessions. During the 55 recorded
sessions, the therapist and clients wore psychophysiological ambulatory monitoring devices
(*Kölner Vitaport System Vitaport-4*; Mutz & Becker, 2006) and strain-detecting belts to capture
heart rate, heart rate variability, and reparation behavior. Tschacher and Meier (2019) discovered
evidence of respiratory, heart rate, and heart rate variability synchrony during individual
psychotherapy sessions. The researchers also found a positive association between physiological
synchrony and clients’ ratings of the therapeutic alliance. Similarly, Bar-Kalifa and colleagues
(2019) investigated the connection between physiological synchrony and the therapeutic alliance.
The researchers recruited participant clients (*N* = 31; ages 19-53 years-old; women, *n* = 23
[74.2%]; men, *n* = 8 [25.8%]) with test-taking anxiety from two German and Israeli Universities.
The researchers captured electrodermal activity (EDA) data using electrodes placed on the thenar
(i.e., inner thumb musculature) and hypothenar (i.e., inner base of the little finger [fifth digit]
musculature) areas on participants’ nondominant hands. Bar-Kalifa et al. (2019) used the *Session
Alliance Inventory* (SAI; Falkenström et al., 2015) to measure therapeutic alliance strength and
quality. The therapy treatment involved two therapeutic components: (1) imagery work (i.e., safe
space, exploratory, and rescripting guided imagery exercises) and (2) cognitive behavioral
therapy (CBT). For the imagery therapy sessions, clients reported higher therapeutic alliance
quality during sessions with greater physiological synchrony. However, Bar-Kalifa and
colleagues did not identify an association between physiological synchrony during CBT and
clients’ therapeutic alliance ratings. Bar-Kalifa et al. provided evidence for the positive impact of
physiological synchrony on counseling processes. However, the researchers only examined one
psychophysiological indicator (EDA; galvanic skin response) during therapy sessions.

After conducting a comprehensive review of the literature, the researcher identified a gap
in the psychophysiological counseling research; to date, researchers have not investigated child-
therapist psychophysiological synchrony during play therapy sessions. Play therapists believe that the relationship between the child and therapist is the therapeutic change agent. Children with multiple ACEs may experience different self-regulatory progress patterns during CCPT treatment because those who endure complex trauma are often (1) preoccupied with danger or (2) unable to differentiate safety and threat cues (van der Kolk et al, 2009). In order to examine whether children can begin co-regulating with the therapist, it is necessary to determine whether the child and therapists’ heart rates synchronized during play therapy.

**Chapter Two Summary**

In Chapter Two, the researcher thoroughly reviewed scholarship and research related to childhood complex trauma, ACEs, play therapy, and polyvagal theory. Researchers found that CCPT was an effective treatment for children exposed to multiple ACEs, evidenced by children’s improvements in social, emotional, behavioral, and trauma symptoms (Haas & Ray, 2020; Ray et al., 2022). However, no researchers have examined the psychophysiological impacts of CCPT during and across play therapy sessions, despite the neurobiological impacts of ACEs, such as compromised amygdala functioning and highly reactive sympathetic nervous systems (Luby et al., 2019; Jimenez et al., 2021; Pretty et al., 2013). Through identifying clear gaps in play therapy and child counseling research bodies related to the psychophysiological impacts of play therapy, the researcher found support for the project. For this investigation, the researcher examined the processes and mechanisms of change in child-centered play therapy with children with histories of trauma and early adversities.
CHAPTER THREE: METHODOLOGY

Using a time series design (Box et al., 2016), the researcher examined the presence of relational change mechanisms and therapeutic alliance development in play therapy treatment with children who endured complex trauma and early adversities. Specifically, the researcher examined how the child-counselor relationship (as measured by child-counselor heart rate synchrony) functioned during and across play therapy sessions. In this chapter, the researcher introduces the research design, methodology, and procedures of the current investigation. In the following sections, the researcher outlines the following elements of the present research study: (1) research design, (2) recruitment and sampling procedures, (3) instrumentation, (4) intervention, (5) data collection, (6) data analyses, (7) limitations, and (8) ethical considerations.

Research Design

The researcher utilized a time series design (Box et al., 2016) to examine the process and relational mechanisms of change in play therapy with children exposed to complex traumatic events and/or early childhood adversities using intensive longitudinal physiological data. Researchers utilize time-series designs to examine how change occurs throughout a manualized therapy intervention using sequential observational data (Gottman et al., 1969). Gottman and colleagues (1969) advocated for time-series research methodologies because researchers utilizing pretest-posttest designs fail to rival theoretical hypotheses or shed light on the nature of therapeutic change processes. Intensive longitudinal data refers to data measured 20 or more times within a time series (Collins, 2006; McNeish et al., 2021). As data collection technologies advanced during recent decades (e.g., availability of wearable non-intrusive physiological monitors), researchers proposed new possibilities for longitudinal data collection and analysis.
Through using intensive longitudinal data, researchers may attend to “intraindividual variations,” seeking to understand the change process within an individual (Collins et al., 2006, p. 506). Hough (2019) examined the impacts of CCPT for children diagnosed with Generalized Anxiety Disorder (GAD), specifically for ameliorating children’s autonomic nervous system activity (i.e., stress responses); however, the Hough (2019) used a single case research design (SCRD) design rather than a time series design. Therefore, through a time-series methodology, the researcher examined the presence of physiological markers of therapeutic alliance (e.g., attunement; empathy) in CCPT, and whether treatment predicted autonomic nervous system regulatory changes among children exposed to ACEs.

**Sampling and Recruitment Strategies**

The researcher obtained approval from the University of Central Florida’s Institutional Review Board (IRB) before engaging in participant recruitment and data collection. Specifically, the researcher submitted an IRB application that included: (1) an informed consent document, (2) demographic questionnaire; (3) *Pediatric ACEs and Related Life Events Screener* (Koita et al., 2018); and (4) *Human Research Protocol* form. After receiving IRB approval from the University of Central Florida, the researcher submitted a research request application to the elementary school’s district ethics and research department. After receiving all necessary approvals from the university and school district, the researcher recruited participants from a Title-I elementary school in the Southeast United States. The researcher employed a purposive sampling strategy and utilized the elementary school counselor’s referrals. The school counselor referred students with histories of ACEs (as measured by the *Pediatric ACEs and Related Life Events Screener* [PEARLS]; Koita et al., 2018). After completing the PEARLS screening on potential participants based on their knowledge of the child’s home situation, the school
counselor sent home the informed consent document to caregivers before providing PEARLS outcomes to the researcher. Also, the researcher met with teachers and administrators at the elementary school prior to the start of the 2022-2023 academic year to establish rapport. During interactions, the researcher answered teachers’, administrators’, and caregivers’ questions about the nature of the research and the CCPT intervention.

The researcher set the following inclusion criteria for participation research study: (1) the child was between the ages of 5-8 years-old; (2) the child endured four or more ACEs (measured by the PEARLS; Koita et al., 2018); and (3) caregivers/guardians provided informed consent for their child’s participation in play therapy treatment and data collection. In addition to caregiver informed consent, children provided ongoing verbal assent throughout the play therapy and data collection process. Verbal assent involves honoring the child’s choice/agreement to participate in play therapy services, which is supplemental to caregiver consent (Ashby & McKinney, 2015; Welfel, 2010; Yee & Cheng, 2022).

The researcher established the following exclusion criteria: (a) children who were receiving play therapy services and/or another mental health counseling related service or (b) children who could not fully participate in the play therapy intervention two days per week during an eight-week period in the elementary school setting. The researcher recruited five participants for the current study. However, one child transferred schools because the family suddenly moved across state lines. For this exploratory study, the researcher utilized intensive longitudinal data. Researchers who collect intensive longitudinal data can investigate complex dynamic associations using the small N design (less than 10 participants; Strahler & Luft, 2019). For each play therapy session (total of 41), the researcher analyzed 3,600 heart rate observations and 115,200 blood volume pulse observations.
**Participant Screening Procedures**

After receiving referrals and initial parental consent for children to participate in the study, the researcher met with caregivers and the school counselor (by phone or in-person, depending on caregiver availability and needs) for a screening interview. During these initial meetings, the researcher further discussed and answered any follow-up questions regarding the informed consent document (already signed before the interview) with caregivers. The informed consent document outlined: (1) the purpose of the research study, (2) data being collected, (3) a description of the play therapy intervention, (4) the researcher’s efforts to ensure confidentiality and anonymity, and (5) the potential risks and benefits associated with participation. The researcher explained caregivers’ rights to withdraw from the research study at any time. After reviewing the informed consent, the researcher facilitated initial intake interviews and screening processes. The researcher conducted brief interviews to gather relevant child background information, including developmental history and mental health history (see Appendix A).

At the conclusion of all participant recruitment and data collection procedures, the researcher recruited a final sample of four children. The researcher initially recruited five children for this intervention study; however, one child experienced a sudden school disruption after the initial play therapy session; thus, four children completed the play therapy treatment and were included in data analysis of the current study. The researcher assigned random pseudonyms for all participants, which the researcher used throughout this study to describe individual participants.

**Jessica**

Jessica was a 7-year-old White cisgender girl in the second grade. She participated in 14 play therapy sessions, and all 14 sessions included the Empatica wristband data. Developmentally, Jessica began walking at 10 months, speaking at age 2, and self-feeding by 18
months, and her caregiver reported that Jessica developed similarly to other children. At the time of this study, Jessica (a) never received a mental health diagnosis, (b) had no history of previous mental health or therapeutic services, and (c) had no previous or current medications. Jessica met criteria for the current study because she experienced five ACEs, including: (a) physical neglect, (b) complex sexual abuse, (c) caregiver separation/divorce, (d) caregiver death, and (e) caregiver mental illness.

**Jadyn**

Jadyn was an 8-year-old, multiracial, Latino cisgender boy in the third grade at the time of this study. Jadyn participated in 10 play therapy sessions, and all 10 sessions included Empatica wristband data. Jadyn qualified for participation in this study because his PEARLS score indicated that he endured six forms of ACE-related exposures, including: (a) domestic violence, (b) physical abuse, (c) caregiver separation/divorce, (d) physical neglect, (e) caregiver serious physical illness, and (f) caregiver death. Jadyn’s caregiver reported that there were no birth and delivery-related complications, and noted that Jadyn seemed to develop similarly to other same-age children. According to his caregiver’s report, Jadyn began walking at age 1, speaking at age 2, and self-feeding at age 1. According to his caregiver-reported mental health history, Jadyn has no history of mental health diagnoses. Additionally, Jadyn has never received mental health or behavioral therapy services, and he was not taking any psychotropic medications during this study.

**Nico**

Nico was a 5-year-old, multiracial, Latino, cisgender boy who was a kindergarten student at the time of this study. Nico participated in 12 play therapy sessions, and seven sessions included Empatica wristband data (seven sessions included in analysis). His caregiver completed
the demographic form and reported an annual household income of less than $25,000 per year. Developmentally, Nico’s caregiver indicated no birth or delivery-related complications, and noted that he developed “more mature” than children his age. Nico’s caregiver reported that he began walking by 13 months, speaking words by 10 months, and self-feeding at 12 months. As it relates to mental health history, Nico had no previous mental health diagnoses or therapeutic services, and he was not taking medication during this study. Nico was exposed to five ACE-related events, including: (a) caregiver mental illness, (b) household substance abuse, (c) witnessing domestic violence in the family household, (d) caregiver separation/divorce, and (e) separation from caregivers due to child welfare involvement (e.g., foster care).

**Ava**

Ava was a 6-year-old Asian American cisgender girl who was a kindergartner student at the time of this study. Ava participated in 10 play therapy sessions, and 10 sessions included Empatica wristband data. While interviewing Ava’s mother at the elementary school, her mother reported that there were no birthing difficulties or delivery-related complications with Ava, and she reported that her daughter developed in a manner that was similar to other children her age. Ava’s mother reported that she began walking at 18 months, speaking at 24 months, and self-feeding at four years old. Ava’s mother reported that her daughter had no mental health services history, with no previous diagnoses, therapeutic services (play therapy, counseling, behavioral therapy), or medication history. Ava qualified for participation in this study because she experienced four categories of ACE-related exposures: (a) caregiver mental health issues, (b) witnessing domestic violence in the household, (c) caregiver separation/divorce, and (d) familial separation (immigration).
Instrumentation

The researcher utilized three instruments for data collection, including: (1) child demographic form; (2) the Pediatric ACEs and Related Life Events Screener (PEARLS; Koita et al., 2018), and (3) Empatica E4 wristbands (Empatica, 2020). In this section, the researcher describes the instruments and their psychometric properties.

**Demographic Form**

During interviews with parents and/or teachers, the researcher collected participants’ demographic information at intake. The researcher developed the demographic form that included the following items: child’s age, grade level, racial identity, ethnicity, gender identity, socio-economic status, family background, and developmental and mental health histories (see Appendix A). The researcher developed the first seven demographic questions based on the U.S. Census questionnaire. The researcher opted to collect gender demographics rather than biological sex for inclusivity purposes (Slade et al., 2021). Following Ray’s (2011) recommendations, the researcher included questions related to child development, family background, and mental health history.

**Pediatric ACEs and Related Life Events Screener (PEARLS)**

The researcher utilized the PEARLS (Koita et al., 2018; see Appendix B) during participant screening procedures to examine participation eligibility. The referring school counselor completed the PEARLS for the child participant based on her knowledge of the child’s history. After receiving informed consent, the researcher gathered additional details about the participants’ trauma histories using the PEARLS. In developing the PEARLS, Koita et al. (2018) expanded the original 10-item ACE scale (Felitti et al., 1998) and included seven ACE-related events. The first 10-items (based on Felitti et al., 1998) consist of three categories: abuse,
neglect, and household dysfunction. The abuse category (3 items) includes items related to (1) physical abuse, (2) psychological abuse, and (3) sexual abuse. The neglect category (2 items) includes items related to (1) physical neglect and (2) emotional neglect. The household dysfunction category includes five items related to the childhood household environment, covering: (1) domestic violence, (2) household member chronic mental illness or suicidality, (3) household member substance abuse, (4) household member incarceration, and (5) parental separation/divorce (Felitti et al., 1998; Koita et al., 2018). In developing the PEARLS, Koita et al. (2018) added seven ACE-related events associated with childhood adversity and toxic stress, including: (1) community violence, (2) discrimination, (3) food insecurity, (4) housing insecurity, (5) forced caregiver separation (e.g., foster care), (6) caregiver death, and (7) caregiver chronic illness or disability.

The PEARLS includes 17 dichotomous items, worded in questions, such as: “do you think your child ever felt unsupported, unloved and/or unprotected?” (Koita et al., 2018). For each item, respondents endorsed items that reflected the child’s experiences by checking “yes.” The researcher calculated participants’ total ACE scores by summing the “yes” responses. To increase the instrument’s face validity, the developers recruited a validating sample of caregivers (n = 28) and clinicians (n = 16) who completed the PEARLS and participated in cognitive interviews. After completing the PEARLS, the respondents participated in cognitive interviews and discussed their comfort with the instrument, item comprehension, item clarity, and coverage (i.e., any significant events missing from the instrument; Koita et al., 2018). After cognitive interviews, Koita et al. (2018) changed wording on items to increase inclusivity (e.g., using “their” rather than “his or her”) and clarity (e.g., adding the word “jail” to incarceration item). Based on cognitive interview findings, Koita et al. combined and separated items based on
caregiver feedback (e.g., combining items related to witnessing and experiencing community violence; separating caregiver separation and caregiver death). Thakur and colleagues (2018) conducted a scale validation study and found evidence for strong concurrent validity: children who were at high-risk for toxic stress-related health outcomes (such as poor executive functioning) consistently scored in the high range (score of four or more) on the PEARLS. The researcher chose the PEARLS because Koita et al. (2018) included the original 10 ACES and additional events linked with toxic, recurring stress during childhood (Thakur et al., 2020). Felitti and colleagues’ (1998) original ACE questionnaire is a self-report measure designed for adult respondents. The researcher selected the PEARLS because it is developmentally appropriate and adults answer the questions based on their knowledge of the child’s history (Koita et al., 2018).

**Empatica E4 Devices**

The researcher utilized Empatica© E4 wristbands (Empatica, 2020) to measure participants’ and counselor’s psychophysiological activity during play therapy sessions. The E4 wristband is worn on the non-dominant wrist and captures continuous physiological data. Researchers use E4 devices to collect biomarkers in an unobtrusive manner during clinical interventions. For a five-minute period before each play therapy session, the child wore the E4 wristbands to capture baseline (Twomey, 2014). The researcher collected this pre-session physiological data because all people have varying normative physiological signals (e.g., HRV; Gruden et al., 2019); for the heart rate (BPM) data, the baseline readings were continued because the researcher wanted children to get comfortable with the wristbands prior to play therapy sessions. During each CCPT session, the child participant and counselor wore the E4 wristbands. The E4 device is a class II medical-grade device and includes four sensors: (1) photoplethysmography (PPG); (2) electrodermal activity (EDA); (3) 3-axis accelerometer; and
(4) infrared thermopile (Empatica, 2020). For this study, utilized the PPG sensors to examine sympathetic and parasympathetic nervous system activity during the play therapy sessions. The researcher examined the participants’ and counselor’s heart rate (beats per minute; BPM) data for the purpose of computing physiological synchrony during play therapy sessions.

Researchers use the PPG sensor to capture blood volume pulse (BVP) changes and compute heart rate variability (HRV) measurements. The researcher generated the following HRV indices: (1) the root mean square of successive differences between normal heartbeats (RMSSD); (2) low frequency to high frequency ratio (LF/HF). Researchers regard the root mean square of successive differences between normal heartbeats (RMSSD) as a reliable indicator of autonomic nervous system modulation (increased parasympathetic nervous system activity) through vagal nerve regulation (Milstein et al., 2020; Shaffer et al., 2014). The Empatica E4 PPG sensor has a sampling frequency of 64 Hz, meaning that the sensor captures 64 samples per second. The researcher utilized RMSSD and LF/HF HRV band indices to understand participants’ shifts in autonomic nervous system regulation nervous system within and across the play therapy treatment process.

**Intervention**

**Counselor/CCPT Facilitator**

The researcher facilitated the CCPT intervention for the proposed study. The researcher is a doctoral student in a counselor education and supervision program at a CACREP-accredited university. The researcher completed three play therapy courses at the University level. In addition, the researcher completed the two CCPT certification workshops through the University of North Texas Center for Play Therapy: (a) CCPT 101: Basics in Child-Centered Play Therapy and (b) CCPT 102: Child-Centered Play Therapy Practice and Application and received over 150
hours of play therapy supervision from Certified Child Centered Play Therapist Supervisors and Registered Play Therapist Supervisors. During the intervention, the researcher received weekly supervision to review session recordings to ensure that she is following the CCPT treatment protocol.

The researcher created a private, designated play therapy room (located in the elementary school) with play therapy toys and materials recommended by Kottman (2011; See Table 1). The researcher provided various toys in the room covering the play therapy toy categories: (a) family/nurturing, (b) fantasy/pretend, (c) aggressive, (d) scary, and (e) expressive arts. The researcher also set up two video recording devices in the space to record play therapy sessions for data collection and supervision purposes.
**Table 1 Play Therapy Toys and Materials**

<table>
<thead>
<tr>
<th>Kottman’s (2011) Toy Category</th>
<th>Purpose</th>
<th>Toys Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family and Nurturing</td>
<td>Provide materials that help children explore family relational dynamics and build relationships within the playroom (i.e., therapist-child relationship)</td>
<td>Baby dolls (multiracial), cradle, toy food, toy kitchenware and appliances, diverse doll families, baby bottle, people puppets</td>
</tr>
<tr>
<td>Fantasy/Pretend</td>
<td>Open opportunities for clients to express emotions, explore diverse roles, and act out situations happening outside of the playroom</td>
<td>Doctor’s kit, magic wand, dress up clothing, telephones, building materials/blocks, sandbox, animal miniatures, puppet theatre</td>
</tr>
<tr>
<td>Expressive Arts</td>
<td>Provide materials for children to increase self-efficacy and problem-solving abilities, express creativity, explore their feelings, and gain mastery.</td>
<td>Easel, paints, glue, clay, scissors, fabrics, popsicle sticks, crayons, markers, colored pencils, feathers, egg cartons</td>
</tr>
<tr>
<td>Aggressive</td>
<td>Provide opportunities to explore and experiment with anger and aggression in a safe, symbolic manner</td>
<td>Bop bag, toy guns, foam swords, handcuffs, plastic or rubber knife, pillows, plastic shields</td>
</tr>
<tr>
<td>Scary Toys</td>
<td>Help children approach and process their fears</td>
<td>Dragons, dinosaurs, spiders, snakes, and monster figurines, toys, and puppets</td>
</tr>
</tbody>
</table>
Intervention

Four children received two 30-minute CCPT sessions per week during an eight-week period (up to 16 total play therapy sessions). Ray and colleagues (2015) conducted a meta-analysis to examine the efficacy of CCPT in school settings and found that shorter-term CCPT (4-25 sessions; average of 12 sessions) was sufficient for capturing change/improvement in various areas, such as externalizing behavior problems and self-efficacy levels. Thus, the researcher aimed to conduct at minimum 12 sessions per child client. Jessica completed 14 sessions, Jadyn completed 10 sessions, Ava completed 10 sessions, and Nico completed 12 sessions (only 7 recorded wristband data). The researcher facilitated the play therapy sessions in a dedicated and confidential space at the elementary school. Jadyn participated in fewer sessions due to absenteeism, and one missed session during a hurricane. Ava started play therapy later in the semester, and missed one additional session during the hurricane. Ten minutes before each session, the researcher visited each participant in their classroom and set up the Empatica © E4 device (worn on their non-dominant wrist) so that the researcher could gather stable baseline HR and HRV data before the intervention. The researcher collected this pre-session physiological data because all people have varying normative physiological signals (e.g., HRV). Therefore, to understand a child’s stress response and regulation patterns during play therapy sessions, the researcher needed to gather consistent baseline HRV data and contextualize each child’s individual psychophysiological activity (Gruden et al., 2019). However, the researcher did not utilize baseline data for the child-counselor HR (beats-per-minute) synchrony analyses. The therapist wore the E4 device for 10-minutes, twice per week for baseline purposes during daytime hours. The therapist maintained physical activity consistent with play therapy activities (sitting in chair, occasionally standing and walking). After baseline data were collected, the
researcher facilitated 30-minute individual CCPT sessions twice per week. After each session, participants and the therapist removed the E4 devices, and the data were uploaded to the secured storage cloud: E4 Connect. E4 connect is hosted through Amazon Web Services, a system that is compliant with "security management best practices and comprehensive security controls" (Empatica, 2022, para 2.) and no identifying information is linked to this platform.

To support Empatica-video recording synchronization, the therapist pressed the event-marking button on her E4 wristband at the beginning of each session, while sitting in front of the video recording device. When the therapist pressed the event-marking button, the E4 wristband illuminated (one second duration; Empatica, 2021) in front of the recording device. Simultaneously, the Empatica physiological data file recorded the event timestamp. The researcher aligned the video recordings to the physiological data files by aligning wristband light flashes (video recorded) and the event timestamps (Empatica data files). Because the child and therapists’ wristbands shared the same internal real-time clock, the child’s wristband data were aligned using the therapists’ wristband data timestamp (e.g., if the therapist marked the session start at 15:28:00.00, the researcher marked that timestamp in the child’s physiological data file as well). To synchronize physiological data with video recordings, the therapist followed Empatica’s (2020) recommended steps:

- Step 1: Watch video recording, and pause video when the Empatica light flashes
- Step 2: In video, find the video recording timestamp (time \( v \)) when the LED light flashes
- Step 3: Locate corresponding event timestamp in Empatica data log (time \( e \))
- Step 4: Determine time offset and synchronize video and physiological data by calculating time \( e - v \)
The therapist facilitated CCPT sessions consistent with Ray’s (2011) CCPT Treatment Manual. During play sessions, the counselor focused on fostering and maintaining a therapeutic relationship involving congruence/genuineness, unconditional positive regard, and empathy. The counselor maintained a non-directive approach and utilized CCPT facilitative responses (see Table 2). During sessions, the therapist also utilized nonverbal skills. The therapist maintained a congruent tone of voice (matching child’s emotional states and therapists’ spoken words; Ray, 2011). The therapist also respected the child’s physical space (Landreth, 2012) and allowed the child to decide how close/far they wanted to be from the therapist (i.e., the therapist sat in a rolling chair and did not follow the child around the room). The therapist also nonverbally tracked the child by shifting body posture and rotating in a rolling chair (i.e., “therapist’s toes should follow their nose;” Landreth, 2012, p.190)
Table 2 Child-Centered Facilitative Responses

<table>
<thead>
<tr>
<th>Facilitative Response</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
</table>
| Tracking              | Therapist verbally responds to the child’s behavior, avoiding labeling items before the child | *You’re hitting that one*  
*You put that one over there* |
| Reflecting Content    | Paraphrasing the child’s verbal communication to help the child feel understood | *Child: this room has so many animals and my classroom has this dog, zebra, and fish....*  
*Therapist: there are lots of things in here like things at your school* |
| Reflecting Feeling    | When child shares feelings (verbally or through play), therapist reflect feelings to communicate their genuine acceptance and understanding of the child’s feelings | *You feel excited*  
*That frog feels worried* |
| Reflecting Relationship| Therapist reflects child’s feelings in relationship to the therapist. Responses include references to both the therapist (me) and the child (you). | *You wanted to move closer to me*  
*You wanted to help me with something*  
*You are excited to be here with me today* |
| Self-Esteem Building Responses | Therapist encourages the child’s efforts by using encouragers | *You are working hard on this painting* |
| Facilitating Decision Making | Therapist facilitates child’s abilities to make choices and do things for themselves | *Child: How do I use this thing?*  
*Therapist: You can decide how that thing is used* |
Purpose and Research Questions

The researcher investigated whether theory-driven relational processes predicted co-regulation and child-counselor physiological synchrony during CCPT play therapy sessions among children exposed to ACEs. Child-centered practitioners emphasize that the relationship is the necessary and sufficient therapeutic change mechanism. The researcher planned to investigate the influence of child-therapist physiological synchrony on intraindividual variations in autonomic nervous system regulation; however, the researcher noted that the therapist and child participants experienced significant heart rate synchrony during 90% of the sessions, while the HRV indices fluctuated more during the play therapy treatment. Therefore, the researcher presented a table of HRV indices for each session without running a predictive model. The following research questions guided this research study:

Research Question 1

What is the co-regulatory impact of CCPT treatment among individual child clients, as measured by child-counselor heart rate synchrony (non-absolute effect sizes) during individual play therapy sessions?

Null Hypothesis 1

H₀: The observed child-counselor heart rate synchrony values do not exceed the pseudo correlations generated through random shuffling of data, and the results fail to exceed what would be expected by chance alone.

Alternative Hypothesis 1

H₁: The observed child-counselor heart rate synchrony values are statistically significantly greater than the pseudo correlations.
Research Question 2

Will the counselor and child clients experience statistically ($p < .05$) and practically (mean $ES_{noabs} \neq 0$) significant levels of heart rate synchrony across sessions during CCPT treatment?

Null Hypothesis 2

$H_0$: The mean effect size of non-absolute Z values ($ES_{noabs}$) is not significantly greater than zero, indicating a lack of synchrony.

Alternative Hypothesis 2

$H_1$: The mean effect size of the non-absolute Z values ($ES_{noabs}$) is significantly greater than zero, indicating significant in-phase heart rate synchrony across play therapy sessions.

Data Preprocessing

Heart Rate Variability

To calculate HRV indices (RMSSD and LF/HF), the researcher computed time-domain and frequency domain HRV analyses of the PPG sensor data. The researcher computed and visually presented two HRV indices in the proposed study: (1) RMSSD and (2) LF/HF. The researcher computed these HRV indices using Kubios 3.3 Premium HRV analysis software (https://www.kubios.com/hrv-premium/). RMSSD is a measure of beat-to-beat intervals (R-R intervals), and researchers utilize RMSSD to determine parasympathetic nervous system activity and vagal functioning (Laborde et al., 2017; Shaffer & Ginsberg, 2017). Schaffer and Ginsberg (2017) reported that RMSSD is the primary index of vagally mediated HRV changes because RMSSD is primarily influenced by parasympathetic activity, rather than respiration frequency and movement. The high frequency band (0.24-1.04 Hz) is also an index of parasympathetic
nervous system activity, whereas the low frequency band (.04-0.24) is an index of sympathetic nervous system activity. Researchers have associated the LF/HF index with parasympathetic and sympathetic balance. The researcher examined PPG Empatica wristband data using Kubios preprocessing procedures. The researcher examined noise segments (distorted portions of recording) and ensured that they were excluded from HRV analyses (consistent with recommended protocols; Kubios, 2018).

For heart rate data, the researcher downloaded the heart rate (HR) CSV data file from the Empatica Connect secured cloud storage system. The HR data, expressed in beats-per-minute (BPM), is pre-processed through the Empatica E4 algorithm and provides heart rate estimates for each second (1 Hz; Milstein & Gordon, 2020). Therefore, the researcher did not use baseline data to calculate child-counselor synchrony.

Data Analysis

Research Questions 1

What is the co-regulatory impact of CCPT treatment among individual child clients, as measured by child-counselor’s heart rate synchrony during individual play therapy sessions?

To examine the presence of heart rate synchrony between the child and counselor during play therapy sessions, the researcher applied the SUSY (Surrogate Synchrony; Tschacher & Meier, 2020; https://CRAN.R-project.org/package=SUSY) statistical software in R Studio Version 2022.12.0+353. Using SUSY in R Statistical software, the researcher computed cross-correlations between the therapist’s and child’s heart rate data (BPM) across shared time segments (i.e., each session; Tschacher & Meier, 2020). The SUSY algorithm cuts time series segments and computes cross-correlations across designated windows (Tschacher & Meier, 2020). The researcher applied the SUSY algorithm to generate control variables (via random
sequence shuffling), which allowed the researcher to identify if correlations were greater than values anticipated by chance alone (Kleinbub et al., 2020; Ramseyer & Tschacher, 2010). The researcher utilized the non-absolute effect sizes to determine the level of physiological synchrony within sessions and across sessions (Tschacher & Haken, 2019).

The researcher computed surrogate tests using random sequence shuffling that served as control conditions for all Z values (Tschacher & Meier, 2020). For each session, there were \( n(n - 1) \) surrogate tests. Through these surrogate tests, the researcher obtained effect size values: non-absolute effect size \( (\text{ES}_\text{noabs}) \). The \( \text{ES}_\text{noabs} \) is the effect size for the non-absolute Z values, calculated as the difference between the non-absolute Z values and surrogate non-absolute Z values, divided by the standard deviation of surrogate non-absolute Z values:

\[
\frac{(Z_{\text{noabs}} - Z_{\text{noabs-surr}})}{SD(Z_{\text{noabs-surr}})}.
\]

The researcher chose to examine \( \text{ES}_\text{noabs} \) because this value differentiates positive (in-phase) and negative (antiphase) synchrony across segments in each session (Coutinho et al., 2020; Tschacher & Meier, 2020).

**Research Question 2**

*Will the counselor and child clients experience statistically and practically significant levels of heart rate synchrony across sessions during CCPT treatment?*

The researcher conducted a single sample \( t \)-test to identify if the SUSY effect sizes \( (\text{ES}_\text{noabs}) \) for heart child-counselor heart rate synchrony across the 41 play therapy sessions differed significantly from zero (consistent with previous researchers utilizing SUSY analyses across psychotherapy treatments; Coutinho et al., 2020; Tschacher & Meier, 2020; Wilson et al., 2018). The researcher exported the SUSY \( \text{ES}_\text{noabs} \) values for the 41 play therapy sessions to an IBM Statistical Package for the Social Sciences (SPSS; Version 29) data file for analysis. If the
results of the one sample t test show a mean $ES_{noabs}$ that deviates significantly from zero, and is statistically significant ($p < .05$), the researcher will accept the alternative hypothesis (statistically and practically significant heart rate synchrony across sessions).

**Ethical Considerations**

The researcher followed the University of Central Florida’s IRB ethical research guidelines. The researcher submitted an IRB application that includes the following: (1) informed consent documents (e.g., parent/caregiver, teacher/school administrator), (2) demographic questionnaire; (3) *Pediatric ACEs and Related Life Events Screener* (Koita et al., 2018); and (4) a Human Research Protocol form. First, the researcher obtained IRB approval before engaging in data collection processes. After receiving IRB approval from the University of Central Florida (see Appendix C), the researcher received approval from district’s Research and Evaluation review department. The researcher obtained informed consent from all parents and assent from child participants (see Appendices D and E) prior to data collection. The researcher protected participants’ confidentiality by de-identifying all assessments (i.e., using participant number) so that children’s names or personal information could not be linked to their scores. Additionally, participants’ session recordings were stored on a password-protected hard drive.

**Chapter Three Summary**

In Chapter three, the researcher provided a detailed overview of the proposed methodology, including: (1) research design, (2) recruitment and sampling procedures, (3) instrumentation, (4) intervention, (5) data collection, (6) data analysis plans, (7) limitations and threats to validity, and (8) ethical considerations. In Chapter 4, the researcher reports the quantitative results of this study.
CHAPTER FOUR: RESULTS

In Chapter Four, the researcher presents the results of the current study. The researcher implemented a time series research design to examine the processes and mechanisms of change in child-centered play therapy with children with histories of trauma and early adversities. First, the researcher describes the participants in the current study. Next, the researcher provides individualized results per child across play therapy sessions. To protect the privacy of participants in this study, the researcher provided pseudonyms that are used throughout Chapters Four and Five.

Individualized Results

Research Question 1: What is the co-regulatory impact of CCPT treatment, as measured by child-counselor’s heart rate synchrony during individual play therapy sessions?

To examine the presence of heart rate synchrony between the child and counselor during play therapy sessions, the researcher applied the SUSY (Tschacher & Meier, 2020; https://CRAN.R-project.org/package=SUSY) statistical software in R Studio Version 2022.12.0+353. During play therapy sessions, the counselor and child’s heart rate data were collected at a sampling frequency of one Hz (one measurement per second). The researcher computed SUSY analyses with the following parameters: sampling rate (Hz = 1), segment size (120 seconds), max lag (three seconds), window (six seconds). The SUSY analysis uses Fisher’s Z transformations to allow for aggregation of data within each window. To evaluate the accuracy of synchronization, the researcher used surrogate synchrony (i.e., “within-dyads” pseudo-synchrony; Kleinbub et al., 2020; Ramseyer & Tschacher, 2010).
**Individualized Results: Jessica**

Jessica was a 7-year-old White cisgender girl in the second grade. She participated in 14 play therapy sessions, and 14 sessions included video and Empatica wristband recordings. Developmentally, Jessica began walking at 10 months, speaking at age 2, and self-feeding by 18 months, and her caregiver reported that Jessica developed similarly to other children. At the time of this study, Jessica had no history of previous mental health or therapeutic services or medications. Jessica met criteria for the current study because she experienced five ACEs, including: (a) physical neglect, (b) complex sexual abuse, (c) caregiver separation/divorce, (d) caregiver death, and (e) caregiver mental illness. Over the course of therapy, she presented with the following play themes: relationship, perfectionism, integration, and mastery.

**Session 1**

The large non-absolute effect size indicated in-phase heart rate synchrony between Jessica and the counselor during play therapy, $ES_{noabs} = 23.86984$ ($SD = 0.04983$; see Figure 1). Through examining the non-absolute cross-correlation and surrogate non-absolute cross-correlation plot, the researcher observed that the real synchrony was greater than the pseudo synchrony values (null hypothesis) at -3, -2, -1, 0, 1, 2, and 3-second lags (see Figure 2).
To examine session-level shifts in child-counselor heart rate synchrony during play therapy session one, the researcher observed the plot of segment synchronies (cross-correlations and surrogate-cross correlations across the time segments). Jessica and the counselor experienced
greater heart rate synchrony than what was anticipated by surrogate controls (e.g., null hypothesis) during nine of the 13 segments (69.23% of session). Jessica and the counselor shared greater heart rate synchrony than surrogate correlation estimates during segments 1-3 (real corr. range: 0.75 - 0.8; surrogate corr. range: 0.4 – 0.55) 5 (real corr. = 0.78; surrogate corr. = 0.45), 7 (real corr. = 0.95; surrogate corr. = 0.50), and 9-12 (real corr. ranges, 0.6 – 0.9; surrogate corr. ranges, 0.32 – 0.56). Jessica and the counselor demonstrated heart rate synchrony below what would be expected during only four segments: 4, 6, 8, and 13, and there were no equal surrogate and true values across the segments (see Figure 3).

Figure 3 Real Synchrony and Pseudo Synchrony Values Across 120-second Segments: Session 1

**Session 2**

The researcher conducted a SUSY analysis to examine Jessica’s and the counselor’s heart rate synchrony levels during session two. The large non-absolute effect size indicated in-phase heart rate synchrony between Jessica and the counselor during session two, $\text{ES}_{\text{noabs}} = 150.8796 \ (SD = 0.0452; \text{see Figure 4})$. The researcher observed evidence that the real synchrony values were greater than mean surrogate values at all time lags (see Figure 5).
Next, the researcher generated a segment synchrony plot and visually inspected shifts in child-counselor heart rate synchrony during specific time segments during play therapy session two (see Figure 6). In session 2, Jessica’s and the counselor’s physiological synchrony values exceeded chance correspondences (i.e., pseudo estimates) during time segments 5 (real corr. =
0.75; surrogate corr. = 0.70), 7 (real corr. = 0.88; surrogate corr. = 0.62), 9-10 (real corr. range =
0.74 – 0.78; surrogate corr. range = 0.45 – 0.65), 12 (real corr. = 0.84; surrogate corr. = 0.58),
and 14 (real corr. = 0.88; surrogate corr. = 0.65). The pseudo correlations were greater than the
observed synchrony values during segments 1-4, 6, 8, 11, and 13, and there were no equal
surrogate and true values across the segments. Overall, the therapeutic dyad demonstrated greater
heart rate synchrony than what was anticipated by surrogate controls during six of the 14
segments (43% of the session).

Figure 6 Real Synchrony and Pseudo Synchrony Values Across 120-second Segments: Session 2

Session 3

The large positive non-absolute effect size indicated in-phase heart rate synchrony
between Jessica and the counselor during play therapy session 3, ESnoabs = 49.59021 (SD =
0.06288; see Figure 7). The real synchrony values were greater than the pseudo synchrony values
at -3, -2, -1, 0, 1, 2, and 3-second lags (see Figure 8).
The researcher further examined Jessica’s and the counselor’s heart rate synchrony during play therapy session three, noting fluctuations in synchrony across time the 120-second time segments (see Figure 9). During session three, Jessica’s and the counselor’s observed heart rate synchrony exceeded pseudo synchrony values for the following segments: 1 (real corr. =
0.92; pseudo corr. = 0.66), 2 (real corr. = 0.83; pseudo corr. = 0.66), 3 (real corr. = 0.88; pseudo corr. = 0.66), 4 (real corr. = 0.70; pseudo corr. = 0.68), 5 (real corr. = 0.88; pseudo corr. = 0.60), 8 (real corr. = 0.81; pseudo corr. = 0.62), 9 (real corr. = 0.85; pseudo corr. = 0.66), and 10 (real corr. = 0.90, pseudo corr. = 0.56). The counselor and child’s observed synchrony values were below the surrogate controls during segments 6-7 and 11-15, and there were no equal surrogate and true values across the segments. Overall, Jessica and her counselor experienced greater synchrony than pseudo synchrony control values during eight of the 15 segments (53.33% of the play therapy session).

The researcher inspected the Z-synchrony non-absolute correlation plot and observed evidence

Figure 9 Real Synchrony and Pseudo Synchrony Values Across 120-second Segments: Session 3

Session 4

The counselor and Jessica met for a 20-minute play therapy session rather than 30 because of school scheduling issues and a 10-minute delay occurred. The non-absolute effect size was greater than 0 and indicated in-phase heart rate synchrony between Jessica and the counselor during play therapy session four, ES_{noabs} = 1.41325 (SD = 0.02236103; see Figure 10). The researcher inspected the Z-synchrony non-absolute correlation plot and observed evidence
that the real synchrony values were greater than mean surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second lags; see Figure 11).

Figure 10 Time Series of Jessica’s and the Counselor’s Heart Rate: Session 4

Figure 11 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 4
The researcher created a segment synchrony plot and visually inspected child-counselor heart rate synchrony within different time segments across play therapy session four (see Figure 12). During play therapy session four, Jessica’s and the counselor’s heart rate synchrony values exceeded surrogate correlation estimates during three of the 10 segments (50% of the play therapy session). Jessica and the counselor demonstrated above expected synchrony values during segments 1 (real corr. = 0.60; pseudo corr. = 0.42), 5 (real corr. = 0.58; pseudo corr. = 0.32), 7 (real corr. = 0.41; pseudo corr. = 0.39), 9 (real corr. = 0.68; pseudo corr. = 0.35), and 10 (real corr. = 0.42; pseudo corr. = 0.22). Jessica and the counselor demonstrated heart rate synchrony below what would be expected during four segments: 2, 3, 4, and 6. Jessica’s and the counselor’s heart rate synchrony values were equal to the surrogate correlation estimates during segment 8 (real correlation and pseudo corr. = 0.52).

Figure 12 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 4
Session 5

The large positive non-absolute effect size indicated large in-phase heart rate synchrony between Jessica and the counselor during play therapy session five, ESnoabs = 88.9438 (SD = 0.01406244; see Figure 13). The researcher inspected the Z-synchrony non-absolute correlation plot and observed evidence that the real synchrony values were greater than mean surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second; see Figure 14).

Figure 13 Time Series of Jessica’s and the Counselor’s Heart Rate: Session 5
The researcher generated segment synchrony plots and examined child-counselor heart rate synchrony across varying time segments during play therapy session five via visual inspection of the plots (see Figure 15). During their fifth session, Jessica’s and her counselor’s heart rate synchrony values exceeded the pseudo synchrony value control estimates during the following time segments: 2 (real corr. = 0.72; pseudo corr. = 0.39), 3 (real corr. = 0.56; pseudo corr. = 0.38), 4 (real corr. = 0.80; pseudo corr. = 0.62), 8 (real corr. = 0.88; pseudo corr. = 0.50), 12 (real corr. = 0.80; pseudo corr. = 0.50), 13 (real corr. = 0.50; pseudo corr. = 0.44), and 15 (real corr. = 0.79; pseudo corr. = 0.50). Jessica’s and the counselor’s observed heart rate synchrony was below the surrogate control values for segments 1, 5, 6, 7, 9, 10, 11, and 14, and there were no equal surrogate and true values across the segments. Overall, Jessica’s and the counselor’s observed heart rate synchrony levels were above surrogate correlations during seven of the 15 segments (i.e., above-expectation synchrony levels during 46.7% of the play therapy session).

Figure 14 Jessica’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 5
Session 6

The researcher computed a SUSY analysis of heart rate synchrony for play therapy session six and identified a large negative non-absolute effect size ($\text{ES}_{\text{noabs}} = -6.36744, \text{SD} = 0.08517846$). The negative non-absolute effect size indicated that there was a lack of in-phase synchrony for Jessica’s and the counselor’s heart rate during session six. The researcher observed evidence that the real synchrony values were greater than mean surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags) through an examination of the Z-synchrony non-absolute plot (see Figure 16).

Figure 15 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 5
The researcher examined child-counselor heart rate synchrony across varying time segments during play therapy session six via visual inspection of the segment synchrony plots (see Figure 17). During session six, Jessica and her counselor’s heart rate synchrony values exceeded the control surrogate pseudo correlation estimates during the following time segments:

3 (real corr. = 0.82; pseudo corr. = 0.55), 4 (real corr. = 0.90; pseudo corr. = 0.58), 6 (real corr. = 0.90; pseudo corr. = 0.62), 8 (real corr. = 0.90; pseudo corr. = 0.63), 9 (real corr. = 0.68; pseudo corr. = 0.60), 10 (real corr. = 0.88; pseudo corr. = 0.58), 11 (real corr. = 0.85; pseudo corr. = 0.50), 12 (real corr. = 0.97; pseudo corr. = 0.58), 13 (real corr. = 0.58; pseudo corr. = 0.50), and 14 (real corr. = 0.55; pseudo corr. = 0.48).
The researcher computed a SUSY analysis of heart rate synchrony between Jessica and her counseling during play therapy session seven, and identified a large positive non-absolute effect size (ES_{noabs} = 85.88205, SD = 0.03411079; see Figure 18). The large positive non-absolute effect size indicated the presence of in-phase synchrony during play therapy session 7. The researcher identified evidence that the real in-phase synchrony values were greater than mean pseudo surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second lags) through an examination of the Z-synchrony non-absolute plot (see Figure 19).
Figure 18 Time Series of Jessica’s and the Counselor’s Heart Rate: Session 7

Figure 19 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 7
The researcher generated a segment synchrony plot and visually inspected time varying shifts in child-counselor heart rate synchrony during play therapy session seven (see Figure 20). During session seven, Jessica and the counselor experienced greater than expected heart rate synchrony during the following time segments: 4, 5, 11, 13, 14, and 15. Overall, Jessica and the counselor experienced greater heart rate synchrony than what was expected by chance (null hypothesis, pseudo synchrony correlations) during 6 of the 15 segments (40% of the time during session seven).

![Figure 20 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 7](image)

**Session 8**

The researcher generated a SUSY analysis to assess heart rate synchrony between Jessica and the counselor during play therapy session 8. The SUSY results suggested strong in-phase heart rate synchrony during play therapy session 8, as the non-absolute SUSY effect size was
positive and significantly greater than zero ($ES_{\text{noabs}} = 76.46616$, $SD = 0.03193544$; see Figure 21). The researcher identified evidence that the real in-phase synchrony values were greater than mean pseudo surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags) through an examination of the Z-synchrony non-absolute plot (see Figure 22).

Figure 21 Time Series of Jessica’s and the Counselor’s Heart Rate: Session 8

Figure 22 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 8
Through a visual review of the segment synchrony plot for heart rate variability in session eight, the researcher identified changes in child-counselor heart rate synchrony across time segments in play therapy session eight (see Figure 15). During session eight, Jessica and the counselor experienced greater than expected heart rate synchrony during nine of the 12 segments (synchrony during 75% of play therapy session). The dyad experienced greater than estimated synchrony during the following time segments: 3 (real corr. = 0.74; pseudo corr. = 0.52), 4 (real corr. = 0.51; pseudo corr. = 0.42), 5 (real corr. = 0.78; pseudo corr. = 0.68), 6 (real corr. = 0.82; pseudo corr. = 0.58), 7 (real corr. = 0.65; pseudo corr. = 0.22), 8 (real corr. = 0.68; pseudo corr. = 0.58), 9 (real corr. = 0.78; pseudo corr. = 0.38), 11 (real corr. = 0.75; pseudo corr. = 0.70), and 12 (real corr. = 0.72; pseudo correlation = 0.45). Jessica and the counselor demonstrated below what would be expected by chance for heart rate synchrony during segments 1, 2, and 10.

Figure 23 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 8
Session 9

The researcher generated a SUSY analysis to assess heart rate synchrony between Jessica and the counselor during play therapy session nine. The negative non-absolute effect size indicated that there was a lack of in-phase synchrony for Jessica’s and the counselor’s heart rate during session nine: ES\textsubscript{noabs} = -48.068, SD = 0.03672811). The negative non-absolute effect size indicates antiphase synchrony (e.g., as one person’s heart rate increased, the other person’s heart rate decreased; Tschacher & Meier, 2020). During session nine, Jessica’s average heart rate was 96.93 beats per minute and the counselor’s average heart rate was 82.00 beats per minute. The researcher generated a heart rate time series plot to examine the extent of antiphase synchrony during session nine (see Figure 24). The researcher noted segments when the child experienced peaks in heart rate and the counselor maintained regular changes in heart rate fluctuations (i.e., no sudden spikes in heart rate). The researcher identified evidence that the real in-phase synchrony values were lower than mean pseudo surrogate synchrony values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second lags) through an examination of the Z-synchrony non-absolute plot (see Figure 25).
Figure 24 Time Series of Jessica’s and the Counselor’s Heart Rate in Session 9 with child HR spikes highlighted for visual inspection purposes

Figure 25 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 9

Session 10

The researcher generated a SUSY analysis to assess heart rate synchrony between Jessica and the counselor in the tenth play therapy session. The session was cut short (23 minutes)
because of a school event that was scheduled during the later third of the play session. The non-absolute SUSY effect size was positive and significantly greater than zero ($ES_{noabs} = 134.7224$, $SD = 0.04699173$; see Figure 26), suggesting strong in-phase heart rate synchrony during play therapy session ten. The researcher identified evidence that the real in-phase synchrony values were greater than mean pseudo surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags) through an examination of the Z-synchrony non-absolute plot (see Figure 27).

Figure 26 Time Series of Jessica’s and the Counselor’s Heart Rate in Session 10
The researcher found differences in child-counselor heart rate synchrony during varying time segments in session ten (see Figure 28). During play therapy session ten, Jessica and the counselor experienced greater heart rate synchrony during seven of the 11 segments (heart rate synchrony during 63.6% of the play therapy session) than expected by chance alone (i.e., surrogate/pseudo correlations). Jessica’s and the counselor’s observed synchrony values were greater than pseudo synchrony values during the following time segments: 1 (real corr. = 0.70; pseudo corr. = 0.60), 3 (real corr. = 0.88; pseudo corr. = 0.60), 5 (real corr. = 0.82; pseudo corr. = 0.62), 6 (real corr. = 0.79; pseudo corr. = 0.52), 7 (real corr. = 0.78; pseudo corr. = 0.60), 8 (real corr. = 0.98; pseudo corr. = 0.62), and 9 (real corr. = 0.48; pseudo corr. = 0.42). Jessica and the counselor demonstrated below what would be expected by chance for heart rate synchrony during the following segments: 2, 4, 10, and 11.

Figure 27 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 10
The researcher conducted a SUSY analysis to assess heart rate synchrony between Jessica and the counselor in the 11th play therapy session. The non-absolute SUSY effect size was positive and greater than zero ($ES_{noabs} = 69.268$, $SD = 0.04883789$), suggesting strong in-phase heart rate synchrony during play therapy session 11 (see Figure 29). The researcher visually inspected the Z-synchrony non-absolute plot (see Figure 30) and observed evidence that the real in-phase synchrony values were greater than mean pseudo surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second lags).
For session 11, the researcher identified differences in child-counselor heart rate synchrony during varying time segments (see Figure 31). During play therapy session 11, Jessica and the counselor experienced greater heart rate synchrony, as compared to the surrogate control correlation values. Jessica’s and the counselor’s heart rate synchrony values were greater than
the surrogate synchrony control values for eight of the 13 segments (in-phase heart rate synchrony during 61.5% of the play therapy session). Real synchrony values were greater than pseudo synchrony values for the following segments: 1 (real corr. = 0.68; pseudo corr. = 0.60), 2 (real corr. = 0.88; pseudo corr. = 0.48), 4 (real corr. = 0.86; pseudo corr. = 0.58), 5 (real corr. = 0.92; pseudo corr. = 0.59), 8 (real corr. = 0.72; pseudo corr. = 0.58), 11 (real corr. = 0.52; pseudo corr. = 0.45), 12 (real corr. = 0.70; pseudo corr. = 0.66), and 13 (real corr. = 0.92; pseudo corr. = 0.56). The observed heart rate synchrony was below pseudo synchrony control values during segments 3, 6, 7, and 9, and equal during segment 10.

Figure 31 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 11

Session 12

The researcher conducted a SUSY analysis to assess heart rate synchrony between Jessica and the counselor in the 12th session. The researcher found evidence for strong in-phase heart rate synchrony during session 12, ES\text{noabs} = 124.9537 (SD = 0.03639352; see Figure 32). The
researcher observed evidence that the real synchrony values exceeded pseudo synchrony values at all time lags (-3, -2, -1, 0, 1, 2, and 3-seconds; see Figure 33).

![Figure 32 Time Series of Jessica’s and the Counselor’s Heart Rate in Session 12](image)

![Figure 33 Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 12](image)

Through examining the plot of segment synchronies (see Figure 34), the researcher observed segment-level differences in heart rate synchrony as compared to surrogate control tests. The child and counselor experienced greater heart rate synchrony than what was
anticipated by surrogate controls in seven of the 14 segments (heart rates synchronized during 50% of play therapy session 12). Jessica’s and the counselor’s synchrony values exceeded pseudo synchrony values during the following segments: 2 (real corr. = 0.68; pseudo corr. = 0.44), 6 (real corr. = 0.96; pseudo corr. = 0.58); 7 (real corr. = 0.80; pseudo corr. = 0.65), 8 (real corr. = 0.70; pseudo corr. = 0.66), 9 (real corr. = 0.96; pseudo corr. = 0.66), 11 (real corr. = 0.60; pseudo corr. = 0.52), and 12 (real corr. = 0.62; pseudo corr. = 0.36). The observed synchrony values were below the mean pseudo correlations for the remaining seven segments (segments # 1, 3, 4, 5, 10, 13, and 14).

![Figure 34 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 12](image)

**Figure 34 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 12**

**Session 13**

The counselor met with Jessica for session 13 approximately two weeks after session 13 because the child was exposed to COVID-19 and was required to remain in quarantine for two weeks per school protocol. To examine heart rate synchrony levels between Jessica and the
counselor following this gap in therapy, the researcher conducted a SUSY analysis. The large positive non-absolute effect size indicated large in-phase heart rate synchrony between Jessica and the counselor during play therapy session 13, \( \text{ES}_{\text{noabs}} = 40.92185 \) (\( SD = 0.02997482 \); see Figure 35). The researcher inspected the Z-synchrony non-absolute correlation plot and observed evidence that the real synchrony values were greater than mean surrogate values at all time lags (see Figure 36).

![Figure 35 Time Series of Jessica’s and the Counselor’s Heart Rate in Session 13](image-url)
The researcher further scanned heart rate synchrony across varying time segments during the 13th play therapy session via visual inspection of the segment synchrony plots (see Figure 37). During play therapy session 13, Jessica’s and the counselor’s heart rate synchrony values exceeded the control surrogate pseudo correlation estimates during the following time segments: 2 (real corr. = 0.78; pseudo corr. = 0.34), 5 (real corr. = 0.68; pseudo corr. = 0.58), 7 (real corr. = 0.54; pseudo corr. = 0.52), 9 (real corr. = 0.80; pseudo corr. = 0.62), 10 (real corr. = 0.64; pseudo corr. = 0.48), 11 (real corr. = 0.86; pseudo corr. = 0.66), and 13 (real corr. = .90; pseudo corr. = 0.52). The real observed heart rate synchrony between Jessica and the counselor was lower than the pseudo control values for the remaining six segments: 1, 3, 4, 6, 8, and 12. Overall, Jessica and her counselor experienced greater synchrony than anticipated by pseudo control values during seven of the 13-time segments (approximately 54% of the 13th play therapy session).
Figure 37 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 13

Session 14

The researcher computed a SUSY analysis for heart rate synchrony during the 14th and final play therapy session. The researcher found evidence for strong in-phase heart rate synchrony during session 14, as evidenced by the large positive non-absolute SUSY effect size ($ES_{noabs} = 2.28181, SD = 0.03510402$; see Figure 38). The researcher visually inspected plots of Z-Synchrony and their respective time lags, and noted that the average observed child-counselor heart rate synchrony values were greater than the mean pseudo synchrony values at each time lag.
(-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 39).

**Figure 38** Time Series of Jessica’s and the Counselor’s Heart Rate in Session 14

**Figure 39** Jessica and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 14
Next, the researcher created a segment synchrony plot and visually inspected shifts in child-counselor heart rate synchrony during specific time segments during the 14th play therapy session (see Figure 40). In session 14, heart rate synchrony exceeded levels that would be expected by chance during nine of the 15 segments (e.g., Jessica’s and the counselor’s heart rates synchronized beyond chance correlations during 60% of the 120-second time segments). Jessica and the counselor experienced above-chance heart rate synchrony during segments 4 (real corr. = 0.79; pseudo corr. = 0.68), 6 (real corr. = 0.88; pseudo corr. =0.60), 8 (real corr. = 0.84; pseudo corr. = 0.66), 9 (real corr. = 0.58; pseudo corr. = 0.44), 10 (real corr. = 0.76; pseudo corr. = 0.57), 11 (real corr. = 0.88; pseudo corr. = 0.34), 12 (real corr. = 0.82; pseudo corr. = 0.44), 13 (real corr. = 0.56; pseudo corr. = 0.50), and 14 (real corr. = 0.90; pseudo corr. = 0.64). The surrogate cross-correlations were greater than the real cross-correlations of Jessica’s and the counselor’s heart rates during segments 2, 3, 5, 7, and 15, and real synchrony values were equal to surrogate correlations during segment 1.

Figure 40 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 14
Individualized Results: Jadyn

Jadyn was an 8-year-old, multiracial, Latino cisgender boy in the third grade at the time of this study. He participated in 10 play sessions, and 10 sessions included video and Empatica wristband recordings. Jadyn qualified for participation in this study because his PEARLS score indicated that he endured six forms of ACE-related exposures, including: (a) domestic violence, (b) physical abuse, (c) caregiver separation/divorce, (d) physical neglect, (e) caregiver serious physical illness, and (f) caregiver death. Jadyn’s caregiver reported that there were no birth and delivery-related complications, and noted that Jadyn seemed to develop similarly to other same-age children. According to his caregiver’s report, Jadyn began walking at age 1, speaking at age 2, and self-feeding at age 1. According to his caregiver-reported mental health history, Jadyn has no history of mental health diagnoses. Additionally, Jadyn has never received mental health or behavioral therapy services, and he was not taking any psychotropic medications during this study. Over the course of therapy, he presented with the following play themes: relationship, dependency, and nurturing.

Session 1

To evaluate whether Jadyn’s and the counselor’s heart rates synchronized during the initial play therapy session, the researcher conducted a SUSY analysis. The large and positive non-absolute effect size indicated in-phase heart rate synchrony between Jadyn and the counselor during the first play therapy session, ES\text{noabs} = 44.3532 (SD = 0.034316; see Figure 41). Through examining the non-absolute cross-correlation and surrogate non-absolute cross-correlation plot, the researcher found that the observed child-counselor heart rate synchrony values exceeded surrogate synchrony values at all time lags (-3, -2, -1, 0, 1, 2, and 3 second lags; see Figure 42).
Figure 41 Time Series of Jadyn’s and the Counselor’s Heart Rate in Session 1

Figure 42 Jayden’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 1
In addition, the researcher found that Jadyn and the therapist experienced greater heart rate synchrony, as compared to surrogate tests, during time segments 2 (real corr. = 0.92; pseudo corr. = 0.60), 4 (real corr. = 0.70; pseudo corr. = 0.62), 5 (real corr. = 0.80; pseudo corr. = 0.62), and 7 (real corr. = 0.90; pseudo corr. = 0.50). The surrogate cross-correlations were greater than the real cross-correlations of Jadyn’s and the counselor’s heart rates during segments 1, 3, 6, 8, 9, and 10. Overall, Jadyn and the counselor demonstrated greater than average heart rate synchrony during 40% of the first play therapy session (see Figure 43).

![Figure 43 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 1](image)

**Session 2**

The researcher computed a SUSY analysis to examine heart rate synchrony between Jadyn and the counselor during play therapy session two. The results indicated strong in-phase heart rate synchrony during session two, as evidenced by the positive non-absolute SUSY effect size (ES_{noabs} = 3.149931, SD = 0.0288; see Figure 44). The researcher inspected the non-absolute
Z-synchrony correlation table to examine synchrony levels as mediated by the lagged correlation window (see Figure 45). Based on these results, the synchrony values were greater than surrogate synchrony values when utilizing -3, -2, -1, 0, and 1-second lags.

**Figure 44 Time Series of Jadyn’s and the Counselor’s Heart Rate in Session 2**

![Time Series of Jadyn’s and the Counselor’s Heart Rate in Session 2](image)

**Figure 45 Jayden’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 2**

![Jayden’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 2](image)
The researcher found that Jadyn and the counselor experienced greater heart rate synchrony than levels expected by the surrogate cross-correlations during time segments 1 (real corr. = 0.85; pseudo corr. = 0.46), 2 (real corr. = 0.70; pseudo corr. = 0.53), 6 (real corr. = 0.64; pseudo corr. = 0.48), and 9 (real corr. = 0.61; pseudo corr. = 0.56; see Figure 46). The real synchrony values were less than the surrogate cross-correlations during segments 3, 4, 5, 7, 8, and 10, and none were equal. Overall, the real synchrony cross-correlations for Jadyn’s and the counselor’s heart rates were greater than surrogate estimates during 40% of the second play therapy session.

![Figure 46 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 2](chart)

**Session 3**

The researcher computed a SUSY analysis to examine heart rate synchrony between Jadyn and the counselor during play therapy session three. The researcher noted evidence for strong in-phase heart rate synchrony between Jadyn and the counselor during the third play therapy session, as evidenced by the positive non-absolute SUSY effect size (ES_noabs = 15.22558,
$SD = 0.0576360$; see Figure 47). Additionally, the actual cross-correlations were greater than synchrony estimates for all lags in the 6-second window ($-3$, $-2$, $-1$, $0$, $1$, $2$, and $3$; see Figure 48).

Figure 47 Time Series of Jadyn’s and the Counselor’s Heart Rate in Session 3

Figure 48 Jayden’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 3
The researcher noted the following time segments when Jadyn and the counselor’s heart rate synchrony values were greater than would be anticipated under the null hypothesis: segment 1 (real corr. = 0.95; pseudo corr. = 0.60), 2 (real corr. = 0.62; pseudo corr. = 0.55), 8 (real corr. = 0.82; pseudo corr. = 0.38), 9 (real corr. = 0.80; pseudo corr. = 0.61), 10 (real corr. = 0.88; pseudo corr. = 0.64), 11 (real corr. = 0.54; pseudo corr. = 0.40), 12 (real corr. = 0.89; pseudo corr. = 0.68), and 13 (real corr. = 0.84; pseudo corr. = 0.50; see Figure 49). Jadyn’s and the counselor’s real synchrony values were less than the surrogate cross-correlations during segments 3, 4, 5, and 6, and the dyad’s real synchrony values were equal to surrogate estimates during time segment 7. Overall, Jadyn and the counselor’s synchrony levels were greater than what would be expected under the null hypothesis for eight of the 13 segments (61.5% of the play therapy session).

Figure 49 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 3
Session 4

The researcher computed SUSY analysis to examine Jadyn and the counselor’s heart rate synchrony during play therapy session 4. The non-absolute effect size was positive and significantly greater than zero (ES_{noabs} = 161.9763, SD = 0.03207), suggesting strong in-phase heart rate synchrony during play therapy session four (see Figure 50). Additionally, the results provided support that synchrony was greater than what would be expected by chance alone for -3, -2, -1, 0, 1, 2, and 3-second lags (see Figure 51).

![Figure 50 Time Series of Jadyn’s and the Counselor’s Heart Rate in Session 4](image-url)
The researcher generated a segment synchrony plot and visually inspected shifts in child-counselor heart rate synchrony during specific segments in play therapy session four (see Figure 52). During play therapy session four, Jadyn and the counselor experienced greater than expected (i.e., above surrogate correlation estimates) during time segments 4 (real corr. = 0.25; pseudo corr. = 0.38), 6 (real corr. = 0.90; pseudo corr. = 0.60), 7 (real corr. = 0.95; pseudo corr. = 0.62), 8 (real corr. = 0.82; pseudo corr. = 0.63), and 9 (real corr. = 0.82; pseudo corr. = 0.60). Jadyn’s and the counselor’s heart rate synchrony levels were below surrogate correlations during segments 1, 2, 3, 5, 10, and 11, and no synchrony values were equal across the 11 segments. Overall, Jadyn and the counselor experienced significant heart rate synchrony during five of the 11 segments (45.5% of the fourth play therapy session).
The researcher conducted a SUSY analysis to determine Jadyn’s and the counselor’s heart rate synchrony levels during play therapy session five. The researcher found significant in-phase heart rate synchrony during session five, as evidenced by the large positive non-absolute effect size, $ES_{\text{noabs}} = 26.84246$, $SD = 0.0538$ (see Figure 53). The results provided support that observed synchrony was greater than surrogate correlations at all lags (-3, -2, -1, 0, 1, 2, and 3-second lag; see Figure 54).
The researcher examined the segment synchrony plot and found that Jadyn’s and the counselor’s heart rate synchrony levels were above surrogate cross-correlations during segments 1 (real corr. = 0.85; pseudo corr. = 0.38), 3 (real corr. = 0.61; pseudo corr. = 0.39), 7 (real corr. = 0.88; pseudo corr. = 0.65), 8 (real corr. = 0.78; pseudo corr. = 0.59), 9 (real corr. = 0.89; pseudo corr. = 0.55), 10 (real corr. = 0.85; pseudo corr. = 0.60), and 14 (real corr. = 0.92; pseudo corr. = 0.62). Jadyn’s and the counselor’s observed synchrony levels were below surrogate estimates.
during 5 segments (2, 4, 6, 11, and 12), and equal to surrogate estimates for two segments (5 and 11). Overall, the child and counselor’s synchrony levels were above the surrogate control estimates for seven of the 14 segments (50% of the play therapy session; see Figure 55).

![Figure 55 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 5 Session 6](image)

The researcher conducted a SUSY analysis and examined Jadyn’s and the counselor’s heart rate synchrony levels during play therapy session six. The results of the SUSY analysis indicated that Jadyn and the counselor experienced in-phase heart rate synchrony during the sixth play therapy session ($ES_{noabs} = 95.59286, SD = 0.06211252$; see Figure 56). The observed heart rate synchrony was greater than the surrogate levels at all lags (-3, -2, -1, 0, 1, 2, and 3-seconds; see Figure 57).
Jadyn and the counselor’s heart rate synchrony levels were above surrogate cross-correlations during segments 2 (real corr. = 0.84, pseudo corr. = 0.52), 3 (real corr. = 0.94; pseudo corr. = 0.52), 5 (real corr. = 0.68; pseudo corr. = 0.38), 6 (real corr. = 0.80; pseudo corr. = 0.45), and 7 (real corr. = 0.88; pseudo corr. = 0.52; See Figure X). Jadyn’s and the counselor’s real synchrony values were below the surrogate correlations during segments 1, 4, 8, 9, and 10, and there were no equal surrogate and true values across the segments. Overall, the child and
counselor’s observed synchrony levels were above surrogate estimates for five of the 10 segments (50% of the play therapy session).

Figure 58 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 6

Session 7

The researcher computed a SUSY analysis to determine heart rate synchrony levels between Jadyn and the counselor during play therapy session seven. The results suggested large in-phase heart rate synchrony during session eight, $ES_{\text{noabs}} = 137.6807$, $SD = 0.05394169$ (see Figure 59). The real synchrony levels were larger than surrogates at all lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 60).
The researcher generated a segment plot and visually inspected shifts in child-counselor heart rate synchrony during specific segments in play therapy session seven (see Figure 61). The researcher noted that the observed synchrony levels were greater than surrogates during segments 1 (real corr. = 0.90; pseudo corr. = 0.64), 2 (real corr. = 0.58; pseudo corr. = 0.52), 5
(real corr. = 0.88; pseudo corr. = 0.70), 6 (real corr. = 0.92; pseudo corr. = 0.58), 8 (real corr. = 0.80; pseudo corr. = 0.65), 9 (real corr. = 0.92; pseudo corr. = 0.60), 12 (real corr. = 0.90; pseudo corr. = 0.72), and 13 (real corr. = 0.96; pseudo corr. = 0.70). The real synchrony values were less than surrogates during 6 segments (3, 4, 7, 11, 14, and 15), and equal to surrogate correlations during one segment (10). Overall, the true counselor-child heart rate synchrony levels during session seven exceeded surrogate estimates during 8 of the 15 segments 53.3% of play therapy session).

**Figure 61 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 7**

**Session 8**

The researcher examined child-counselor heart rate synchrony during play therapy session eight through a SUSY analysis. The researcher found evidence for large in-phase heart rate synchrony during play therapy session eight, $ES_{noabs} = 166.3695$, $SD = 0.0413349$ (see Figure 62). Further, true child-counselor synchrony levels were larger than surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 63).
The researcher examined session-level shifts in child-counselor heart rate synchrony during specific 120-second segments in play therapy session eight (see Figure 64). The researcher observed that real child-counselor heart rate synchrony levels were greater than surrogates during segments 2 (real corr. = 0.78; pseudo corr. = 0.72), 3 (real corr. = 0.72; pseudo corr. = 0.50), 4 (real corr. = 0.79; pseudo corr. = 0.45), 5 (real corr. = 0.80; pseudo corr. = 0.62),
6 (real corr. = 0.80; pseudo corr. = 0.50), 7 (real corr. = 0.36; pseudo corr. = 0.26), 8 (real corr. = 0.70; pseudo corr. = 0.40), 9 (real corr. = 0.90; pseudo corr. = 0.60), 13 (real corr. = 0.90; pseudo corr. = 0.66), 14 (real corr. = 0.80; pseudo corr. = 0.70), and 16 (real corr. = 0.92; pseudo corr. = 0.58). The real synchrony values were less than surrogates during four segments (1, 11, 12, and 15), and equal to surrogate correlations during one segment (10). Overall, the true counselor-child heart rate synchrony levels during session seven exceeded pseudo estimates during 11 of the 16 segments (68.75% of play therapy session).

Figure 64 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 8

Session 9

The researcher conducted a SUSY analysis and found evidence for large in-phase child-counselor heart rate synchrony during session nine, ES_{noabs} = 76.55761 (SD = 0.04626402; see Figure 65). The real child-counselor heart rate synchrony levels were greater than pseudo values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 66).
The researcher identified differences in child-counselor heart rate synchrony during varying time segments (see Figure 67). During play therapy session nine, child-counselor heart rate synchrony levels were greater than the surrogate synchrony control values for eight of the 13 segments (in-phase heart rate synchrony during 61.5% of the play therapy session). Real
synchrony values were greater than pseudo synchrony values for the following segments: 2 (real corr. = 0.82; pseudo corr. = 0.48), 4 (real corr. = 0.76; pseudo corr. = 0.50), 5 (real corr. = 0.88; pseudo corr. = 0.44), 6 (real corr. = 0.72; pseudo corr. = 0.42), 8 (real corr. = 0.72; pseudo corr. = 0.58), 9 (real corr. = 0.84; pseudo corr. = 0.46), 10 (real corr. = 0.90; pseudo corr. = 0.58), and 13 (real corr. = 0.80; pseudo corr. = 0.60). The real child-counselor heart rate synchrony values were less than pseudo correlations during segments 1, 3, 7, 11, and 12, and there were no equal surrogate and true values across the segments.

Figure 67 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 9

Session 10

The researcher conducted a SUSY analysis and examined child-counselor heart rate synchrony during the final play therapy session. The researcher noted evidence for large in-phase heart rate synchrony during play therapy session eight, ES\textsubscript{noabs} = 43.48013, SD = 0.03930306 (see Figure 68). Further, true child-counselor synchrony levels were larger than surrogate values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 69).
During the final play therapy session, the real child-counselor heart rate synchrony levels exceeded pseudo estimates during the following segments: 1 (real corr. = 0.82; pseudo corr. = 0.58), 2 (real corr. = 0.86; pseudo corr. = 0.68), 6 (real corr. = 0.60; pseudo corr. = 0.44), 7 (real corr. = 0.62; pseudo corr. = 0.48), 8 (real corr. = 0.74; pseudo corr. = 0.68), 9 (real corr. = 0.92;
pseudo corr. = 0.64), and 12 (real corr. = 0.88; pseudo corr. = 0.68). The real synchrony values were less than surrogates during segments 3, 4, 5, 10, 11, and 13, and there were no equal surrogate and true values across the segments. Overall, the real child-counselor heart rate synchrony levels exceeded surrogates during seven of the 13 segments (53.85% of the play therapy session; see Figure 70).

![Figure 70 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 10](image)

**Individualized Results: Ava**

Ava was a 6-year-old Asian American cisgender girl who was a kindergarten student at the time of this study. Ava participated in 10 play therapy sessions, and 10 sessions included video and Empatica wristband recordings. While interviewing Ava’s mother at the elementary school, her mother reported that there were no birthing difficulties or delivery-related complications with Ava, and she reported that her daughter developed in a manner that was similar to other children her age. Ava’s mother reported that she began walking at 18 months, speaking at 24 months, and self-feeding at four years old. Ava’s mother reported that her
daughter had no mental health services history, with no previous diagnoses, therapeutic services (play therapy, counseling, behavioral therapy), or medication history. Ava qualified for participation in this study because she experienced four categories of ACE-related exposures: (a) caregiver mental health issues, (b) witnessing domestic violence in the household, (c) caregiver separation/divorce, and (d) familial separation (immigration). During the play therapy treatment, Ava presented with the following play themes: perfectionism, nurturing, and mastery.

**Session 1**

The large non-absolute effect size indicated in-phase heart rate synchrony between Ava and the counselor during play therapy session one, $ES_{\text{noabs}} = 13.09469$ ($SD = 0.0368711$; see Figure 71). The researcher observed that the real synchrony was greater than the pseudo synchrony values at -3, -2, -1, 0, 1, 2, and 3-second lags (see Figure 2).

*Figure 71 Time Series of Ava’s and the Counselor’s Heart Rate in Session 1*
The researcher examined the segment synchrony plot and found that child-counselor heart rate synchrony levels between Ava and the counselor were above surrogate cross-correlations during segments 1 (real corr. = 0.62; pseudo corr. = 0.50), 2 (real corr. = 0.68; pseudo corr. = 0.63), 3 (real corr. = 0.90; pseudo corr. = 0.58), 4 (real corr. = 0.70; pseudo corr. = 0.48), 5 (real corr. = 0.62; pseudo corr. = 0.42), 10 (real corr. = 0.68; pseudo corr. = 0.66), 12 (real corr. = 0.84; pseudo corr. = 0.06), 14 (real corr. = 0.56; pseudo corr. = 0.50), 15 (real corr. = 0.60; pseudo corr. = 0.36), and 16 (real corr. = 0.88; pseudo corr. = 0.59; see Figure 73). The real synchrony levels were below pseudo correlations during segments 6, 7, 8, 9, 11, and 13, and none were equal across the segments. Overall, the observed child-counselor heart rate synchrony values exceeded surrogate correlations during 10 of the 16 segments (62.5% of the first play therapy session).
The researcher conducted a SUSY analysis and examined child-counselor heart rate synchrony during Ava’s second play therapy session. The researcher found evidence for in-phase child-counselor heart rate synchrony, \( ES_{noabs} = 82.78465 \) \( (SD = 0.03702004; \text{see Figure 74}) \). Further, real child-counselor heart rate synchrony was greater than the pseudo correlations at -3, -2, -1, 0, 1, 2, and 3-second lags (see Figure 75).
The researcher noted that the real child-counselor heart rate synchrony levels exceeded pseudo correlations during segments 1 (real corr. = 0.76; pseudo corr. = 0.50), 3 (real corr. = 0.86; pseudo corr. = 0.59), 4 (real corr. = 0.74; pseudo corr. = 0.50), 7 (real corr. = 0.82; pseudo
corr. = 0.54), 8 (real corr. = 0.94; pseudo corr. = 0.52), 9 (real corr. = 0.81; pseudo corr. = 0.40), 11 (real corr. = 0.90; pseudo corr. = 0.56), 13 (real corr. = 0.56; pseudo corr. = 0.44), and 15 (real corr. = 0.82; pseudo corr. = 0.38; see Figure 76). The observed child-counselor synchrony values fell below surrogate correlations during segments 2, 5, 6, 10, 12, and the pseudo and observed values were equal at segment 14. Overall, the real child-counselor heart rate synchrony values were greater than the surrogate controls during nine of the 15-time segments (60% of the second play therapy session).

![Graph](image)

**Figure 76 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 2**

**Session 3**

The researcher conducted a SUSY analysis to determine Ava’s and the counselor’s heart rate synchrony levels during play therapy session three. The researcher found significant anti-phase heart rate synchrony during session three as evidenced by the large negative non-absolute effect size, $E_{noabs} = -193.4628$, $SD = 0.0528$ (see Figure 77). Additionally, the researcher noted
that the real synchrony values did not exceed pseudo correlations during any of the time lags within the six-second window (see Figure 78).

**Figure 77 Time Series of Ava’s and the Counselor’s Heart Rate in Session 3**

![Time Series of Ava’s and the Counselor’s Heart Rate in Session 3](image)

**Figure 78 Ava’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 3**

![Z-Synchrony not ABS Ava-Therapist segment: 120s; 182 pseudos](image)
Session 4

The researcher conducted a SUSY analysis and examined Ava’s and the counselor’s heart rate synchrony levels during play therapy session four. The results of the SUSY analysis indicated that Ava and the counselor experienced in-phase heart rate synchrony during the fourth play therapy session ($ES_{noabs} = 117.6141$, $SD = 0.03764$; see Figure 79). The researcher noted that the observed child-counselor synchrony values exceeded surrogate controls at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 80).

![Figure 79 Time Series of Ava’s and the Counselor’s Heart Rate in Session 4](image)
Next, the researcher generated a segment synchrony plot and visually inspected shifts in child-counselor heart rate synchrony during specific time segments during play therapy session four (see Figure 81). During session four, the child-counselor physiological synchrony values exceeded chance correspondences during time segments 2 (real corr. = 0.32; pseudo corr. = 0.29), 3 (real corr. = 0.78; pseudo corr. = 0.77), 5 (real corr. = 0.80; pseudo corr. = 0.62), 7 (real corr. = 0.95; pseudo corr. = 0.62), 9 (real corr. = 0.61; pseudo corr. = 0.50), 11 (real corr. = 0.80; pseudo corr. = 0.52), 12 (real corr. = 0.55; pseudo corr. = 0.30), 13 (real corr. = 0.86; pseudo corr. = 0.61), 14 (real corr. = 0.61; pseudo corr. = 0.60), 15 (real corr. = 0.54; pseudo corr. = 0.52), and 16 (real corr. = 0.82; pseudo corr. = 0.74). The real observed child-counselor heart rate synchrony values fell below surrogate estimates during segments 1, 4, 6, 8, and 10, and there were no equal observed and pseudo values across the segments. Overall, Ava’s and the counselor’s observed heart rate synchrony levels exceeded chance estimates during 11 of the 16 segments (68.75% of play therapy session four).
The researcher conducted a SUSY analysis and examined Ava’s and the counselor’s heart rate synchrony levels during the fifth play therapy session. The session was shortened due to a planned fire drill at the school; therefore, the counselor facilitated a 20-minute play therapy session. The researcher determined evidence for in-phase child-counselor heart rate synchrony during session five, $ES_{noabs} = 59.813$ ($SD = 0.01618$; see Figure 82). Further, the observed child-counselor heart rate synchrony values exceeded pseudo correlations at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 83).
During this shortened play therapy session, Ava’s and the counselor’s observed heart rate synchrony values exceed pseudo correlations during two of the nine segments (22.22% of the fifth play therapy session; see Figure 84). The observed synchrony values were greater than the
pseudo correlations at segments three (real corr. = 0.58; pseudo corr. = 0.42) and four (real corr. = 0.22; pseudo corr. = 0.20). The real child-counselor heart rate synchrony levels fell below the pseudo correlations during seven segments (1, 2, 5, 6, 7, 8, and 9), and there were no equal observed and pseudo correlations across the segments.

![Chart](image)

Figure 84 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 5

Session 6

The researcher conducted a SUSY analysis to examine child-counselor heart rate synchrony levels during Ava’s sixth play therapy session. The results demonstrated in-phase heart rate synchrony during session six, $ES_{\text{noabs}} = 1.179229$ ($SD = 0.01023$; see Figure 85). Ava’s and the counselor’s heart rate synchrony values were greater than pseudo correlations at five specific time lags (-3, -2, -1, 0, and 1-seconds; see Figure 86).
The researcher generated a segment synchrony plot and noted shifts in child-counselor heart rate synchrony during specific time segments during Ava’s sixth play therapy session (see...
Figure 87. The researcher found that Ava’s and the counselor’s observed heart rate synchrony values surpassed pseudo estimates during segments 1 (real corr. = 0.58; pseudo corr. = 0.44), 2 (real corr. = 0.78; pseudo corr. = 0.68), 3 (real corr. = 0.38; pseudo corr. = 0.30), 4 (real corr. = 0.94; pseudo corr. = 0.54), 7 (real corr. = 0.61; pseudo corr. = 0.48), and 13 (real corr. = 0.70; pseudo corr. = 0.61). The observed values were less than surrogate correlations during segments 5, 6, 8, 9, 10, 11, and 12, and there were no equal pseudo and observed correlations across the segments. Overall, the child and counselor experienced heart-rate synchrony levels that exceeded chance correspondences during six of the 13 segments (46% of the sixth play therapy session).

Figure 87 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 6

Session 7

The researcher examined Ava’s and the counselor’s heart rate synchrony levels during play therapy session seven. Based on SUSY analysis results, the researcher found evidence for in-phase child-counselor heart rate synchrony during the seventh play therapy session, $ES_{noabs} =$

148
15.12893 (SD = 0.0269; see Figure 88). The observed child-counselor synchrony levels were greater than pseudo correlations at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 89).

Figure 88 Time Series of Ava’s and the Counselor’s Heart Rate in Session 7

Figure 89 Ava’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 7
The researcher noted that the observed child-counselor heart rate synchrony values exceeded pseudo synchrony values during segments 1 (real corr. = 0.72; pseudo corr. = 0.50), 2 (real corr. = 0.75; pseudo corr. = 0.65), 3 (real corr. = 0.68; pseudo corr. = 0.49), 4 (real corr. = 0.78; pseudo corr. = 0.51), 5 (real corr. = 0.82; pseudo corr. = 0.64), 6 (real corr. = 0.71; pseudo corr. = 0.37), 7 (real corr. = 0.64; pseudo corr. = 0.37), 9 (real corr. = 0.92; pseudo corr. = 0.63), 10 (real corr. = 0.58; pseudo corr. = 0.52), 11 (real corr. = 0.88; pseudo corr. = 0.64), and 13 (real corr. = 0.68; pseudo corr. = 0.59; see Figure 90). The pseudo synchrony estimates were greater than the true child-counselor heart rate synchrony levels during two time segments (8 and 12), and there were no equal pseudo and observed values across the segments. Overall, the observed child-counselor heart rate synchrony values exceeded chance correspondences during 11 of the 13-time segments (84.6% of the seventh play therapy session).

*Figure 90 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 7*
Session 8

The researcher conducted a SUSY analysis for Ava’s eighth play therapy session and found evidence for large in-phase heart rate synchrony, $ES_{noabs} = 23.41263$ ($SD = 0.02211754$; see Figure 91). The child-counselor heart rate synchrony values were larger than surrogate synchronies at all lags in the six-second window (see Figure 92).

![Figure 91 Time Series of Ava’s and the Counselor’s Heart Rate in Session 8](image1)

![Figure 92 Ava’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 8](image2)
The researcher created a segment synchrony plot and inspected shifts in child-counselor heart rate synchrony across time segments during Ava’s eighth play therapy session (see Figure 93). During the eighth play therapy session, the observed child-counselor heart rate synchrony values exceeded chance correspondences during segments 1 (real corr. = 0.76; pseudo corr. = 0.58), 2 (real corr. = 0.89; pseudo corr. = 0.52), 10 (real corr. = 0.64; pseudo corr. = 0.52), 12 (real corr. = 0.78; pseudo corr. = 0.48), 13 (real corr. = 0.78; pseudo corr. = 0.54), 15 (real corr. = 0.92; pseudo corr. = 0.50), and 17 (real corr. = 0.72; pseudo corr. = 0.53). The observed child-counselor synchrony values were less than pseudo correlations during the remaining segments (3-9, 11, and 14), and there were no equal pseudo and observed synchrony values across the segments. Overall, Ava’s and the counselor’s heart rate synchrony levels were greater than pseudo estimates during 8 of the 16 segments (47% of the eighth play therapy session).

![Figure 93 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 8](image)

*Figure 93 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 8*
Session 9

The researcher generated a synchrony analysis for Ava’s ninth play therapy session and found evidence for in-phase heart rate synchrony ($ES_{noabs} = 15.6178; SD = 0.02569$; see Figure 94). The observed child-counselor synchrony levels exceeded pseudo estimates at all time lags within the six-second window (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 95).

![Figure 94 Time Series of Ava’s and the Counselor’s Heart Rate in Session 9](image)

![Figure 95 Ava’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 9](image)
The observed child-counselor heart rate synchrony values during Ava’s ninth play therapy session were greater than pseudo correlations during seven of the 14 segments (50% of play therapy session nine spent in heart rate synchrony; see Figure 96). Specifically, Ava’s and the counselor’s heart rate synchrony levels exceeded chance correspondences during segments 1 (real corr. = 0.80; pseudo corr. = 0.56), 3 (real corr. = 0.59; pseudo corr. = 0.56), 4 (real corr. = 0.42; pseudo corr. = 0.40), 7 (real corr. = 0.73; pseudo corr. = 0.50), 8 (real corr. = 0.88; pseudo corr. = 0.58), 11 (real corr. = 0.84; pseudo corr. = 0.56), and 12 (real corr. = 0.64; pseudo corr. = 0.44). The observed synchrony levels were less than pseudo correlations during segments 2, 5, 6, 9, 10, 13, and 14, and none were equal across the segments.

![Figure 96 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 9](image)

**Session 10**

The researcher conducted a SUSY analysis and examined Ava’s and the counselor’s heart rate synchrony levels during the final play therapy session. The researcher found evidence for large in-phase child-counselor heart rate synchrony during play therapy session 10 (ES_{noabs} =
6.640023; $SD = 0.05377138$; see Figure 97). The true child-counselor synchrony values exceeded chance estimates at all time lags in the six-second window (see Figure 98).

*Figure 97 Time Series of Ava’s and the Counselor’s Heart Rate in Session 10*

*Figure 98 Ava’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 10*

The researcher generated a segment synchrony plot and observed segmented shifts in child-counselor heart rate synchrony during Ava’s final play therapy session (see Figure 99). The researcher noted that Ava’s and the counselor’s observed heart rate synchrony values exceeded
surrogate corresponding estimates during segments 1 (real corr. = 0.88; pseudo corr. = 0.62), 2 (real corr. = 0.70; pseudo corr. = 0.48), 6 (real corr. = 0.94; pseudo corr. = 0.54), 8 (real corr. = 0.60; pseudo corr. = 0.48), 10 (real corr. = 0.90; pseudo corr. = 0.58), 12 (real corr. = 0.60; pseudo corr. = 0.44), 13 (real corr. = 0.85; pseudo corr. = 0.52), and 14 (real corr. = 0.79; pseudo corr. = 0.48). The observed child-counselor synchrony values were smaller than pseudo estimates during segments 3, 4, 5, 7, 9, and 11, and none were equal across the segments. Overall, the observed child-counselor heart rate synchrony values were greater than chance correspondences during eight of the 14 segments during the final session (57.142% of the 10th play therapy session).

![Figure 99](image)

**Figure 99 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 10**

**Individualized Results: Nico**

Nico was a 5-year-old, multiracial, Latino, cisgender boy who was a kindergarten student at the time of this study. He participated in 12 sessions, and seven included video and Empatica
wristband recordings (seven included in data analysis). His caregiver completed the demographic form and reported an annual household income of less than $25,000 per year. Developmentally, Nico’s caregiver indicated no birth or delivery-related complications, and noted that he developed “more mature” than children his age. Nico’s caregiver reported that he began walking by 13 months, speaking words by 10 months, and self-feeding at 12 months. As it relates to mental health history, Nico had no previous mental health diagnoses or therapeutic services, and he was not taking medication during this study. Nico was exposed to five ACE-related events, including: (a) caregiver mental illness, (b) household substance abuse, (c) witnessing domestic violence in the family household, (d) caregiver separation/divorce, and (e) separation from caregivers due to child welfare involvement (e.g., foster care). Over the course of play therapy, Nico displayed the following play themes: protection, separation, safety, and anxiety.

**Session 1**

The researcher examined child-counselor heart rate synchrony levels during Nico’s first play therapy session, and the researcher noted evidence for anti-phase heart rate synchrony, $ES_{noabs} = -1.701593$ ($SD = 0.01594386$; see Figure 100). The true non-absolute Z mean correlations exceeded pseudo correlations at 0, 1, 2, and 3-second lags (see Figure 101).
Session 2

The researcher computed a SUSY analysis for Nico’s second play therapy session and found evidence for large in-phase heart rate synchrony, $E_{\text{Snoabs}} = 68.28965 \ (SD = 0.05234749)$;
see Figure 102). The observed child-counselor synchrony levels exceeded pseudo estimates at all time lags within the six-second window (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 103)

**Figure 102 Time Series of Nico’s and the Counselor’s Heart Rate in Session 2**

**Figure 103 Nico’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 2**
The researcher examined shifts in child-counselor heart rate synchrony by segments during play therapy session two. The true child-counselor heart rate synchrony levels exceeded corresponding pseudo values during segments 1 (real corr. = 0.92; pseudo corr. = 0.62), 2 (real corr. = 0.84; pseudo corr. = 0.54), 3 (real corr. = 0.94; pseudo corr. = 0.48), 7 (real corr. = 0.88; pseudo corr. = 0.61), 11 (real corr. = 0.78; pseudo corr. = 0.72), 12 (real corr. = 0.58; pseudo corr. = 0.50), and 13 (real corr. = 0.88; pseudo corr. = 0.68; see Figure 104). The observed synchrony values were less than surrogate correlations during segments 4, 5, 6, 8, 9, and 10, and there were no equal surrogate and true values across the segments. During Nico’s second play therapy session, the true child-counselor heart rate synchrony values exceeded chance-based correlation values during seven of the 13 segments (heart rate synchrony during 53.8% of session two).

![Figure 104 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 2](image)

*Figure 104 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 2*
Sessions 3 and 4

At the start of play therapy sessions three and four, Nico expressed curiosity related to using the button on the E4 wristband. He pressed the wristband button for several seconds (admiring the colored light), and the device powered off. To remain theoretically consistent in CCPT treatment, the counselor continued the play therapy sessions and focused on maintaining acceptance, empathic understanding, and congruence during the 30-minute play therapy sessions. Therefore, there is no data for these sessions.

Session 5

The researcher conducted SUSY analysis and examined child-counselor heart rate synchrony during Nico’s fifth play therapy session. The researcher found evidence for in-phase child-counselor heart rate synchrony during session five, $ES_{noabs} = 16.75421$ ($SD = 0.0406$; see Figure 105). Further, the observed synchrony values exceeded pseudo values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 106).

![Figure 105 Time Series of Nico’s and the Counselor’s Heart Rate in Session 5](image)
Next, the researcher generated a segment synchrony plot and visually inspected shifts in child-counselor heart rate synchrony during specific time segments during Nico’s fifth play therapy session (see Figure 107). Nico’s and the counselor’s observed heart rate synchrony levels exceeded corresponding pseudo values during segments 1 (real corr. = 0.68; pseudo corr. = 0.60), 2 (real corr. = 0.76; pseudo corr. = 0.46), 7 (real corr. = 0.90; pseudo corr. = 0.68), 9 (real corr. = 0.86; pseudo corr. = 0.66), 11 (real corr. = 0.88; pseudo corr. = 0.64), and 13 (real corr. = 0.80; pseudo corr. = 0.70). The observed synchrony levels were less than pseudo correlations during segments 3, 4, 5, 6, 8, 10, and 12, and there were no equal surrogate and true values across the segments. Overall, Nico’s and counselor’s heart rate synchrony values exceeded surrogate correlations during six of the 13 segments (heart rate synchrony during 46.15% of the play therapy session five).
At the start of play therapy session six, Nico chose to power off his E4 device while playing with the button. Therefore, there is no data for these sessions.

Session 7

For play therapy session seven, Nico powered off the wristband after thirteen minutes; therefore, the following results reflect child-counselor heart rate synchrony during the first 43% of the play therapy session. Through examining the SUSY results, the researcher found evidence for in-phase child-counselor heart rate synchrony during the 13-minute period, $ES_{no abs} = 52.52863$ ($SD = 0.0290007$; see Figure 108). The real child-counselor heart rate synchrony levels were greater than pseudo values at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 109).
The researcher visually examined synchrony plot to examine changes in child-counselor heart rate synchrony during Nico’s seventh play therapy session (see Figure 110). The observed
child-counselor heart rate synchrony values exceeded pseudo correlations during the first four segments: 1 (real corr. = 0.83; pseudo corr. = 0.58), 2 (real corr. = 0.62; pseudo corr. = 0.58), 3 (real corr. = 0.38; pseudo corr. = 0.18), and 4 (real corr. = 0.62; pseudo corr. = 0.38). The observed synchrony values were less than the observed heart rate synchrony values during segments 5 and 6, and there were no equal pseudo and real correlations across the six segments. Overall, Nico’s and the counselor’s heart rate synchrony values exceeded pseudo correlations during four of the six segments (67% of the 13-minute recording in session seven).

![Graph showing real and pseudo synchrony values by 120-second segments for session 7.](image)

**Figure 110 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 7**

**Session 8**

The researcher did not collect Nico’s heart rate data during session eight because of technological difficulties (Nico turned off the device). Therefore, there is no data for these sessions.
Session 9

Through examining the SUSY results, the researcher found evidence for in-phase child-counselor heart rate synchrony during Nico’s ninth play therapy session, $ES_{noabs} = 11.53633$ ($SD = 0.04213357$; see Figure 111). The researcher also noted that the observed synchrony values were greater than pseudo correlations at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 112).

Figure 111 Time Series of Nico’s and the Counselor’s Heart Rate in Session 9

Figure 112 Nico’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 9
The researcher examined shifts in child-counselor heart rate synchrony by segments during play therapy session nine (see Figure 113). The observed child-counselor heart rate synchrony values exceeded pseudo correlations during segments 1 (real corr. = 0.92; pseudo corr. = 0.60), 6 (real corr. = 0.58; pseudo corr. = 0.18), 7 (real corr. = 0.94; pseudo corr. = 0.54), 8 (real corr. = 0.82; pseudo corr. = 0.60), and 9 (real corr. = 0.90; pseudo corr. = 0.64). The pseudo correlations were greater than the real heart rate synchrony values in segments 2, 3, 5, and 10. The surrogate and true synchrony values were equal in segment 4. Overall, Niko’s and the counselor’s heart rate synchrony values exceeded surrogate correlations during five of the ten segments (50% of play therapy session nine).

Figure 113 Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 9
Session 10

Due to technical difficulties, there were no data available from Nico’s 10th session because he pressed the “off” button at the start of the session.

Session 11

The researcher conducted SUSY analysis and examined child-counselor heart rate synchrony during Nico’s 11th play therapy session. The researcher noted evidence for in-phase child-counselor heart rate synchrony during session 11, ES_{neabs} = 23.53387 (SD = 0.04992819; see Figure 114). The observed synchrony values were greater than pseudo correlations at all time lags (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 115).

Figure 114 Time Series of Nico’s and the Counselor’s Heart Rate in Session 11
The researcher generated a segment synchrony plot and observed segmented shifts in child-counselor heart rate synchrony during Nico’s 11th play therapy session. The observed child-counselor heart rate synchrony values exceeded pseudo correlations during segments 2 (real corr. = 0.62; pseudo corr. = 0.58), 3 (real corr. = 0.68; pseudo corr. = 0.56), 4 (real corr. = 0.52; pseudo corr. = 0.30), 7 (real corr. = 0.88; pseudo corr. = 0.46), 8 (real corr. = 0.54; pseudo corr. = 0.45), 9 (real corr. = 0.56; pseudo corr. = 0.40), 12 (real corr. = 0.88; pseudo corr. = 0.50), and 13 (real corr. = 0.92; pseudo corr. = 0.38). The pseudo correlations were greater than true synchrony values during segments 1, 5, 6, and 11. The observed and pseudo correlations were equal for segments 9 and 14. Overall, Nico’s and the counselor’s observed heart rate synchrony exceeded chance correlations during eight of the 14 segments (heart rate synchrony.
during 57.14% of the segments in play therapy session 11).

![Figure 116: Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 11](image)

**Figure 116 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 11**

**Session 12**

The researcher conducted a SUSY analysis for Nico’s 12th play therapy session and found evidence for in-phase child-counselor heart rate synchrony, $ES_{noabs} = 21.33271$ ($SD = 0.058538$; see Figure 117). The observed heart rate synchrony between Nico and the counselor during the 12th session exceeded surrogate correlations at all lags within the six-second window (-3, -2, -1, 0, 1, 2, and 3-second lags; see Figure 118).
Figure 117 Time Series of Nico’s and the Counselor’s Heart Rate in Session 12

Figure 118 Nico’s and Counselor’s Observed and Pseudo Synchrony Values by Lag: Session 12

The researcher created a segment synchrony plot and visually examined shifts in child-counselor heart rate synchrony levels during Nico’s 12th play therapy session (see Figure 119). The researcher identified that the observed child-counselor heart rate synchrony values exceeded
pseudo correlations during seven segments: 1 (real corr. = 0.78; pseudo corr. = 0.52), 2 (real corr. = 0.56; pseudo corr. = 0.54), 5 (real corr. = 0.79; pseudo corr. = 0.74), 8 (real corr. = 0.90; pseudo corr. = 0.56), 9 (real corr. = 0.77; pseudo corr. = 0.41), 10 (real corr. = 0.71; pseudo corr. = 0.63), and 12 (real corr. = 0.84; pseudo corr. = 0.66). The pseudo correlations from surrogate tests exceeded the true heart rate synchrony values during segments 3, 4, 6, 7, and 11. There were no equal pseudo and real correlations across the 12 segments. During Nico’s 12th play therapy session, the true child-counselor heart rate synchrony values exceeded chance-based correlation values during seven of the 12 segments (heart rate synchrony during 58.33% of session 12).

Figure 119 Real Synchrony and Pseudo Synchrony Values by 120-second Segments: Session 12
Results: Research Question 2

Will the counselor and child clients experience statistically and practically significant levels of heart rate synchrony across sessions during CCPT treatment?

To examine if the children and their counselor experienced statistically and practically significant levels of heart rate synchrony across sessions during CCPT treatment, the researcher gathered the heart rate synchrony effect sizes for all sessions (see Table 1). The researcher conducted a single sample \( t \)-test to identify if the SUSY effect sizes (ES\(_{\text{noabs}}\)) for heart child-counselor heart rate synchrony across the 41 play therapy sessions differed significantly from zero (consistent with previous researchers utilizing SUSY analyses across psychotherapy treatments; Coutinho et al., 2020; Tschacher & Meier, 2020; Wilson et al., 2018). The researcher exported the SUSY ES\(_{\text{noabs}}\) values for the 41 play therapy sessions to an IBM Statistical Package for the Social Sciences (SPSS; Version 29) data file for analysis.

One outlier was identified and removed through visual inspection of the boxplots, as this value significantly skewed the data (Ava session 3, -193.462). The results of the single sample \( t \)-test provided statistically significant evidence for heart rate synchrony during play therapy sessions. The mean non-absolute effect size was 52.3385 (\( SD = 52.37 \)), and this mean effect size was statistically significantly different from zero in the single sample \( t \)-test, \( t (39) = 6.320, p < .001 \). Because the mean ES\(_{\text{noabs}}\) was positive and significantly deviated from zero, the researcher noted evidence for overall in-phase child-counselor heart rate synchrony across the 40 play therapy sessions.

For data visualization purposes, the researcher used Kubios 3.3 Premium HRV analysis software to generate Jessica’s session-level HRV indices across the play therapy treatment process (see Table 3). Across the 14 play therapy sessions, Jessica’s RMSSD indices ranges from
1.2817 to 51.146, which appeared to gradually increase from session 1 (3.4791) to 14 (33.740). Also, Jessica’s LF/HF ranged from 0.37109 to 12.974 during treatment. Her LF/HF indices gradually increased throughout the treatment, with average-high ranges in the last two sessions (6.4 – 6.85), indicating increased balance between sympathetic (LF) and parasympathetic (HF) responses.

*Table 3 Jessica’s HRV Frequency-Domain, Time-Domain, and Heart Rate Synchrony Values Across Play Therapy Sessions*

| Session | LF Peak (Hz) | HF Peak (Hz) | LF/HF  | RMSSD | Z     | ES
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0400</td>
<td>0.6433</td>
<td>0.37109</td>
<td>3.4791</td>
<td>.89238</td>
<td>23.869 69.23%</td>
</tr>
<tr>
<td>2</td>
<td>0.0466</td>
<td>0.3833</td>
<td>12.974</td>
<td>23.553</td>
<td>.77188</td>
<td>150.87 43%</td>
</tr>
<tr>
<td>3</td>
<td>0.1000</td>
<td>0.2400</td>
<td>1.5080</td>
<td>4.6676</td>
<td>.91878</td>
<td>49.590 53.33%</td>
</tr>
<tr>
<td>4</td>
<td>0.0433</td>
<td>0.2400</td>
<td>0.47265</td>
<td>1.2817</td>
<td>.45958</td>
<td>1.4132 50%</td>
</tr>
<tr>
<td>5</td>
<td>0.1200</td>
<td>0.3933</td>
<td>1.8985</td>
<td>29.352</td>
<td>.58699</td>
<td>88.944 46.7%</td>
</tr>
<tr>
<td>6</td>
<td>0.1300</td>
<td>0.2466</td>
<td>0.45065</td>
<td>13.304</td>
<td>.08562</td>
<td>-6.3674 Anti-phase 40%</td>
</tr>
<tr>
<td>7</td>
<td>0.0433</td>
<td>0.2433</td>
<td>2.250</td>
<td>34.957</td>
<td>.66118</td>
<td>85.882 85%</td>
</tr>
<tr>
<td>8</td>
<td>0.1100</td>
<td>0.2833</td>
<td>3.6438</td>
<td>34.8</td>
<td>.78443</td>
<td>76.466 75%</td>
</tr>
<tr>
<td>9</td>
<td>0.0566</td>
<td>0.2933</td>
<td>5.3601</td>
<td>37.799</td>
<td>.60028</td>
<td>-48.068 Anti-phase 63.6%</td>
</tr>
<tr>
<td>10</td>
<td>0.1666</td>
<td>0.2400</td>
<td>.62222</td>
<td>38.158</td>
<td>.79739</td>
<td>134.72 63.6%</td>
</tr>
<tr>
<td>11</td>
<td>0.0900</td>
<td>0.3166</td>
<td>.63687</td>
<td>3.5236</td>
<td>.81144</td>
<td>69.268 57.14%</td>
</tr>
<tr>
<td>12</td>
<td>0.0433</td>
<td>0.4000</td>
<td>0.5930</td>
<td>3.7713</td>
<td>.7432</td>
<td>124.95 50%</td>
</tr>
<tr>
<td>13</td>
<td>0.0400</td>
<td>0.2466</td>
<td>6.4411</td>
<td>51.146</td>
<td>0.6308</td>
<td>40.921 54%</td>
</tr>
<tr>
<td>14</td>
<td>0.0633</td>
<td>0.3166</td>
<td>6.8515</td>
<td>33.740</td>
<td>0.5911</td>
<td>2.2818 60%</td>
</tr>
</tbody>
</table>
The researcher used Kubios 3.3 Premium HRV analysis software to generate Jadyn’s session-level HRV indices across the play therapy treatment process (see Table 4). Across the 10 play therapy sessions, Jadyn’s RMSSD indices ranges from 68.399 to 84.406, which appeared to fluctuate across the play therapy treatment process. Jadyn’s LF/HF indices ranged from 1.8588 to 3.5713, fluctuating throughout the play therapy treatment process. This may indicate a need for additional play therapy sessions to work on increasing parasympathetic nervous system activity to balance sympathetic responses (e.g., increased self-regulation, coping).

Table 4 Jadyn’s HRV Frequency-Domain, Time-Domain, and Heart Rate Synchrony Values Across Play Therapy Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>LF Peak (Hz)</th>
<th>HF Peak (Hz)</th>
<th>LF/HF</th>
<th>RMSSD (ms)</th>
<th>Z</th>
<th>ES_noabs</th>
<th>% Session in Sync</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0400</td>
<td>0.2400</td>
<td>2.6393</td>
<td>77.064</td>
<td>0.8062</td>
<td>44.3532</td>
<td>40%</td>
</tr>
<tr>
<td>2</td>
<td>0.0400</td>
<td>0.2633</td>
<td>2.8257</td>
<td>73.470</td>
<td>0.5863</td>
<td>3.14993</td>
<td>40%</td>
</tr>
<tr>
<td>3</td>
<td>0.0433</td>
<td>0.2733</td>
<td>2.5429</td>
<td>75.377</td>
<td>0.8889</td>
<td>15.2256</td>
<td>61.5%</td>
</tr>
<tr>
<td>4</td>
<td>0.1266</td>
<td>0.3100</td>
<td>2.1434</td>
<td>72.436</td>
<td>0.7881</td>
<td>161.976</td>
<td>45.5%</td>
</tr>
<tr>
<td>5</td>
<td>0.0533</td>
<td>0.2400</td>
<td>2.5159</td>
<td>77.613</td>
<td>0.8211</td>
<td>26.8425</td>
<td>50%</td>
</tr>
<tr>
<td>6</td>
<td>0.0633</td>
<td>0.2866</td>
<td>1.8588</td>
<td>70.918</td>
<td>0.8286</td>
<td>95.5928</td>
<td>50%</td>
</tr>
<tr>
<td>7</td>
<td>0.0400</td>
<td>0.2566</td>
<td>3.5713</td>
<td>75.538</td>
<td>0.9687</td>
<td>137.681</td>
<td>53.3%</td>
</tr>
<tr>
<td>8</td>
<td>0.0400</td>
<td>0.2633</td>
<td>2.7623</td>
<td>75.523</td>
<td>0.8417</td>
<td>166.369</td>
<td>68.75%</td>
</tr>
<tr>
<td>9</td>
<td>0.0400</td>
<td>0.2400</td>
<td>2.1230</td>
<td>84.406</td>
<td>0.7585</td>
<td>76.5576</td>
<td>61.5%</td>
</tr>
<tr>
<td>10</td>
<td>0.0500</td>
<td>0.2700</td>
<td>3.2692</td>
<td>68.399</td>
<td>0.8265</td>
<td>43.4801</td>
<td>53.85%</td>
</tr>
</tbody>
</table>
The researcher used Kubios 3.3 Premium HRV analysis software to compute Ava’s session-level HRV indices across the play therapy treatment process (see Table 5). Across the 10 play therapy sessions, Ava’s RMSSD HRV indices ranged from 10.254 to 119.62. Ava’s RMSSD indices gradually increased from session 1 (31.305) to session 10 (73.555), indicating increased vagally mediated changes in HRV (Shaffer & Ginsberg, 2017). Ava’s LF/HF HRV indices fluctuated across treatment, with ratios ranging from 0.82798 to 2.7565. The researcher noted that Ava would benefit from continuing play therapy treatment to increase regulatory capacities.

*Table 5* Ava's HRV Frequency-Domain, Time-Domain, and Heart Rate Synchrony Values Across Play Therapy Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>LF Peak (Hz)</th>
<th>HF Peak (Hz)</th>
<th>LF/HF</th>
<th>RMSSD</th>
<th>Z</th>
<th>ESnoabs</th>
<th>% Session in Sync</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.05667</td>
<td>0.32667</td>
<td>0.82798</td>
<td>31.305</td>
<td>0.74307</td>
<td>13.0946</td>
<td>62.5%</td>
</tr>
<tr>
<td>2</td>
<td>0.04000</td>
<td>0.50333</td>
<td>0.99101</td>
<td>10.254</td>
<td>0.77963</td>
<td>82.7846</td>
<td>60%</td>
</tr>
<tr>
<td>3</td>
<td>0.04333</td>
<td>0.24000</td>
<td>1.1414</td>
<td>119.62</td>
<td>0.01259</td>
<td>-193.462</td>
<td>Anti-phase</td>
</tr>
<tr>
<td>4</td>
<td>0.04000</td>
<td>0.24333</td>
<td>2.6900</td>
<td>62.644</td>
<td>0.75568</td>
<td>117.614</td>
<td>68.75%</td>
</tr>
<tr>
<td>5</td>
<td>0.04000</td>
<td>0.26333</td>
<td>1.7873</td>
<td>75.562</td>
<td>0.27129</td>
<td>59.813</td>
<td>22.22%</td>
</tr>
<tr>
<td>6</td>
<td>0.05000</td>
<td>0.29667</td>
<td>2.2258</td>
<td>73.026</td>
<td>0.51536</td>
<td>1.17923</td>
<td>46%</td>
</tr>
<tr>
<td>7</td>
<td>0.04000</td>
<td>0.26000</td>
<td>2.7565</td>
<td>53.525</td>
<td>0.90261</td>
<td>15.1289</td>
<td>84.6%</td>
</tr>
<tr>
<td>8</td>
<td>0.04000</td>
<td>0.24000</td>
<td>2.4874</td>
<td>71.510</td>
<td>0.62534</td>
<td>23.4126</td>
<td>47%</td>
</tr>
<tr>
<td>9</td>
<td>0.04000</td>
<td>0.26667</td>
<td>2.5115</td>
<td>68.443</td>
<td>0.62998</td>
<td>15.6178</td>
<td>50%</td>
</tr>
<tr>
<td>10</td>
<td>0.04667</td>
<td>0.25667</td>
<td>2.0594</td>
<td>73.555</td>
<td>0.80711</td>
<td>6.64002</td>
<td>57.2%</td>
</tr>
</tbody>
</table>
The researcher used Kubios 3.3 Premium HRV analysis software to generate Nico’s HRV indices across the play therapy treatment (see Table 6). Across 12 total sessions, the researcher successfully recorded E4 sensor data during seven sessions. Across treatment, his LF/HF indices ranged from 1.2013 to 2.76 and fluctuated during the seven sessions. His RMSSD indices ranged from 71.748 to 122.72, with most scores in the 70s-80s range consistently across sessions. His RMSSD was highest during session one, when he was becoming introduced to the playroom and less engaged with the play therapist (anti-phase synchrony). Based on Nico’s findings, the researcher noted that he would benefit from continued play therapy services.

*Table 6 Nico's HRV Frequency-Domain, Time-Domain, and Heart Rate Synchrony Values Across Play Therapy Sessions*

<table>
<thead>
<tr>
<th>Session</th>
<th>LF Peak (Hz)</th>
<th>HF Peak (Hz)</th>
<th>LF/HF</th>
<th>RMSSD</th>
<th>Z</th>
<th>ES\textsubscript{noabs}</th>
<th>% Session in Sync</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0466</td>
<td>0.3366</td>
<td>1.2013</td>
<td>122.72</td>
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Chapter Four Summary

In Chapter Four, the researcher presented Jessica’s, Jadyn’s, Ava’s, and Nico’s individualized results for session-level child-counselor heart rate synchrony. Jessica participated in 14 CCPT sessions, and experienced in-phase child-counselor heart rate synchrony during 10 sessions. Jadyn participated in 10 CCPT sessions, and the researcher found that Jadyn and the counselor experienced in-phase heart rate synchrony during all sessions. Ava received 10 CCPT sessions, and experienced in-phase heart rate synchrony during nine sessions, with anti-phase synchrony during one session (session 3). Nico participated in 12 CCPT sessions, and seven sessions included sensor data due to technical difficulties. Of the seven data-inclusive sessions, Nico and the counselor experienced in-phase heart rate synchrony during seven sessions, and there was a lack of in-phase synchrony during play therapy session one. The researcher computed a one sample $t$-test to determine if the mean non-absolute effect size (ES$_{noabs}$) for child-counselor heart rate synchrony significantly deviated from zero, aligning with previous researchers who used the SUSY algorithm (Coutinho et al., 2020; Tschacher & Meier, 2020; Wilson et al., 2018). The researcher found evidence for overall in-phase child-counselor heart rate synchrony across the 40 play therapy sessions, as the mean ES$_{noabs}$ was positive ($M = 52.3385$) and significantly deviated from zero, $t (39) = 6.320, p < .001$. In Chapter Five, the researcher provides an overview of results, and discusses limitations of this research, possibilities for future research, and implications for counselors, play therapists, and counselor educators.
CHAPTER FIVE: DISCUSSION

In Chapter Five, the researcher provides a summary of the current research study and discusses the results within the contexts of current counseling, play therapy, and child mental health research. The researcher addresses limitations, future research, and implications for counselors, play therapists, and counselor educators. The researcher completed the first investigation of relational change mechanisms in play therapy through examining continuous child-counselor physiological synchrony during and across play therapy sessions. Through this investigation, the researcher aimed to examine the process and relational change mechanisms in CCPT with children exposed to complex trauma and early adversities.

Study Summary

Annually, one in every six children in the United States experience abuse, neglect, or serious maltreatment, and nearly 70% of children survive at least one traumatic event before their 16th birthday (Substance Abuse & Mental Health Services Administration [SAMHSA], 2022). Children who endure complex trauma are exposed to compounded, repeated, and chronic traumatic events within interpersonal contexts (Cook et al., 2005; van der Kolk et al., 2015; van der Kolk, 2005). Complex trauma exposure negatively impacts children’s well-being across multiple domains, including: (a) compromised brain development (Kliethermes et al., 2014; Luby et al., 2019; Teicher et al., 2016; Wilson et al., 2011); (b) early-onset cardiometabolic symptoms (e.g., increased heart rate and diastolic blood pressure; Jimenez et al., 2021); (c) increased chances for developing depression, anxiety, and ADHD during early childhood (Elmore & Crouch, 2020; Walker et al., 2021); and (d) elevated risks for substance use disorders, health risk behaviors, and suicide attempts (Campbell et al., 2019; Felitti et al., 1998; Fuller-
Thompson et al., 2016; Lee et al., 2020). Given the prevalence of children with trauma histories, counselors should develop knowledge and developmentally appropriate skills to serve children with complex trauma and ACEs.

Scholars have noted that Child-Centered Play Therapy (CCPT) is a promising evidence-based child mental health intervention for children with complex trauma histories because of the emphasis on consistent and safe therapeutic relationships, which is fundamental for children who have been relationally wounded or deprived (Burton & Choo, 2019; Conroy & Perryman, 2022; Cook et al., 2005). Recently, Ray and colleagues (2021) conducted a randomized control trial examining the efficacy of CCPT for children with multiple adverse childhood experiences (ACES) and found that children who participated in CCPT experienced statistically and clinically significant improvements in empathy, self-regulation, and behavioral problems. Ray and colleagues’ (2021) results provided strong evidence that CCPT is an effective mental health intervention for children who endure ACE exposures. Children with complex trauma often suffer with feelings of detachment (i.e., attunement difficulties) and trusting others (van der Kolk et al., 2009); however, CCPT therapists identify the therapeutic relationship as the primary change agent (Ray, 2011). Therefore, the researcher aimed to examine the relational change mechanisms in play therapy with children exposed to complex trauma, and how children respond and connect with counselors after enduring complex trauma on a nonverbal, physiological level.

Prior to data collection procedures, the researcher received approval from the University of Central Florida’s Institutional Review Board, as well as the elementary school district’s ethics and research department. The researcher utilized a time series research design (Box et al., 2016) to examine the relational processes and mechanisms of change in child-centered play therapy with children with histories of trauma and early adversities. The researcher recruited child
participants (ages 5-8) from a Title-I elementary school in the Southeast United States, using a purposive sampling strategy via school counselor referrals. After obtaining caregiver/guardian consent and verbal assent from the children, the elementary school counselor referred children with four or more ACEs (as measured by the *Pediatric Adverse Childhood Experiences and Related Life Events Scale* [PEARLS]; Koita et al., 2018).

The researcher facilitated twice weekly play therapy sessions with the participants, and sessions were facilitated in a designated, private playroom in the elementary school. Prior to this intervention, the researcher received over 150 hours of play therapy supervision from Certified Child Centered Play Therapist Supervisors (CCCPT Supervisor) and Registered Play Therapist Supervisors (RPT-S).

During play therapy sessions, the researcher and child participants wore Empatica© E4 wristbands (Empatica, 2020), and the researcher utilized data from the E4 sensors to generate heart rate (BPM; one observation per second) and heart rate variability indices (root mean square of successive differences [RMSSD] as well as low-frequency to high-frequency HRV ratios [LF/HF]; 64 observations per second). The researcher computed SUSY analyses to examine whether the counselor and child participants experienced significant levels of heart rate synchrony during and across play therapy sessions.

First, the researcher calculated individualized results for each child to understand intraindividual variations (change process *within* an individual, consistent with time series designs involving intensive longitudinal data; Collins et al., 2006). For each child, the researcher examined child-counselor heart rate synchrony during all play therapy sessions. The researcher noted individual shifts that occurred within sessions through visual inspections of segmented synchrony plots. During most sessions (90% of the 41 play therapy sessions included in this
study), the researcher found the degree of counselor-child heart rate synchrony exceeded surrogate control correlations at zero lags, which indicates instantaneous physiological synchronization between the counselor and child. The degree of observed synchrony consistently occurred at both negative and positive time-lags. Conroy (2021) encouraged future counseling researchers to examine lag time in physiological synchrony, as researchers can use lag time to understand how one person may be consistently influencing and leading the other person.

The presence of bidirectional lagged synchrony across sessions provided evidence that neither person (child nor counselor) was directing or consistently leading the synchrony during sessions (Tschacher & Meier, 2020). Axline’s (1969) sixth principle of non-directive play therapy is “the therapist does not attempt to lead the child’s actions or conversations in any manner” (Axline, 1969, p. 73). The presence of instantaneous (no lag, lag = 0), as well as bidirectional (both negative and positive) indicated attunement between the child and therapist, rather than the therapist leading the child, which supported Axline’s theoretical underpinnings of CCPT.

To determine if the child participants and their counselor experienced statistically and practically significant levels of heart rate synchrony across play therapy sessions during CCPT treatment, the researcher computed a one sample $t$ test (using IBM Statistical Package for the Social Sciences [SPSS; Version 29]). Specifically, the researcher generated the $t$ test using non-absolute SUSY effect sizes ($E_{\text{noabs}}$) for each session, as the researcher could use this value to differentiate in-phase (e.g., child’s and counselor’s heart rates increase together) and anti-phase (e.g., as one person's heart rate increases, the other person’s heart rate decreases) physiological synchrony (Tschacher & Haken, 2019). The mean non-absolute effect size was 52.338 ($SD = 52.38$), and this mean effect size was statistically significantly different from zero in the single
sample $t$-test, $t(39) = 6.320$, $p < .001$. The results of the single sample $t$-test provided evidence for strong in-phase child-counselor heart rate synchrony across participants and sessions.

**Purpose and Research Questions**

Through conducting this investigation, the researcher sought to examine relational processes and change mechanisms in CCPT for children exposed to multiple adversities and complex trauma. The researcher analyzed relational processes and moment-to-moment shifts through analyzing continuous child and therapist physiological data during play therapy sessions. The researcher sought to identify evidence for physiological synchrony during play therapy sessions, and further examine shifts in physiological attunement levels across the treatment process. The researcher developed the following research questions and hypotheses to guide the research process:

**Research Question 1**

What is the co-regulatory impact of CCPT treatment among individual child clients, as measured by child-counselor heart rate synchrony (non-absolute effect sizes) during individual play therapy sessions?

**Null Hypothesis 1**

$H_0$: The observed child-counselor heart rate synchrony values do not exceed the pseudo correlations generated through random shuffling of data, and the results fail to exceed what would be expected by chance alone.

**Alternative Hypothesis 1**

$H_1$: The observed child-counselor heart rate synchrony values are statistically significantly greater than the pseudo correlations.
Research Question 2

Will the counselor and child clients experience statistically \((p < .05)\) and practically (mean \(ES_{\text{noabs}} \neq 0\)) significant levels of heart rate synchrony across sessions during CCPT treatment?

Null Hypothesis 2

\(H_0\): The mean effect size of non-absolute Z values \((ES_{\text{noabs}})\) is not significantly greater than zero, indicating a lack of synchrony.

Alternative Hypothesis 2

\(H_1\): The mean effect size of the non-absolute Z values \((ES_{\text{noabs}})\) is significantly greater than zero, indicating significant in-phase heart rate synchrony across play therapy sessions.

Descriptive Data

The researcher aimed to recruit a sample of children between ages five and eight-years-old who experienced four or more adverse childhood experiences. The researcher used a purposive sampling strategy and utilized the elementary school counselor’s referrals for children to participate in this intervention and data collection process. Specifically, the researcher provided the school counselor with the Pediatric Adverse Childhood Experiences and Related Life Events Scale (PEARLS; Koita et al., 2018) for participant screening purposes, and asked the school counselor to identify students who endured four or more ACEs. The school counselor sent informed consent documents for children’s caregivers to review and sign before providing assessment outcomes to the researcher.

The researcher created the Demographic Form and Caregiver Questionnaire, which included general demographic, familial, developmental, and health-related questions that were relevant to the study. The demographic characteristics included: (1) child’s age, (2) child’s grade
in school, (3) racial identity, (4) ethnicity, (5) gender, (6) and household annual income-level.

The developmental history items included: (1) birth/delivery complications, (2) approximate age
the child first started to walk/speak/self-feed, and (3) caregiver’s perspective on the child’s
development in comparison to other children. The mental health history items included: (1)
child’s previous mental health diagnoses, (2) child’s previous mental health services for mental-
health concerns, and (3) child’s current medications.

At the conclusion of all participant recruitment and data collection procedures, the
researcher recruited a final sample of four children. The researcher initially recruited five
children for this intervention study; however, one child experienced a sudden school disruption
after the initial play therapy session; thus, four children completed CCPT treatment and were
included in data analysis (see Table 7). The researcher assigned random pseudonyms for all
participants, which the researcher used throughout this study to describe individual participants.
Table 7 Participants’ ACE Scores, Experiences, Number of Sessions, and Play Themes Across Treatment

<table>
<thead>
<tr>
<th>Child</th>
<th>ACE Score</th>
<th>ACE Experiences</th>
<th>Number of Sessions (# with Data)</th>
<th>Play Themes Across Treatment</th>
</tr>
</thead>
</table>
| Jessica | 5 |● Physical neglect  
● Sexual abuse  
● Caregiver divorce  
● Caregiver death  
● Caregiver mental illness | 14 (14) | Relationship, Perfectionism, Integration, Mastery |
| Jadyn | 6 |● Domestic violence  
● Physical abuse  
● Caregiver divorce  
● Physical neglect  
● Caregiver illness  
● Caregiver death | 10 (10) | Relationship, Dependency, Nurturing |
| Ava | 4 |● Caregiver mental illness  
● Domestic violence  
● Caregiver divorce  
● Family separation (immigration) | 10 (10) | Perfectionism, Nurturing, Mastery |
| Nico | 5 |● Caregiver mental illness  
● Household substance abuse  
● Domestic violence  
● Caregiver divorce  
● Child-caregiver separation (foster care) | 12 (7) | Protection, separation, safety, Anxiety |
Discussion of Findings

In the following sections, the researcher provides an overview of the findings of the current study. The researcher discusses results of the individualized session-level surrogate synchrony analyses (Research Question 1), followed by the results of the one sample t test (Research Question 2).

Research Question 1

The researcher hypothesized that in-phase child-counselor heart rate synchrony levels would increase gradually during the play therapy treatment process because children who experience interpersonal trauma and ACEs often struggle with forming trusting relationships (Kliethermes et al., 2014). The researcher anticipated lower levels of child-counselor heart rate synchrony during initial sessions because children with complex trauma histories are often preoccupied with environmental danger cues and struggle with differentiating safe and threatening relationships (Cook et al., 2005; van der Kolk, 2005; van der Kolk et al., 2009). Through analyzing individualized child-counselor synchrony levels on a session-by-session basis, the researcher found evidence for large in-phase heart rate synchrony throughout the play therapy treatment process. Of the 41 total play therapy sessions analyzed in this study, the counselor and children experienced significant heart rate synchrony levels during 37 sessions (90% of the play therapy sessions included in the present study).

For most of the play therapy sessions in this study, the client’s and counselor’s heart rate synchrony levels exceeded surrogate control correlations across all time lags (-3, -2, -1, 0, 1, 2, and 3-seconds). These lagged correlation findings provide contexts for the nature of synchrony between the counselor and child during sessions, as the therapist and child synchronize instantaneously (lag 0), as well as in response to one another (negative and positive lags). Based
on this lagged correlation finding, the researcher concluded that the counselor and children did not assume consistent leadership in the synchrony across sessions. While physiological synchrony operates outside one's cognitive awareness, it is important that non-directive counselors consider how one may unintentionally lead the child’s play through nonverbal communication or physiological cues (e.g., increase in heart rate when the child is playing with a fragile toy). Axline (1969) noted that non-directive play therapists should avoid unintentional leading the child’s behaviors, play, and experience in the playroom; therefore, attending to lag time was theoretically relevant in this CCPT intervention study.

The researcher noted that these findings of consistent, large heart rate synchrony levels across most play therapy sessions deviated from previous studies with adult clients and therapists, as well as couples in counseling (Conroy et al., 2023; Coutinho et al., 2020; Tschacher & Meier, 2020). While traditional adult-oriented therapies are more left-brain oriented (i.e., verbal reasoning), Schore (2021) noted that right-brain-to-right-brain communication is the most direct path to synchronized internal states, and argued that attuned therapists strive to learn about their clients on a nonverbal level and communicate their understanding through gradually matching clients’ nonverbal communication patterns. During play therapy sessions, the counselor followed the Child Centered Play Therapy Treatment Manual (Ray, 2011), which includes nonverbal facilitative responses such as following the child’s movements, maintaining an open stance toward the child, and matching the child’s affective state. Schore (2021) also noted that neuroscience researchers have identified specific right hemispheric regions of the brain associated with instantaneous interbrain synchronization, which relates to greater levels of heart rate synchrony during play therapy sessions at the zero-lagged correlations. The lag time is
important to the current study because in CCPT, “the therapist does not attempt to lead the child’s actions or conversations in any manner” (Axine, 1969, p. 73).

In this study, the counselor and child client experienced anti-phase synchrony during four sessions. There are several reasons that a dyad may experience anti-phase synchrony, especially within a play therapy session. To contextualize anti-phase synchrony findings in relation to the play therapy process and dynamics, the researcher examined the play therapy session recording for Ava’s third play therapy session (which involved significant anti-phase synchrony between therapist and child). The researcher noted that Ava spent a large proportion of the play session exploring the playroom and facing away from the counselor. During other sessions, Ava was consistently engaging the therapist (e.g., eye contact, inviting into play, talking to/with therapist). This observational finding aligns with Robinson’s (2011) argument that play therapists should strive to mirror and align with children using body language and eye contact, as this activates the mirror neuron system and promotes greater attunement. In CCPT, the therapist maintains this contact through nonverbal tracking and shifting body posture and rotating in a rolling chair to face the child (i.e., “therapist’s toes should follow their nose;” Landreth, 2012, p. 190). While there were some segments of the session involving high levels of relational engagement between Ava and the counselor (i.e., playful sword match with non-aggressive affect; nurturing play with the doctor’s kit), they were not in visual or affectual contact for majority of the session (roughly 60% of the time). Another possible explanation for the anti-phase heart rate synchrony during this session was the announcement of the upcoming hurricane the next day. The therapist facilitated sessions on Tuesday that week, and the hurricane was anticipated on Wednesday evening; that day, both Jessica and Ava experienced anti-phase synchrony which may relate to natural disaster-related community trauma (Kujawa et al., 2016). While the researcher was able
to note changes in Ava’s play, there were no significant shifts in Jessica’s play themes, behaviors, or general affect during this session. Future researchers may examine whether the direction and strength of non-verbal synchrony differ based on session-level shifts.

During Nico’s first play therapy session, there was a lack of child-counselor heart rate synchrony. Ray (2011) applied Rogers’ (1961) stage process of personality change to the CCPT play therapy process and noted that during initial sessions (i.e., Stage 1), children are often defensive and express resistance toward the therapist. Similar to Ava’s session, the researcher noted that Nico was exploring the room and was faced away from the counselor for most of this session. As it relates to CCPT treatment, Jayne and Ray (2014) suggested that “matching” of affective states and body language promotes greater attunement and empathic understanding during sessions. Therefore, future researchers should examine the session-level impacts of mirroring, body language, and face-to-face contact on child-counselor physiological synchrony.

The researcher anticipated increased levels of in-phase heart rate synchrony during the play therapy treatment process; however, anti-phase synchrony does not necessarily indicate a lack of relationship and empathy. Nyman-Salonen and colleagues (2021) noted that occasional anti-phase synchrony levels may indicate that a dyad is taking turns while engaging in verbal conversations (e.g., one person is talking, the other person is listening and processing the other’s statements). In this situation, the dyad is engaging in more empathic behaviors through giving space to one another and taking turns, rather than speaking at the same time (Nyman-Salonen et al., 2021). An example of this turn-taking process in play therapy could be when the child processes the counselor’s verbalizations during limit setting, when the child is listening to the therapist and making a choice about alternatives (example: I know you would like to hit me with that, and I am not for hitting, you can choose to hit the bop bag or the pillow).
Research Question 2

The researcher aimed to examine if the counselor and child clients experienced statistically and practically significant levels of heart rate synchrony across play therapy sessions. To identify if heart rate synchrony levels differed significantly from zero (null hypothesis was correlation of 0; non-significant mean synchrony across sessions), the researcher computed a single sample $t$ test and included the 41 play therapy sessions with four clients. The researcher found that the mean non-absolute effect size ($M = 42.34$, $SD = 52.38$) for the 41 sessions significantly deviated from zero in the one sample $t$-test, $t(39) = 6.320$, $p < .001$. Because the researcher used non-absolute effect sizes for this analysis, the large positive mean effect size indicated overall in-phase synchrony during the play therapy sessions in this study.

Through visually inspecting Tables 1, 2, 3, and 4, the researcher identified shifts in children’s HRV indices across the sessions. Ava’s RMSSD indices gradually increased from session 1 (31.305) to session 10 (73.555), indicating increased vagally mediated changes in HRV (Shaffer & Ginsberg, 2017). Additionally, Jessica’s HRV results indicated increased parasympathetic nervous system recovery in later sessions, as evidenced by greater RMSSD HRV values. Other children’s HRV results were less consistent in their increase/decrease over time. Examining ratios is important because while sympathetic nervous system activity may increase (LF bands), the child may actually be more regulated if their parasympathetic nervous system is also more active (HF bands). The balance between sympathetic and parasympathetic nervous systems indicates greater regulatory capacities. The child’s ability to encounter stressful content and downregulate via the parasympathetic nervous system is necessary for later stages of play therapy, when children are able to fully express their feelings and work through underlying issues (Moustakas, 1973; Ray, 2011; Rogers, 1942).
Implications

There are numerous implications of the current research study for counselor educators, play therapists, school counselors, and trauma counselors. First, the results of this study can be used to emphasize the importance of therapeutic presence in play therapy and child counseling. From a polyvagal perspective, Geller (2018) emphasized that therapeutic presence is both an *internal* and *relational* experience, and presence promotes co-regulatory processes with clients. On the internal level, counselors with high levels of therapeutic presence are grounded and live out their authentic selves within therapeutic relationships (Geller 2018). The relational aspect of therapeutic presence involves immersion (empathic understanding). Through being empathic and grounded in one’s authentic self, clients can more easily receive and accept neuroceptions of safety and co-regulatory opportunities in counseling sessions. The findings of the present study provide further evidence that child-centered play therapy promotes clients’ capacities for attunement and social engagement. Previous researchers noted that children with complex trauma histories often feel threatened in response to interpersonal attempts for connection (e.g., eye-contact) and experience deep detachment and difficulties with attunement (van der Kolk et al., 2009; Steuwe et al., 2014). However, the child participants in the present study demonstrated high levels of relational resilience and openness to co-regulation early in the therapeutic treatment process. Although previous research studies provided important information regarding children’s trauma-related behaviors and struggles, it is vital that play therapists maintain trust in the child’s capacities for growth, change, and relational success, and this trust of children is a necessary component of CCPT (Axline, 1947; Landreth, 2012; Ray, 2011).

Future researchers may expand this research by further investigating the influence of the therapeutic relationship on play therapy treatment outcomes, as well as children’s autonomic
nervous system regulatory capacities. For example, researchers may examine child-counselor electrodermal activity (skin conductance response) synchrony, which is an efficient measure of sympathetic nervous system activation (Alinia et al., 2021). Through examining changes in children’s autonomic nervous system regulatory capacities (via SCRs or HRV indices during sessions), researchers can determine mechanisms of play therapy that address the neurobiological consequences of trauma.

The researcher examined the influence of child-counselor physiological synchrony and the therapeutic relationship within child-centered play therapy sessions. However, therapists’ abilities to foster warm, empathic, and genuine relationships with clients is a core change mechanism, regardless of the therapists’ orientation. The therapeutic relationship and empathic understanding are common factors associated with therapeutic change across all psychotherapeutic approaches (Wampold et al., 2015). Therefore, researchers may examine the influence of client-counselor attunement across diverse orientations, such as cognitive behavior therapy and solution focused brief therapy, to gain more in-depth understandings regarding the transtheoretical influence of the therapeutic alliance and attitudinal conditions.

The researcher chose to examine physiological synchrony during CCPT sessions because the therapeutic relationship is the primary change mechanism in CCPT (Landreth, 2012; Ray, 2011). Within an established therapeutic relationship, child-centered counselors believe that the relationship is necessary and sufficient for change and healing when the counselor experiences and accurately communicates the attitudinal conditions: (1) empathic understanding, (2) unconditional positive regard, and (3) genuineness/congruence (Landreth, 2012; Rogers, 1956).
The results of this dissertation study further highlighted the necessity of the attitudinal conditions. Importantly, children in this study began experiencing heart rate synchrony with the counselor as early as session one. Therefore, it is critical that counselors maintain empathy, acceptance, and openness early in the therapeutic relationship to promote children’s co-regulatory capacities. Moreover, the researcher believes that these findings further outline the need for counselors to maintain self-awareness and congruence. Children with trauma histories deserve to work with caring adults who are consistent, genuine, and predictable, and children may be less likely to seek co-regulatory opportunities if they do not experience their therapist as genuine and consistent (Cook et al., 2005).

In addition to implications for child counseling and clinical intervention research practices, counselor educators and supervisors may incorporate these findings into their work with supervisees and practicum/internship-level counselors-in-training. Through this study, the researcher established that clinicians and child clients may experience significant levels of physiological linkage, starting as early as the initial counseling sessions. Researchers found that physiological synchrony during counseling sessions was associated with clients’ positive perceptions of the working alliance (Bar-Kalifa et al., 2019; Tal et al., 2023; Tschacher & Meier, 2020; Tourunen et al., 2020). While physiological synchrony is associated with empathic understanding and willingness to enter the client’s world, supervisors should also consider potential physical and psychological consequences. For example, supervisees counseling individuals with complex trauma histories may need additional support as they learn to self-regulate and avoid vicarious traumatization (Coutinho et al., 2014; Helpingstine et al., 2021).
Coutinho and colleagues (2014) suggested that highly empathic counselors should develop self-regulatory skills to better serve clients and avoid toxic sympathetic nervous system activation. Supervisors and counselor educators may support counselors-in-training through integrating self-care practices throughout preparation programs, and modeling strategies such as mindfulness exercises. Lastly, researchers may examine physiological synchrony within supervisory relationships, and how synchrony corresponds with supervisees’ abilities to form working alliances with their clients (DePue et al., 2022).

**Limitations**

One limitation of this exploratory time-series design is the small sample size \( (N = 4) \). While the researcher’s choice in design was appropriate based on the number of observations per session, it is possible that the therapist \( (N = 1) \) influenced a large proportion of the variance across sessions; therefore, limiting the generalization of the findings. Yet, the outcomes from this study are promising as they relate to physiological synchrony and relational resilience among children with complex trauma histories in play therapy. Thus, future researchers should examine non-verbal synchrony in play therapy sessions with larger samples of child participants and multiple counselors to increase the generalizability of these results. Also, researchers may consider examining child-counselor heart rate synchrony with children presenting with other concerns known to impact attunement, such as childhood depression.

There were notable threats to the internal validity of the study findings, including threats of history, maturation, contamination effect, and attrition. The potential history threat to internal validity was if participants received additional mental health interventions (besides the CCPT
treatment) during the intervention phase of this study. To address this potential history threat, the researcher included the following exclusion criterion: (a) children who were receiving play therapy services and/or another mental health counseling related service. Because children started play therapy during different weeks (staggered start), history events were minimal. There were potential maturation threats to internal validity, including participants aging throughout the intervention phase, or significant life events occurring during the intervention. During this study, there were two hurricanes local to the elementary school. The first hurricane occurred the week play therapy was scheduled to start. The second hurricane occurred during the fifth intervention week; therefore, children only received one weekly play therapy session during week five due to the school closure. The counselor facilitated CCPT sessions the day when school administrators announced school closure because of the anticipated hurricane that week; that day, Jessica (session 9) and Ava (session 3) experienced notable anti-phase heart rate synchrony with the counselor. Therefore, future researchers should further examine the impacts of natural disasters on client-counselor heart rate synchrony. The researcher conducted this study during the COVID-19 pandemic, which may have impacted the therapeutic process because of widespread fear, loss, and uncertainty.

There were potential threats to external validity, such as ecological validity/ reactive effects of arrangements. Reactive effects of arrangements occur when the experimental environment is unrealistic and not consistent with real-world mental health counseling settings (making it impossible to generalize findings). To address ecological threats, the researcher facilitated play therapy services in a small school counseling office to ensure that the
environment was consistent with typical school based mental health services. The environment was set up in a manner consistent with standard playrooms (Landreth, 2012).

There is also a need for research that aligns physiological markers of the therapeutic relationship with objective and validated instruments. Future researchers may examine the relationship between child-counselor physiological synchrony and children’s perspectives of the therapeutic relationship. Child counseling and play therapy researchers have created developmentally informed scales for assessing children’s experiences in the therapeutic relationship, such as the Relationship Inventory for Children (RIFC; Purswell & Bratton, 2018) and the Counseling Session Experience Scale for Children (CSES; 2020, Mumbauer-Pisano, 2020). Therefore, future researchers may examine whether physiological synchrony levels predict children’s CSES and RIFC scores.

Researchers may also utilize video recordings to align session-level shifts with changes in the child-counselor physiological synchrony. This form of observation-based outcome research may promote greater knowledge and identification of relationship ruptures and other critical moments in play therapy. Further, observational measures may be more appropriate for assessing relational experiences that occur in child therapy because nonverbal communication is particularly relevant within the play therapy room.

The lack of control or comparison groups was another limitation; however, the SUSY algorithm allowed the researcher to compare the true observed segment-wise cross correlations to surrogate controls (hundreds per session). Future researchers may examine other therapeutic approaches (e.g., directive play therapy, general talk therapy, Adlerian Play Therapy, Theraplay,
trauma-focused cognitive behavior therapy [TF-CBT]) to determine whether there are differences in physiological synchrony based on therapeutic approach.

**Chapter Five Summary**

In Chapter Five, the researcher provided a summary of the current study, and discussed the findings within the contexts of existing play therapy and child mental health research. The researcher presented implications and limitations of this study, as well as opportunities for future researchers to expand this research. Through this exploratory time-series research study, the researcher identified empirical evidence of physiological attunement and nonverbal synchronization between play therapists and four children who endured multiple early childhood adversities. The researcher examined how therapist-child relationships (as measured by therapist-child heart rate synchrony) develop and function during and across play therapy sessions. The researcher sought to examine relational processes and change mechanisms in CCPT that align with the unique and important relational needs of children exposed to multiple adversities and complex trauma. These results support the importance of the therapeutic relationship as a change mechanism in play therapy treatment, and the need for counselors to maintain congruence and provide children with consistent and safe relationships (Landreth, 2012). Researchers have found that children with complex trauma histories suffer neurobiological consequences that compromise their abilities to attune, empathize, and trust safe adults (Kliethermes et al., 2014; Luby et al., 2019; van der Kolk, 2015). The child participants in this investigation demonstrated high levels of relational resilience, evidenced by significant levels of in-phase child-counselor heart rate synchrony during 90% of the play therapy sessions. On an individual level, children experienced significant levels of in-phase heart rate synchrony, including Jessica (12 of 14 sessions; 86% of sessions), Jadyn (10 of 10 sessions, 100%), Ava (9 of 10 sessions, 90%), and
Nico (6 of 7 data recorded sessions, 86%). Future researchers should replicate this study and provide further evidence for the relational benefits of humanistic play therapy for children who endure complex trauma.
Part I: Demographics

1. Child’s Name: _____________________________

2. Child’s Age: ________

3. Child’s grade in school (circle one)
   a. Kindergarten
   b. 1st grade
   c. 2nd grade
   d. 3rd grade

4. Race (circle one):
   a. Black or African American
   b. White
   c. Asian
   d. Native American, First Nations, or Alaskan Native
   e. Pacific Islander or Native Hawaiian
   f. Biracial or multiracial
   g. other (please indicate): _______________

5. Is your child Hispanic or Latino (circle one)?
   a. Yes, my child is Hispanic and/or Latino/a/x
   b. No, my child is not Hispanic and/or Latino/a/x

6. Gender (circle one):
a. boy
b. girl
c. gender expansive (i.e., non-binary, gender non-conforming)
d. I prefer to self-identify (indicate): ________________

7. Please select the following that best captures your household annual income (circle one):
   a. Less than $25,000 per year
   b. $25,001-$50,000 per year
   c. $50,001-$100,000 per year
   d. $100,000-$200,000 per year
   e. More than $200,000 per year

   Developmental History

1) Were there any birth/delivery complications (check one)?
   
   □ No
   □ Yes (what complications?): ________________________________

2) At approximately what age did your child first start:
   Walking       _________
   Speaking       _________
   Self-feeding   _________
3) From your perspective, did your child seem to develop like other children?

☐ Yes

☐ No (How so?) ________________________________

**Mental Health History**

1) Has your child received any mental health diagnoses?

☐ No

☐ Yes (If yes, please note below)

________________________________________________________________________

________________________________________________________________________

2) Has your child received mental health services (i.e., counseling, play therapy, behavioral therapy) for any mental health-related concerns? If so, please list below:

<table>
<thead>
<tr>
<th>Service(s)</th>
<th>Date(s)</th>
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3) Please list any medications your child is currently taking:

________________________________________________________________________
APPENDIX B: PEARLS (Koita et al., 2018)
Many families experience stressful life events. Over time these experiences can affect your child's health and wellbeing. We would like to ask you questions about your child so we can help them be as healthy as possible. At any point in time since your child was born, has your child seen or been present when the following experiences happened? Please include past and present experiences.

Please note, some questions have more than one part separated by “OR.” If any part of the question is answered “Yes, “then the answer to the entire question is “Yes.”

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<tbody>
<tr>
<td>1.</td>
<td>Has your child ever lived with a parent/caregiver who went to jail/prison?</td>
<td>Yes No</td>
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<td>2.</td>
<td>Do you think your child ever felt unsupported, unloved and/or unprotected?</td>
<td>Yes No</td>
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<tr>
<td>3.</td>
<td>Has your child ever lived with a parent/caregiver who had mental health issues? (For example, depression, schizophrenia, bipolar disorder, PTSD, or an anxiety disorder)</td>
<td>Yes No</td>
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<td>4.</td>
<td>Has a parent/caregiver ever insulted, humiliated, or put down your child?</td>
<td>Yes No</td>
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<tr>
<td>5.</td>
<td>Has the child’s biological parent or any caregiver ever had, or currently has a problem with too much alcohol, street drugs or prescription medications use?</td>
<td>Yes No</td>
</tr>
</tbody>
</table>
6. Has your child ever lacked appropriate care by any caregiver (for example, not being protected from unsafe situations, or not cared for when sick or injured even when the resources were available)?

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<thead>
<tr>
<th></th>
<th>Yes</th>
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7. Has your child ever seen or heard a parent/caregiver being screamed at, sworn at, insulted, or humiliated by another adult?

Or

Has your child ever seen or heard a parent/caregiver being slapped, kicked, punched beaten up or hurt with a weapon?

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<th></th>
<th>Yes</th>
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</table>

8. Has any adult in the household often or very often pushed, grabbed, slapped or thrown something at your child?

Or

Has any adult in the household ever hit your child so hard that your child had marks or was injured?

Or

Has any adult in the household ever threatened your child or acted in a way that made your child afraid that they might be hurt?

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<th></th>
<th>Yes</th>
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9. Has your child ever experienced sexual abuse? For example, anyone touched your child or asked your child to touch that person in a way that was unwanted, or made your child feel uncomfortable, or anyone ever attempted or actually had oral, anal, or vaginal sex with your child?

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<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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10. Have there ever been significant changes in the relationship status of the child’s caregiver(s)? For example, a parent/caregiver got a divorce or separated, or a romantic partner moved in or out?

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<th>Yes</th>
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Write the total number of Yeses in this first section here:  

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206
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<tr>
<td>11. Has your child ever seen, heard, or been a victim of violence in your neighborhood, community or school? (For example, targeted bullying, assault or other violent actions, war or terrorism)</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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<td>12. Has your child experienced discrimination (for example being hassled or made to feel inferior or excluded because of their race, ethnicity, gender identity, sexual orientation, religion, learning differences, or disabilities)?</td>
<td></td>
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<td>Yes</td>
<td>No</td>
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<td>13. Has your child ever had problems with housing (for example being homeless, not having a stable place to live, moved more than two times in a six-month period, faced eviction or foreclosure, or had to live with multiple families or family members)?</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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<td>14. Have you ever worried that your child did not have enough food to eat or that the food for your child would run out before you could buy more?</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>15. Has your child ever been separated from their parent or caregiver due to foster care, or immigration?</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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<td>16. Has your child ever lived with a parent/caregiver who had a serious physical illness or disability?</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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<td>17. Has your child ever lived with a parent or caregiver who died?</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
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Write the total number of Yeses in this second section here:  

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August 12, 2022

Dear Dalena Taylor:

On 8/12/2022, the IRB reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Modification / Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Stronger Together: Using Social-Emotional Learning to Bridge the Academic Gap</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Dalena Taylor</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>MOD00003107</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
</tr>
<tr>
<td>Grant ID:</td>
<td>None</td>
</tr>
<tr>
<td>IND, IDE, or HDE:</td>
<td>None</td>
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</table>

Documents Reviewed:  
- Demographic Questionnaire, Category: Survey / Questionnaire;  
- Informed Consent for Teachers and Administrators, Category: Consent Form;  
- Informed Consent Tier 3, Category: Consent Form;  
- PEARLS, Category: Survey / Questionnaire;  
- Stronger Together Protocol, Category: IRB Protocol;

The IRB approved the minor modification 8/12/2022.

In conducting this protocol, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. Guidance on submitting Modifications and a Continuing Review or Administrative Check-in are detailed in the manual. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

[Signature]

Kamilli C. Birkbeck
APPENDIX D: CAREGIVER INFORMED CONSENT DOCUMENT
Title of research study: Stronger Together: Using Social-Emotional Learning to Bridge the Academic Gap

Principal Investigator(s): Dalena Dillman Taylor, Ph.D

Investigational Site(s): University of Central Florida and Aloma Elementary School

How to Return this Consent Form:
You are provided with two copies of this consent form. If you give consent for your child to participate in the research, please sign one copy and return it to the researcher and keep the other copy for your records.

Key Information: The following is a short summary of this study to help you decide whether or not to be a part of this study. More detailed information is listed later on in this form.

Why is my child being invited to take part in a research study?
Your child is being invited to take part in a research study because they are between the ages of 5-11, attend Aloma Elementary School. Aloma administration has partnered with UCF to provide additional support services to children who either missed a year of school or who have been struggling academically, behaviorally, socially, or emotionally.

Why is this research being done?
The purpose of this research study is to increase social-emotional learning in students through a tiered approach to support academic achievement and overall wellness.

At Aloma Elementary, the school has created a tiered program for students. Your student may already receive services to help with social/emotional learning in their classrooms. Based on your child’s needs, they were referred for Tier 2 or 3 services.

Tier 2, using mentoring, is taking place for research purposes. Mentoring sessions provide your student with academic and/or social/emotional support through helping with schoolwork, playing games, and/or reading to your student.

Tier 3, using Play Therapy, is taking place for research purposes. Play therapy sessions are therapeutic sessions in which your child uses the toys as their words to explain any concerns your child has.

How long will the research last and what will my child need to do?
Your child, who presents mental health concerns (i.e., emotional outbursts, depressive symptoms, externalizing behaviors [aggressive behaviors, disruptive to class and/or teachers, inattentive]) and/or is academically behind will be identified through (Tier 1) SEL instruction and/or teacher report. Your child may qualify for the mentoring intervention (Tier 2) if they demonstrate some of the issues presented above or your child may qualify for play therapy services (Tier 3) if they present more than two issues above.
Permission to Take Part in a Human Research Study

In Tier 2, your child will participate in biweekly mentoring services with student volunteers. Volunteers can read to your child, offer academic support through completion of schoolwork, and/or play games with your child to develop social and emotional support on a more individualized level.

In Tier 3, your child will participate in an intake process with you that will include questions concerning your child’s overall mental health and an initial 30-45 minute play session. You will receive information regarding play therapy – a developmentally, responsive approach to counseling children – when you meet with your child’s counselor. Each session lasts 30-45 minutes, and your child will participate in up to 9 additional sessions. Therefore, because your child qualifies for this tier, we expect that your child will be in this research study for 16, 30-45 minute play therapy sessions during the 2022-2023 academic year.

The duration of the study will last approximately 16 weeks. The researcher will collect baseline classroom data from the teacher for about 2 weeks. If receiving mentoring, your child will participate in biweekly sessions (mentoring) for 6 weeks. If your child is receiving play therapy services, your child will participate in biweekly or triweekly sessions for 6-8 weeks, dependent upon their academic schedule.

Is there any way being in this study could be bad for my child?
Your child’s participation in this study is not expected to pose more than minimal risks. However, your child may experience heightened emotional states as they find themselves in a supportive environment. If your child experiences a heightened emotional state beyond typical play, the faculty member will work with the school counselor to refer your child to an appropriate referral for more specialized counseling services.

Will being in this study help my child in any way? Although we cannot promise direct benefits to your child, previous research has shown that children who engage in social/emotional learning curricula and/or play therapy are more likely to feel connected to their teacher, peers, and school as well as achieve higher academic goals.

What happens if I do not want my child to be in this research?
Participation in research is completely voluntary. You can decide to allow your child to participate or not to participate.

Detailed Information: The following is more detailed information about this study in addition to the information listed above.

What should I know about a research study?
- Someone will explain this research study to you and your child.
- Whether or not you allow your child to take part is up to you.
- You can choose not to allow your child to take part.
- You can agree to allow your child to take part and later change your mind.
- Your decision will not be held against you or your child.
- You can ask all the questions you want before you decide.
Permission to Take Part in a Human Research Study

Who can I talk to?
If you have questions, concerns, or complaints, or think the research has hurt your child, talk to the research team at Dalena.Taylor@ucf.edu. This research has been reviewed and approved by an Institutional Review Board (“IRB”). You may talk to them at 407-823-2901 or irb@ucf.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your child’s rights as a research subject.
- You want to get information or provide input about this research.

How many people will be studied?
We expect about 540 children and 120 caregivers/parents will be a part of this research study.

What happens if I say yes, I want my child to be in this research?
You will be asked to complete a demographic questionnaire including information about your child’s age, gender, race/ethnicity, program area, and your child’s developmental and mental health history. The school counselor will complete a brief screener, the Pediatric ACEs and Related Life Events based on your child’s history. You will also be asked to complete an interview process about your child (if selected for Tier 3).

Your child will be asked to come into the designated playroom (either at Aloma Elementary School or the University of Central Florida) accompanied by a research assistant to play for 30-45 minutes biweekly or triweekly. During play sessions, your child will wear a smart wristband that collects heart rate and sweat. This data is collected without any identifying information. Before each session, your child will wear the wristband for approximately 10 minutes to establish baseline heart rate and sweat levels. The counselor will help set up the wristband for your child each time, and the counselor will also help remove the wristband immediately after each session. Mentoring sessions will be audio recorded to ensure quality of services provided to your child. The playtime will be video recorded and downloaded onto a secure database where graduate students on the research team will conduct a qualitative content analysis of the data.

In accordance with COVID-19 safety precautions, play therapy sessions may be postponed due to the occurrence of symptoms and/or exposure. Participants and research personnel will engage in ongoing safety practices including sanitation and self-monitoring of symptoms.

Audio or video taping:
You and your child will be audio (Tier 2) or videotaped (Tier 3) during this study. If you do not want you or your child to be audio or videotaped, your child will not be able to participate in the study. Please discuss any questions or concerns with the primary researcher or a research team member. If you or your child is audio or videotaped, the tape will be kept on an encrypted, password protected computer and flash drive. The tape will be erased or destroyed after 7 years. All interviews and interactions with you and your child, as well as play therapy sessions, will be videotaped.

What happens if I say yes, but I change my mind later?
You can have your child leave the research at any time it will not be held against you or your child.
Permission to Take Part in a Human Research Study

Collected data will be removed from the research at the point of withdrawal, however all data must be retained for five years per Florida Law. If you withdraw, the data will be retained, but stored separately. If the PI, Dr. Dalena Dillman Taylor, assesses further need to provide services, she will discuss options with parents to either have child stay in the study for an additional sessions or be referred out to someone in the community.

What happens to the information collected for the research?
Efforts will be made to limit the use and disclosure of your child’s personal information, including research study records, to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your child’s information include the IRB and other representatives of this organization.

Your child's identity will be kept confidential to the extent provided by law. Your name will not be stored with data and all information will be reported in a summary format. All data will be stored on an encrypted, password protected computer and flash drive, separate from any identifiers. If your child discloses information regarding abuse to a research team member, that team member must report the abuse to the Department of Children and Families (DCF) and therefore will limit the ability to maintain your child’s confidentiality.

We may publish the results of this research and produce videos for commercialization to better train future registered play therapists on the specific skills needed to produce behavioral change. However, we will keep your child’s name and other identifying information confidential, including blurring faces when visible in the video.

If identifiers are removed from your child’s identifiable private information that are collected during this research, that information could be used for future research studies or distributed to another investigator for future research studies without your additional informed consent.

Can my child be removed from the research without my OK?
The person in charge of the research study, Dalena Dillman Taylor, can remove your child from the research study without your approval. Possible reasons for removal include your child’s retraction of assessment by verbalizing their desire to end their time in the playroom. Parents will be informed in child does not want to participant.
Permission to Take Part in a Human Research Study

Signature Block for Children

Your signature documents your permission for the named child to take part in this research.

Printed name of child

Signature of parent or individual legally authorized to consent to the child’s general medical care

Date

☐ Parent
☐ Individual legally authorized to consent to the child’s general medical care (See note below)

Printed name of parent or individual legally authorized to consent to the child’s general medical care

☐ I, ______________________ (caregiver of child), provide permission for Dr. Dillman Taylor and her research team to use de-identified videos of my child, ______________________, for training and commercialization purposes.

☐ If the child or parent discloses child abuse, neglect, exploitation or intent to harm another person, the therapist is required by law to report it to the appropriate authority.
Permission to Take Part in a Human Research Study

Title of research study: Stronger Together: Using Social-Emotional Learning to Bridge the Academic Gap

Investigator: Dalena Dillman Taylor, Ph.D, LMHC, RPT-S

Key Information: The following is a short summary of this study to help you decide whether or not to be a part of this study. More detailed information is listed later on in this form.

Why am I being invited to take part in a research study?
We invite you to take part in a research study because you are either a teacher or administrator at Aloma Elementary School. You have hands-on experience with students and could provide adequate information regarding their possible social and emotional needs, and are 18 or older.

Why is this research being done?
The purpose of this research study is to increase social-emotional learning in students through a tiered approach to support academic achievement and overall wellness.

At Aloma Elementary, the school has created a tiered program for students. Tier 1 is in-classroom social-emotional curricula. All students will be enrolled at a minimum in Tier 1. Tier 2 is mentoring services in which the student will work with an assigned mentor that is Vendor approved. Your students may already receive Tier 1 or Tier 2 services. However, they may be eligible for additional services: Tier 3 (in partnership with UCF faculty, Dalena Dillman Taylor).

The researcher is interested in determining what students may benefit from a multi-tiered system of support (MTSS). Play therapy sessions are therapeutic sessions in which students may use the toys as their words to explain any concerns they may have as they transition back into academic learning post-pandemic (Tier 3).

How long will the research last and what will I need to do?
We expect that you will be in this research study for one academic year.

If you are an administrator, you will be asked to collect the survey data from the teachers and work with the researcher (using deidentified data) to place students in either Tier 2 or 3 services. You will also be asked to complete the Pediatric ACEs and Related Life Events Screener (PEARLS) on the students that have experienced traumatic events. You will collaborate with the PI to place students into Tier 2 or 3 services.

If you are a teacher, you are already completing a survey on each student that has missed more than a year of schooling due to the pandemic or is at least one academic year behind their counterparts. After your consent and parent consent, we are asking for access to these surveys. If you opt to complete this needs assessment, you will work with the PI to send out...
Permission to Take Part in a Human Research Study

Informed consents to students eligible for Tier 3 services. If your students’ parents provide consent, you will be asked to meet with the PI for a brief 30-minute meeting to discuss the individual needs of the student and complete the Teacher Report Form (TRF) at each phase of the intervention (a minimum of 3 times: pre, during, and post). Each administration of this assessment will take up to 15 minutes to complete. In addition, in the 30-minute meeting, you will collaborate with the PI to develop a brief 3-item daily measure to track the students’ behaviors and emotions daily throughout the duration of the study. The daily measure will take less than 2 minutes to complete. After enrollment, you will be asked to complete this each day for each student enrolled in the study. Therefore, your time involvement per student over the 16 week period would total approximately 2-3 hours.

More detailed information about the study procedures can be found under “What happens if I say yes, I want to be in this research?”

Is there any way being in this study could be bad for me?
The risks to participation are minimal and do not exceed the risks associated with activities found in daily life.

Will being in this study help me any way?
We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include receiving support from the research team, students in your classroom may be more engaged, close academic gaps, and increase social/emotional development.

What happens if I do not want to be in this research?
Participation in research is completely voluntary. You can decide to participate or not to participate.

Detailed Information: The following is more detailed information about this study in addition to the information listed above.

What should I know about a research study?
- Someone will explain this research study to you.
- Whether or not you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide.

Who can I talk to?
If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team: at Dalena.Taylor@ucf.edu.

This research has been reviewed and approved by an Institutional Review Board (“IRB”). You may talk to them at 407-823-2901 or irb@ucf.edu if:
- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
Permission to Take Part in a Human Research Study

- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

How many people will be studied?
We expect 3 administrators and 31 teachers will be in this research study.

What happens if I say yes, I want to be in this research?
If you are an administrator, you will be collecting the survey data and coordinating the Tiered services. You will be working with the researcher to place students in Tier 2 or 3 services: mentoring or play therapy. The researcher will request your help to schedule these services during or after school: you can provide the school schedule and the researcher will schedule these students with their student counselor.

If you are a teacher, you are completing a survey on each student in your class, regardless of research, that has missed more than one academic year, who is behind by at least one academic year, and/or has social, emotional, and/or behavioral difficulties in the classroom. You will submit this form to Principal Vega at Aloma Elementary School. The researcher will only receive deidentified data from this survey to place students in the appropriate tier with the administration. Principal Vega will coordinate Tier 2 and 3 services with you to ensure that the student does not miss necessary schoolwork. If a student is placed into Tier 3, we are going to ask that you complete a TRF at three different time points throughout the school year. In addition, before the child begins Tier 3, you will be asked to meet with the PI to discuss the child's individual needs. At this meeting, a 3 question daily questionnaire will be completed. You will be asked to complete this daily on the student.

It is possible you could have more than one student enrolled in Tier 3. You will be asked to complete the above for each student. You will only be asked to complete this on children whose parents have consented to them being in Tier 3, which is part of the research study.

If you do not consent to participating in the research study, the student will still be able to participate.

You, as teacher, will commit up to 2-3 hours per students over the duration of 16 weeks, which equates to 11.5 minutes per week on average.

What happens if I say yes, but I change my mind later?
You can leave the research at any time it will not be held against you.

What happens to the information collected for the research?
Efforts will be made to limit the use and disclosure of your personal information, including research study records, to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of this organization.

Your name will not be stored with data and all information will be reported in a summary format. All data will be stored on an encrypted, password protected computer and flash drive, separate from any identifiers.
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For participation in the project, teachers will be compensated with a $10 Amazon gift card per assessment completed. Teachers will be informed at the recruitment stage that the $10 gift card is for completing the TRF at each phase of the project for students enrolled in tier 3 who have parental consent to participate. The compensation will be provided at the end of the teacher’s enrollment in the amount earned.

Signature Block for Capable Adult
Your signature documents your permission to take part in this research.

__________________________________________  ______________
Signature of subject                              Date

________________________________________
Printed name of subject

__________________________________________  ______________
Signature of person obtaining consent            Date

________________________________________
Printed name of person obtaining consent
REFERENCES


https://formative.jmir.org/2021/7/e27891


van der Kolk, B. A., Pynoos, R. S., Cicchetti, D., Cloitre, M., D’Andrea, W., Ford, J. D., & Teicher, M. (2009). Proposal to include a developmental trauma disorder diagnosis for
children and adolescents in DSM-V. *Unpublished manuscript.*


https://doi.org/10.1016/j.chiabu.2020.104884


https://doi.org/10.1080/23727810.2022.2113707