THESIS

ARE MOVEMENT AND DANCE EFFECTIVE METHODS FOR IMPROVING MATERNAL MENTAL HEALTH AND WELLBEING AND EMOTIONAL AVAILABILITY TOWARD THE UNBORN BABY?: A PILOT STUDY

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ABSTRACT

ARE MOVEMENT AND DANCE EFFECTIVE METHODS FOR PROMOTING MATERNAL WELLBEING AND PRENATAL EMOTIONAL AVAILABILITY (EA)?: A PILOT STUDY

Fostering an early bond between a mother and her developing fetus is important as it has profound implications for future attachment relationships and long-term child outcomes (Winston & Chicot, 2016). Emotional Availability (EA) and its associated measurement scales have proven a valuable tool for use in long- and short-term interventions that promote the development of a healthy caregiver-child bond across several age groups and caregiver types (Biringen et al., 2014). However, few existing studies focus on the prenatal period, and none focus specifically on the vital nonverbal components of EA. Movement through dance is an internationally accepted, multi-cultural psychotherapeutic technique that utilizes the power of movement to enhance the body-mind connection (Behrends et al., 2012). Dance-movement research in recent years has noted long-term increases in wellbeing and cognitive and interpersonal abilities for participants. Unfortunately, most of these studies have not utilized consistent or reliable evaluation methods and none focus on the prenatal period (Behrends et al., 2012; Doonan & Bräuninger, 2015; Koch et al., 2019). For this study, we examined the connection between EA concepts and dance-movement techniques to address these gaps. This study proposed that creating EA-based dance-movement workshops would improve mothers' connection with their unborn baby, mental health, and overall wellbeing. A total of 22 participants completed one of the two intervention arms: a dance-only intervention (n = 12) or a dance + psychosocial intervention (n = 10). Outcomes were assessed using paired-samples t-tests

and regression analyses to analyze the effects between the two intervention groups and to detect increases or decreases in maternal mental health, wellbeing, and relationship quality with the fetus pretest to posttest. Paired samples *t*-tests revealed significant decreases in anxiety ($t(21) = 2.51$, $p < .05$) and increases in self-reported EA with the fetus ($t(21) = -3.56$, $p < .05$) from pre- to posttest. Results between participation in the dance-only or dance-+-psychosocial intervention were not significant ($t(21) = .06$, p = n.s.). These results indicate that participants' anxiety decreased from program involvement while their self-reported EA increased, regardless of intervention arm completed.

TABLE OF CONTENTS

CHAPTER 1 – INTRODUCTION

An abundance of research throughout many years has solidified the need to foster the mother-infant bond due to associated long-term child outcomes (Biringen et al., 2014; Saunders et al., 2015; Winston & Chicot, 2016). However, most research utilizing attachment theory does not focus on the complex "emotional" aspects of attachment relationships. Emotional Availability (EA) is a construct that expands upon attachment theory and is correlated with secure and insecure attachment styles. The EA concept highlights the importance of creating a healthy dyadic emotional connection for the formation of a healthy caregiver-child attachment (Biringen et al., 2014; Bretherton, 2000). In 1987, Biringen completed an early version of the multi-dimensional EA system as part of her dissertation (Biringen, 1987). Then together, Biringen et al. (1993) developed the first version of the EA Scales which was exported for use primarily for mothers and their infants in a small number of independent laboratories (2nd edition; Biringen et al., 1993). This was followed by the 3rd edition (Biringen et al., 1998) which was more widely used and across a wider developmental spectrum. The EA Scales are currently in their 4th edition (Biringen, 2008) and measure caregivers and their children between the ages of 0 and 14 years. A newly designed set of Prenatal EA Scales was developed in collaboration with Finnish researchers/clinicians to measure pregnant women in their second trimester up to birth (Salo et al. in, 2019a).

Despite these advancements, few existing EA studies or interventions focus on the prenatal period, with no current research promoting the vital nonverbal EA components. Movement and dance are considered universal forms of nonverbal communication that utilize the power of motion to enhance the mind-body connection and promote awareness (ADTA, 2020;

Behrends et al., 2012). Previous dance-movement research has noted improvements in cognitive and interpersonal abilities that decrease depression and anxiety while promoting general wellbeing and quality of life. For this study, Madeline Harvey and Zeynep Biringen, along with Colorado State University's (CSU) volunteer dance majors/minors, utilized the power of movement to develop a dance intervention based on EA concepts. Improvements in mental health, general wellbeing, and prenatal EA were assessed pre- and post-intervention to determine decreases or improvements in variables of interest. This study proposed combining prenatal EA components with dance movement concepts to improve mothers' overall mental health, wellbeing, and EA during pregnancy.

Attachment Theory

In 1958 John Bowlby created attachment theory with Mary Ainsworth establishing its early assessment tool (1969), the Strange Situation Procedure (SSP), to assess attachment security between caregiver and child. Both Bowlby and Ainsworth recognized that the emotional connection between caregivers and children was the basis for early attachment bonds that profoundly impact individuals throughout their lifespans (Mikulincer & Shaver, 2016; Saunders et al., 2015). According to Bowlby, the attachment system developed from a primal need to protect the vulnerable infant from danger by ensuring proximity to a responsive and supportive caregiver. Internal working models (IWMs), essential for determining lifelong attachment style, are developed through an infant's consistent interactions with the caregiver. Notably, IWMs store memories from previous caregiver interactions and determine expectations about future relationships with others throughout the lifespan. When a child exhibits certain negative or positive behaviors and receives caregiver attention, they deem these behaviors successful at achieving caregiver interaction; the child then internalizes these behaviors as effective modes of

communication that become the pervasive pattern for engaging others' attention (Mikulincer & Shaver, 2016).

As a method for assessing attachment styles between caregivers and children, Mary Ainsworth developed one of the most widely utilized measures for attachment, the SSP. The SSP assesses infants' attachment characteristics between nine and 18 months and has reliably measured attachment relationships since its inception by utilizing a mildly stressful situation to assess child-caregiver interactions. During the procedure, a trained observer assesses the child's response to either, a parent leaving and returning to the room later, or the parent leaving the room, a stranger entering, and the parent returning. I to one of four attachment categories: secure, insecure-avoidant, insecure-anxious, or disorganized (Saunders et al., 2015). Beyond 18 months, many different types of attachment measures are utilized, including the Preschool Strange Situation (Britner et al., 2005), the Attachment Q-Sort (Waters & Deane, 1985), as well as self-report measures (Brennan et al., 1998; Lyddon et al., 1993).

A secure child trusts the parent were provide necessary guidance and be a pillar of support. In a secure attachment relationship, the child explores independently but still regularly connects with the mother and comfortably uses her as a source of support and care. Caregivers who consistently respond in appropriate ways towards their child's affect and needs while allowing for autonomous exploration foster the development of a secure attachment (Mikulincer & Shaver, 2016). Conversely, parents who misinterpret or are unresponsive to their child's physical and emotional needs may foster the development of a child’s insecure attachment. Insecure attachment patterns include avoidant and ambivalent/anxious. Disorganized attachment is most often in the insecure zone; however, a secure profile may also occasionally bear disorganized features. A disorganized attachment style typically emerges if caregivers oscillate

between mixed and avoidant response patterns or fail to react effectively to children's requests.

Individuals with disorganized attachment patterns do not trust others to meet their care needs and alternate between anxious and avoidant attachment styles (Mikulincer & Shaver, 2016). When caregivers aggressively reject a child's needs, the child usually develops an avoidant attachment style. If caregivers are incongruent in their responses to a child's needs, the child may develop an ambivalent/anxious attachment with the caregiver. Individuals with insecure attachment styles often lack interpersonal relationship skills, causing them to be at risk for depression, anxiety, and substance abuse, among other adverse outcomes (Kerns & Brumariu, 2014; Schindler, 2019; Spruit et al., 2020).

What Attachment Theory is Missing: Emotional Availability

While attachment theory and EA share similar attributes, including child outcomes such as emotional regulation, school readiness, and attachment security itself (Biringen et al., 2014; Saunders et al., 2015), many subtle yet vital differences exist. First, EA was designed for use in a variety of low-stress situations, including in natural and semi-structured play settings, whereas the SSP requires a simulated stressful situation often completed in a lab setting. Most importantly, by expanding upon attachment theory, EA accounts for the emotional characteristics between caregiver and child that impact relationship and attachment quality (Biringen, 2000; Saunders et al., 2015). While attachment theory strongly focuses on the parent's level of sensitivity in the parent-child relationship, it does not account for the child's characteristics or other vital emotion-related caregiver elements required for creating a mutually healthy bond. EA illuminates these missing dyadic and emotional elements by utilizing multi-faceted components of the interactions between caregivers (Sensitivity, Intrusiveness, Structuring, Nonhostility) and their child (Responsiveness, Involvement).

One of the foundational concepts of EA is feedback loops, which highlights the impact of child behaviors on the caregiver's actions and vice versa. Because caregiver-child relationships are dyadic, both interactors impact the relationship's dynamic. According to EA, children provide emotional expressions to their caregivers throughout interactions that convey the exchange as either rewarding or overwhelming. In turn, the caregiver should respond appropriately to these cues. This reciprocal interaction is essential for providing the caregiver with confirming feedback that they are needed and valued while validating and meeting the expressed needs of the child (Biringen et al., 2014). In other words, EA focuses on attuned parenting that is vital for promoting a reciprocally beneficial bond between caregiver and child (Bretherton, 2000; Biringen, 2000 Saunders et at., 2015).

As mentioned, attachment theory utilizes the gold standard SSP from infancy to 18 months for (Ainsworth, 1969) analyzing the child's reaction pattern to a caregiver's return to the child after being out of the room for a set period. Therefore, the child's reactions are used to evaluate attachment security and not the parents' actions (Van Rosmalen et al., 2015). Additionally, such stressful scenarios rarely occur for infants in daily life. This limitation inhibits the ability to observe natural caregiver-child interactions and to assess potential attachment during pregnancy. The flexibility of the EA Scales related to contexts as well as age groups makes it applicable for most relationships (Saunders et al., 2015).

The EA Scales are widely studied and have proven effective for accurately assessing dyadic relationships across various caregiver-child relationships, contexts, and ages. Additionally, the EA Scales are a lifespan construct validated for use with children 0-14 years of age, with ongoing research validating the scales for use with children up to 19 years (Biringen et al., 2014). The EA Scales are also reliably predictive of attachment style across multiple

contexts. Overall, mothers who score '*optimal*' across the four parenting EA dimensions are high in Responsiveness and Involvement and have securely attached children. Conversely, children with insecure attachments often have caregivers who classify as insensitive; and intrusiveness is highly predictive of a child's disorganized attachment patterns (Petfield et al., 2015; Trupe et al., 2016).

The Emotional Availability (EA) Scales

The Emotional Availability Scales (EA Scales) are a multidimensional assessment tool developed by Biringen and her colleagues (Biringen et al., 1993; Biringen et al., 1998). Now refined into their 4th edition (Biringen, 2008), the EA Scales are used worldwide throughout different cultures as an evaluation tool for EA trained researchers or clinicians to reliably measure the interactional quality of parent-child relationships (Biringen et al., 2014). Four adult and two child items are analyzed on a Likert scale of one (nonoptimal) to seven (optimal). The four adult characteristics include Sensitivity, Structuring, Nonintrusiveness, and Nonhostility; and the two child characteristics are Responsiveness and Involvement (Biringen, 2008).

To assess EA, trained observers assign scores for each dyad according to the six parent and child qualities observed during a recorded 20-minute caregiver-child interaction in either a natural or semi-structured play setting (Biringen, 2008). The first caregiver dimension, Sensitivity, is optimal (7) when the caregiver appropriately responds to the child's cues. A parent is ideally sensitive when verbal and non-verbal messages are harmonious. Conversely, caregivers considered Nonoptimal (1-2) may appear depressed, withdrawn, or extremely traumatized (Biringen, 2008, p.17). Structuring is related to child empowerment and describes the adult's ability to follow the child's lead while setting limits appropriately. An optimal caretaker provides appropriate guidance while allowing the child to explore and develop autonomy. Non-

intrusiveness involves the caregiver's lack of overprotection or interference with the child's interactions and behaviors. The final dimension, Nonhostility, is optimal when there is a lack of overt and covert hostile actions through words or behaviors considered frightening to the child (Biringen, 2008). In contrast, a caregiver rated lower (1-2) would show "*disrespectful, mocking, or ridiculing*" types of behavior (Biringen, 2008, p. 62). Notably, aggressive background interactions, even if they do not directly involve the child, also negatively impact the hostility rating (Biringen, 2008).

Two constructs to assess the child's interactions with their caregiver are also included. Responsiveness refers to the child's emotional receptiveness to the parent and is ranked optimal (7) when the child exhibits positive, emotionally open responses towards their caregiver. Additionally, the child is comfortable utilizing a range of emotions and can regulate emotions according to context. Involvement refers to the child's ability to balance parental engagement with autonomous activity. A child is rated as optimally involved when they utilize mainly positive methods for incorporating the parent in play. In contrast, consistent use of negative behaviors, like crying or screaming results in a rating of over-involvement (Biringen, 2008).

Prenatal Emotional Availability and the Prenatal EA Scales

In 2013, Van Bakel et al. conducted a study to determine the correlation between a nonverbal, observable form of prenatal attachment (Pictorial Representation of Attachment Measure; PRAM) and a self-report measure, the Maternal Antenatal Attachment Scale (MAAS). Their results showed significant concordance between maternal self-reported and objective levels of attachment to her unborn baby. Their findings adequately support measuring a mother's observed nonverbal emotions towards her baby during pregnancy (Van Bakel et al., 2013). Salo

et al. (2019a) furthered these findings by concluding that observed prenatal emotions predict future attachment patterns and impact the baby's socioemotional and cognitive development.

Together, Salo, Flykt, and Biringen 2019(b) utilized their research findings to adapt the 4th edition EA Scales (Biringen, 2008) into a set of Prenatal EA scales for use during pregnancy in the second and third trimesters. Like the original EA Scales, the Prenatal-EA Scales assess observable behaviors and emotions via a video recording. During the 12–15-minute recording, the mother answers four questions one-on-one with an EA facilitator from her home or a lab setting. The questions are designed to initiate the mothers' emotional responses towards her fetus and pregnancy to tap into the developing mother-fetus attachment (Salo et al., 2019b). Since a child is not present, only two of the original EA items, '*Sensitivity*' and '*Nonhostility*,' are included in the Prenatal EA Scales.

Prenatal Sensitivity refers to a mother's ability to be attuned with her unborn child and respond both verbally and nonverbally towards the fetus with positive, warm affect (Salo et al., 2019a). The optimal mother is seen engaging in reciprocal interactions with the baby's movements. A mother rated as Highly Sensitive (7) may warmly touch her tummy while displaying positive facial expressions or looking towards her belly while making positive statements to the baby. Mothers are deemed moderately sensitive if their affect is considered bland (5) or lacking authenticity (4). Those who receive lower Sensitivity scores may appear withdrawn or depressed, reacting little with their unborn baby (3). Mothers who receive the lowest scores (1-2) may giggle inappropriately, display awkward expressions, or completely shut down (Salo et al., 2019b).

Prenatal Nonhostility refers to the mother's ability to regulate any negative emotions or hostile behaviors exhibited towards the fetus. A mother displaying no negative qualities during

the filmed interaction is optimal (7); alternatively, mothers' rate lower if they demonstrate subtle (5) or noticeable signs of aggression (4). Notably, covert hostility may include negative expressions, posture, or behavior, even if done in jest. Mothers receive the lowest ratings when they display several blatant indications of anger or irritability (3) or negative facial expressions and touch (2), including poking the fetus (1) (Salo et al., 2019b).

To date, Salo et al.'s (2019a) measure of Prenatal-EA is the only validated tool for assessing observed attachment between a mother and her unborn baby. Their findings support the ability to measure EA during pregnancy and construct validity between optimal Prenatal-EA qualities, and mothers' secure-autonomous attachment. Additionally, the Prenatal-EA Scales allow for objective reporting of observed maternal attachment characteristics previously only measured via mother's subjective self-reports.

Emotional Availability and Attachment

Attachment and attachment styles were both used to assist with conceptualizing EA and the EA Scales (Biringen, 2000; Biringen et al., 2014; Licata et al., 2016). Specifically, maternal EA is predictive of child attachment styles throughout infancy and middle childhood (Biringen, 2000). Kim et al.'s (2017) study found that attuned, empathic parenting during the child's first year of life is correlated with a secure attachment style and positive outcomes. The mother's ability to provide a safe and consistent base for her child is an example of high-quality EA that facilitates the development of a secure attachment. Salo et al. (2019a) found that secure-autonomous mothers also exhibit attributes relating to '*optimal*' EA, such as positive affect and interest in engagement with their unborn baby. Conversely, low-quality parenting is associated with insecure attachments and future adverse effects; mothers with insecure attachment traits displayed more negative and lowered EA characteristics (Biringen, 2000).

Impacts of Prenatal Mental Health and Wellbeing on Maternal Emotional Availability

Prenatal Anxiety and Depression

Transitioning into parenthood is a challenging time with significant impacts on mother and child mental health and wellbeing. Mental health during pregnancy correlates with critical long-term outcomes for mother, child, and mother-child bonding (Araji et al., 2020; Henrichs et al., 2021; Monteiro et al., 2020). Unfortunately, pregnancy is a heightened period for mental health difficulties, especially depression and anxiety (Khoury et al., 2021).

Anxiety is a commonly experienced yet underreported psychological condition during pregnancy. An average of 6-10% of pregnant women report normal prenatal anxiety levels in anticipation of childbirth. Anxiety may stem from fears of giving birth, having a child with disabilities, low social support, loneliness, prior negative birth experiences, and maternal physical appearance (Araji et al., 2020; Beyond Blue LTD, 2022; Huzinik et al., 2004). Levels of anxiety are considered normal if feelings of worry or nervousness do not impact daily activities. If daily worries become uncontrollable and start to impact quality of life, then anxiety is categorized as moderate or severe (Beyond Blue LTD, 2022). While moderate anxiety levels are expected during pregnancy, persistently high anxiety levels may negatively impact mother and baby. High prenatal anxiety during the first trimester has been known to cause to loss of the fetus. During the second and third trimesters, severe anxiety may cause preterm delivery or a baby with low birth weight (Shahhosseini et al., 2015). Research about changes in anxiety across gestational trimesters is lacking; however, recent studies have estimated that in the third trimester of pregnancy, between 14-35% of women suffer from symptoms of severe anxiety (Rados et al., 2018; Zhang et al., 2021).

Severe prenatal anxiety may extend into postpartum, negatively influencing mother-child bonding. Concerning EA, generalized anxiety disorder is associated with an increased probability of being labeled as emotionally unavailable (Aran et al., 2021). Mothers with high anxiety may appear disinterested, disengaged, insensitive, or harsh, causing ratings of low EA. As a result, children may develop internalizing or externalizing behaviors if mother-child interactions are not improved (Araji et al., 2020; Henrichs et al., 2021). Promoting awareness about the impact of prenatal anxiety on children's development and parents' bonding abilities is paramount (Araji et al., 2020; Mappa et al., 2020; Rados et al., 2018).

Additionally, anxiety is often comorbid with depression (Araji et al., 2020; Mappa et al., 2020; Rados et al., 2018). Perinatal depression causes intense sadness and anxiety that impacts an estimated 10-20% of United States women. Prevalent, yet often undetected, perinatal depressive symptoms usually continue throughout the first year of the child's life, impacting the mother's ability to form a connection with her unborn baby, eventually negatively influencing the cognitive and socioemotional development of the child (Salo et al., 2019c; Van Niel & Payne, 2020). Significant symptoms associated with perinatal depression and related to the mother-child relationship include obsessive worrying about the baby, anger or resentment towards the unborn baby, feelings of hopelessness or thoughts of harming self or baby, and lack of attachment or interest in the baby (Van Niel & Payne, 2020). In general, maternal depression correlates with lower mother-child EA, and the outcomes of maternal depression may have long-term effects (Biringen et al., 2014). Depression symptoms often impact a mother's ability to form an emotional attachment with her unborn baby, with effects that likely proceed into postpartum (Salo et al., 2019c). Early postnatal interactions are paramount because infants rely on their caregivers for nurturing, stress regulation, and cognitive development – qualities that mothers

with depression or high anxiety may be unable to provide due to their typical unexpressive or overwhelming interactions with the infant (Salo et al., 2019c). Several research studies (MacMillan et al., 2020; Salo et al., 2019c; Van Niel & Payne, 2020) mention the impact of postpartum depression on low maternal EA, noting frequent negative vocal behavior and specific deficits in attunement, affection, and warm physical touch. Mothers in remission from depression show less overall EA during mother-child interactions in the areas of sensitivity, structuring, and hostility (Klucznoik et al., 2016). Positively, MacMillan et al. (2020) note that while children of depressed mothers may commonly experience adverse outcomes, these outcomes are not predetermined provided a healthy emotional connection between parent and child is maintained.

Currently of relevance, the coronavirus 19 (COVID-19) pandemic may have increased prenatal anxiety and depression as mothers struggle to receive up-to-date, scientific information about the effects of the virus on developing fetuses. A study by Mappa et al. (2020) researched the effects of COVID-19 on maternal anxiety during pregnancy and discovered increased rates of anxiety in women with a higher educational status (university diploma and above). Additionally, participants expressed pandemic-related fears of fetal structural abnormalities, fetal growth restriction, and preterm birth, with only 7% reporting receiving professional medical counseling about the pandemic from a care provider.

Early research by Khoury et al. (2021) on women who were pregnant during the pandemic suggests increased anxiety (23% generalized anxiety reported) and depression levels (36%), with 30-40% of women reporting significant worries related to their pregnancy and overall health. These numbers are significantly higher than those reported in pre-pandemic studies for anxiety and depression. Specifically, social isolation and negative cognitive appraisals were linked explicitly to adverse mental outcomes. More importantly, this research was

conducted on a low-risk sample, so there is a potential that higher-risk individuals' anxiety and depressive symptoms may be more severe. Promisingly, they found social support to be a protective factor against maladjustment and mental health.

While still in its infancy, these results impart a need to improve clinicians' awareness of the heightened risk for mothers and increase their access to evidence-based psychometric measures that inquire about mental health and emotional wellbeing, available social supports, and abilities to cope with the pandemic during this stressful time (Khoury et al., 2021). Pregnancy may be a critical time for intervention as it is a unique time in a woman's life that requires her to expand her current life and perceptions to include her unborn baby. There is a critical need to intervene in pregnancy due to the impact of early mother-child interactions on future infant socioemotional and cognitive development, maternal wellbeing, and overall parenting practices (Salo et al., 2019c).

Prenatal Flourishing

Although prenatal psychopathology knowledge is vital, it is equally important to address positive mental health. Unfortunately, previous research has focused on the impacts of adverse mental health, with recent studies just now shifting to studying the predictors and promotion of positive mental health (Johnstone & Mulherin, 2020; Khoury et al., 2021; Monteiro et al., 2020). Promoting the psychological wellbeing of pregnant women contributes to enhanced personal psychological resources and improved outcomes for children (Johnstone & Mulherin, 2020). Research has shown flourishing is one variable essential to a person's emotional, psychological, and social health. Since its introduction in 2010, the Flourishing Scale has been utilized in research to assess self-perceived levels of psychological wellbeing in areas like relationships, self-esteem, and optimism. Current research has linked flourishing to positive outcomes such as

better mental and physical health and resilience to life challenges. Flourishing is also a significant predictor of remission from anxiety and mood disorders. Furthermore, during the prenatal period, positive maternal mental health projected positive outcomes in children's cognitive development, communication, and social development (Monteiro et al., 2020). In studies with pregnant women, determinants of flourishing included high self-confidence, resilience, social support, and self-compassion (Johnstone & Mulherin, 2020). Knowledge about these determinants may prove invaluable as we continue through the COVID-19 pandemic, especially for pregnant women. Our study was the first to analyze flourishing and EA during pregnancy.

Impacts of Adverse Childhood Experiences on Maternal Emotional Availability

Adverse Childhood Experiences (ACEs) are traumatic childhood occurrences (0-17 years of age) that include child abuse or neglect and household dysfunction related to intense separations (i.e., divorce, incarceration), substance abuse, mental illness, or domestic violence. ACEs, estimated to be prevalent in 61% of American adults, cause chronic physical and psychological health problems related to their negative childhood histories (Centers for Disease Control and Prevention, 2020). Adult attachment theory predicts that a parent's previous attachment history impacts their ability to provide empathic support to their children (Salo et al., 2019a). Furthermore, a mother's history of ACEs increases her risk for depression, suicide, and substance abuse, which dramatically impacts forming and maintaining consistent healthy relationships (Murphy et al., 2014). Notably, a maternal history of ACEs negatively impacts EA levels, significantly affecting her child's development. For example, mothers with depression in remission who have a history of ACEs are rated as even less sensitive than mothers who have depression but no ACEs history (Klucznoik et al., 2016).

The Power of Movement and Dance

Dance Movement Therapy (DMT) is an internationally accepted, multi-cultural art-based psychotherapeutic technique that utilizes the power of movement to enhance the body-mind connection and is a worthwhile avenue to consider for promoting EA (ADTA, 2020; Behrends et al., 2012). Movement is a universal form of nonverbal communication that serves as a common language throughout cultures. Additionally, it is the first form of communication used by infants and the primary method in which they perceive and make meaning of caregiver interaction (Devereaux, 2014). In fact, the attachment between mother and child is often referred to as a 'metaphorical' or 'affective dance' (Easterbrooks et al., 2000).

DMT fosters a connection between verbal and nonverbal communication and utilizes mindfulness components that include fostering awareness of bodily sensations, performing body scan exercises, making conscious contact with others, and distantly observing feelings and thoughts (Koch et al., 2019). Doonan and Bräuuninger's (2015) study found attunement exercises to be most beneficial and long-lasting, extending into the home environment post-intervention completion. Equivalent to the foundational concepts of EA, DMT encourages mutual, rhythmic, imitative interactions between two people and considers these crucial elements for developing a sense of self and non-verbal emotional expression (Behrends et al., 2014).

In cultures worldwide, joint group movement is considered a healing ritual that promotes social bonding through connecting mind, body, and spirit (Behrends et al., 2012). Furthermore, movement provides an ability to arouse memories or feelings that assist with emotional meaning-making and self-development. Several research studies have highlighted the importance of collaborative nonverbal interactions between parent and child for supporting positive social relationships and healthy development (Devereaux, 2014). Attuned parent-child interactions

promote healthy attachment, empathy, and mutual understanding and equip the child with necessary nonverbal communication skills. Throughout his work, Bowlby mentions these imperative nonverbal skills that infants use to maintain caregivers' proximity and ensure their needs are met (Mikulincer & Shaver, 2016).

Overall, DMT has proven successful at progressing general wellbeing and quality of life by increasing cognitive and interpersonal abilities while decreasing anxiety and depression symptoms. Promisingly, follow-up studies determined that these favorable effects hold long-term, while some marginally increased (Koch et al., 2019). Unfortunately, comprehensive research utilizing DMT rarely employs strong psychometric measures, and there is a lack of rigorous evaluation and use of non-clinical samples and small sample sizes. Additionally, few studies focus on mothers, pregnancy, or the promotion of healthy parenting (Behrends et al., 2012; Doonan & Bräuninger, 2015; Koch et al., 2019).

Dance/movement workshops for this study were designed based on EA principles and not DMT concepts directly, although the study's workshops did address many similar features. Given that this is a new area of study, research on similar interventions was not available, so findings from the DMT literature were used as guide to develop hypotheses for this study. This research hopes to expand the dance and arts intervention literature versus the DMT literature explicitly. The goal of the dance workshops for this study was to promote mothers' nonverbal expressiveness, responsiveness, attunement towards their unborn baby. Workshops were co-created with DMT and EA concepts in mind by researchers Madeline Jazz Harvey and Dr. Zeynep Biringen. Several EA-based activities from previous interventions were utilized when designing the dance intervention and include the EA pregnancy worksheet prompts and observed prenatal EA interview questions and evaluation criteria. To further promote the development of

healthy EA, the dance components incorporated vital EA-aspects like positive facial expression, touch, and open reciprocal interaction. A progressive sequence was used throughout both dance workshops to improve mothers' comfort level, allowing them to develop the necessary confidence to perform solo improvisations and co-create "choreography" based on their individualized pregnancy experiences. Dance workshop details may be found in Appendix I, with a qualitative summary of outcomes provided in Appendix II.

CHAPTER 2 – THE PRESENT STUDY

This study combined theoretical concepts from EA, attachment, and mindfulness to promote wellbeing and meaningful connections between mothers ($N = 22$) from diverse backgrounds and their unborn babies. Recruited participants were selected for either the dance-only intervention ($n = 12$) or the dance + psychosocial intervention ($n = 10$). Differences in intervention effect were determined between the two intervention arms with independent samples *t*-tests to determine if an EA-based dance-movement intervention may improve mothers' prenatal wellbeing and EA towards their unborn baby. This study attempted to answer the following questions: (1) Does the dance-only intervention (without added psychosocial training) improve maternal prenatal emotional availability, mental health, and wellbeing (i.e., depression, anxiety, flourishing, emotional expressiveness) as much as the dance + psychosocial intervention? (2) Does the dance + psychosocial intervention improve prenatal maternal emotional availability, mental health, and wellbeing more than the dance-only intervention?

We hypothesized that all study participants would report improved mental health and wellbeing with increased emotional availability. However, we expected the dance + psychosocial intervention to yield more improvements in mental health, wellbeing, and emotional availability, than the dance-only intervention due to the training on attachment and parent-child relationships.

Methods

Participants

Pregnant women were recruited between 20- and 30-weeks gestation (when a baby's movements are felt) via the CSU Listserve and prenatal clinics, campus clinics, and doulas. The recruitment period spanned from January 2021 through January 2022. Participants included CSU

faculty, staff, and students, and mothers within the Colorado area, or those individuals who heard of this study through them. This exploratory pilot study did not exclude mothers due to age, education, number of children, disability, nationality, relationship status, race or ethnicity, religion, sexual orientation, or veteran or military status. A total of 27 pregnant women expressed initial interest. Of those women, 24 completed pretest questionnaires; one participant withdrew after pretest completion, and another completed all required workshops but did not complete the final posttest steps.

Women in the final sample ($N = 22$) were on average 26 gestational weeks, married (91%), White Americans (86.4%), between the ages of 25 to 34 (68.2%), who had a post-graduate degree (54.5%). Participants were almost equal in first-time pregnancies; 40% of mothers had previously given birth, and 60% were first-time mothers. Both intervention groups were equal regarding the number of mother's who had other children ($n = 4$), and there was only a slight difference in mean ages of mother's other children between the two groups, with the dance-only averaging to 1.75 years and the dance-plus-psychosocial averaging two years.

Procedures

Participants were assigned to study intervention arms in cohorts of two to three according to the time of enrollment. Random assignment methods were not utilized to assign participants to intervention arms due to the limited time to assess prenatal EA and a lack of consistent access to potential participants. Because of these limitations, participants were assigned to intervention arms based on a first come, first served basis according to the intervention arm that was currently in progress. Therefore, participants were not selected for intervention arms based on their number of previous births, dance experience, first pregnancy, or gestational age. The study timespan for each cohort was approximately 4-6 weeks in length after enrollment completion.

All coaching sessions and workshops were completed online via a secure Zoom link with a waiting room enacted. Cohort sizes remained small (3-4 participants) to maintain individualized attention and coordination of schedules.

Several differences existed between the two intervention arms. Participants in the dance + psychosocial intervention received all the dance workshops that the dance-only intervention received with the addition of several components. Prior to dance workshop completion, the dance + psychosocial participants received an in-person group psychosocial workshop on EA, mindfulness, and attachment during which time they received the Pregnancy Worksheets. The Pregnancy Worksheets furthered the emotional topics discussed during the psychosocial workshop and asked questions about emotional and physical experiences throughout mothers' pregnancies. These worksheets assisted mothers with self-reflection and the development of a health mother-fetus connection. Additionally, the dance + psychosocial group received check-in calls after worksheet completion and again after completing the Zoom recorded observed EA session. All the extra activities for this intervention group were intended to further improve prenatal EA, mental health, and wellbeing. Individuals completing the dance-only intervention did not receive these additional components, however, they were provided with the Pregnancy Worksheets after posttest completion.

Data were linked to participants via a personal identification number assigned and kept confidential by the lead investigators and research team. Researchers coded participant IDs according to the following format: digit one represents the last digit of the year of the participant's workshop, digits two and three represent the month of the participant's workshop, digits four and five represent the first two letters of the participant's first name, and digits six and seven represent the first two letters of the participant's last name. Digits for first and last names

were determined using a phone keypad with numbers two through nine (i.e., A-C=2, D-F=3, etc.). A spreadsheet linking participants' identification numbers to their initials was maintained in a separate location and managed in a different file location only by lead investigators. Figure 1 below details the process of procedures for each intervention arm, and interventions are described in Appendix 1.

Pretest Measures

All members of a cohort were emailed a secure confidential Qualtrics link that contained a demographics questionnaire designed for this study and five pretest questionnaires: Edinburgh Postnatal Depression Scale (EDPS, Cox, et al., 1987), Flourishing Scale (Diener et al., 2009), Emotional Availability Self-Report (EA-SR, Salo, et al., 2019c), Hamilton Anxiety Rating Scale (HAM-A, Hamilton, 1959), and Emotional Expressivity Scale (EES, Kring, et al., 1994). Regardless of intervention arm, all participants completed the same battery of pretest assessments.

Demographics Sheet

The Demographics sheet is a brief, 12-question assessment of participants' general demographics such as age, gender, education level, relationship status, race, and number of previous births and prior dance experience. The researchers developed this assessment to obtain general data for descriptive statistics.

Edinburgh Postnatal Depression Scale (EPDS)

The EPDS (Cox et al., 1987) is a 10-item self-report measure widely and reliably used throughout research in the human sciences to assess symptoms of postnatal depression. Despite being a postnatal scale, it is commonly used to screen for depression both prenatally and postpartum.

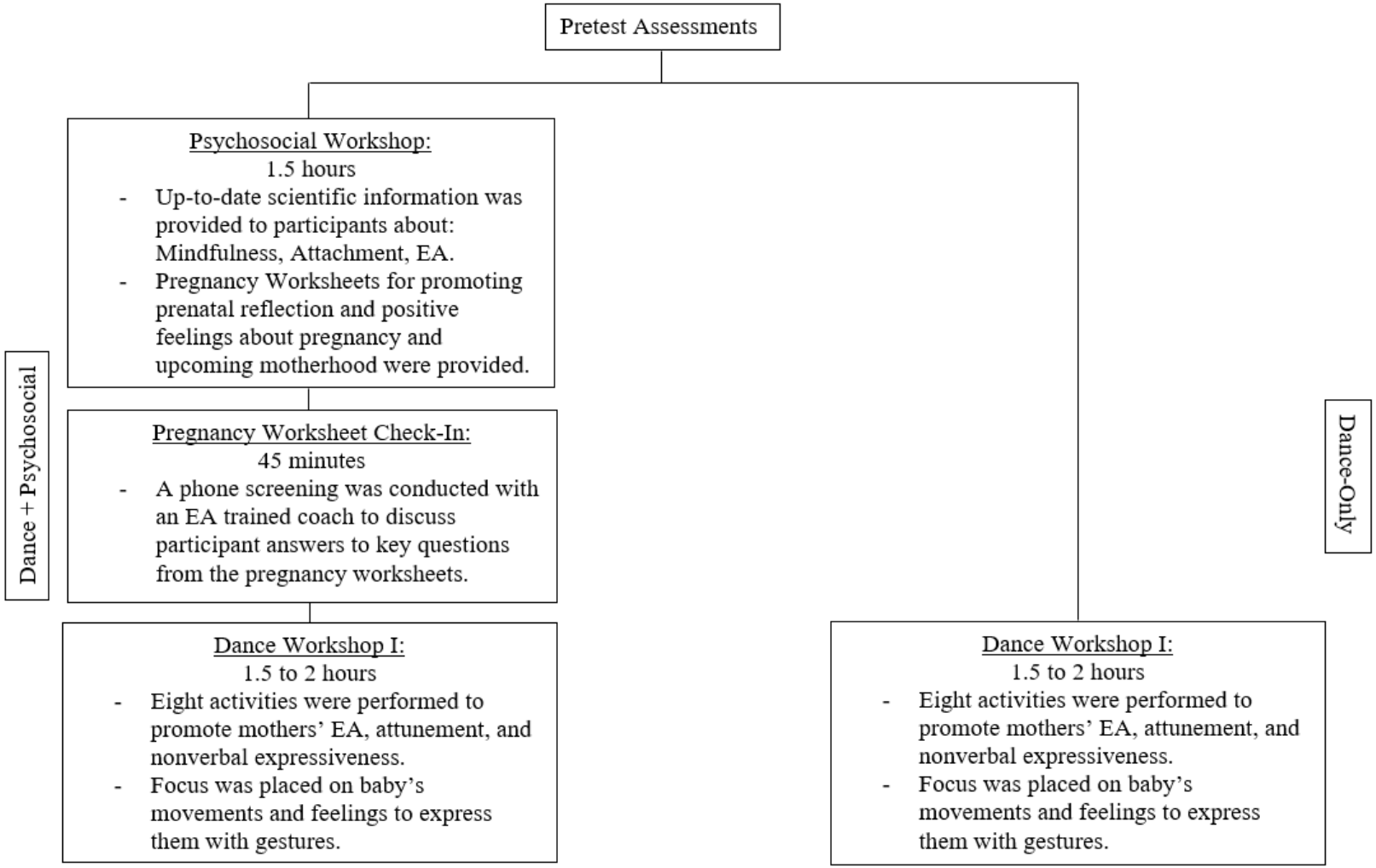

Figure 1
Dance + Psychosocial and Dance-Only Participant Procedures

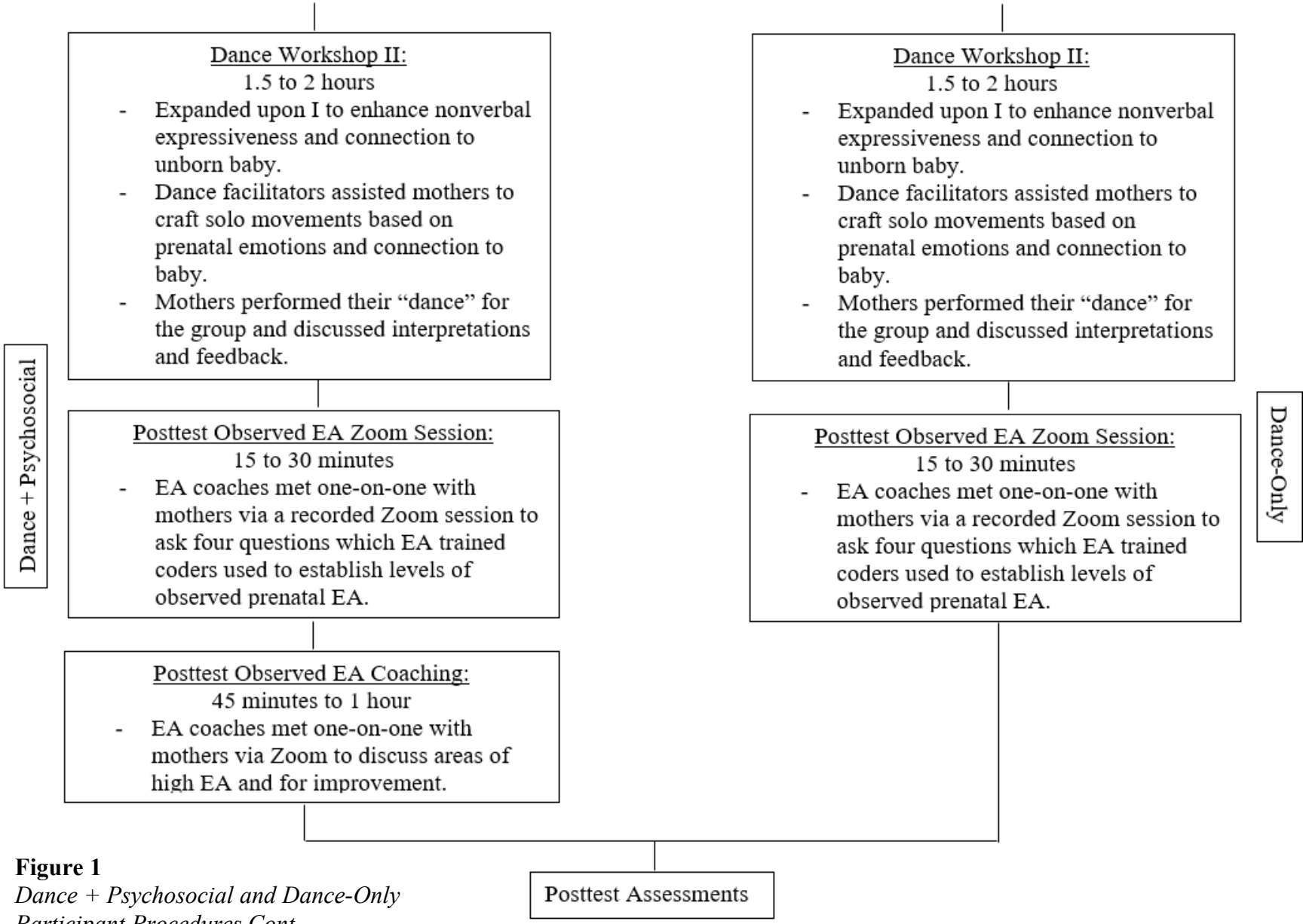

Figure 1
Dance + Psychosocial and Dance-Only Participant Procedures Cont.

Each item is rated on a 4-point Likert scale ranging from 0-3. Items evaluate the individual's fears, sleep issues, self-harming thoughts, and feelings of sadness, happiness, and guilt. The cut-off score is 13 for probable major depression and 9 for probable minor depression, with a maximum score of 30. Cox's original study (1987) detected good reliability with an internal consistency of a = .88, and other studies have cited ranges between a = .85 and a = 0.88. The EDPS is also validated against DSM-IV criteria (Rados et al., 2018; Smith-Nielsen et al., 2018; Venkatesh et al., 2016).

Hamilton Anxiety Scale (HAM-A)

HAM-A (Hamilton, 1959) is one of the first and most widely used scales to analyze the severity of perceived anxiety symptoms. While it was initially developed for use by clinicians, previous research has utilized it as a self-report measure in place of clinicians. HAM-A consists of 14 questions related to psychological and somatic anxiety symptoms and utilizes a 5-point Likert scale ordered 0 (not present) through 4 (severe). A score between 17 and 25 indicates mild anxiety, and scores within the 25-30 range reflect moderate to severe anxiety (Hamilton, 1959; Thompson, 2015). HAM-A has acceptable reliability (a = .74), and it is validated against the Covi Anxiety Scale (r = .63, p < .001) (Maier et al., 1988).

The Flourishing Scale

The Flourishing Scale (Diener et al., 2009) is a brief 8-item self-report questionnaire measuring social and psychological wellbeing and positive functioning. Items assess an individual's level of positive relationships and feelings of competence and leading a meaningful life on a Likert scale ranging from ‘strong disagreement' (1) to 'strong agreement' (7), with higher scores indicating positive functioning. The Flourishing Scale has a Cronbach's alpha of

.87 and has strong cross-cultural and construct validity against the Satisfaction with Life Scale (r = .62, p < .001) (Diener et al., 2010; Johnstone & Mulherin, 2020).

Emotional Expressivity Scale (EES)

EES (Kring et al., 1994) is a 17-item self-report measure designed to assess the extent to which individuals display negative and positive outward emotions. Respondents rate statements according to how true they consider them on a 1 ('*Never true*') to 7 ('*Always true*') Likert scale. Scores range from 7 to 119, with total scores typically averaging 64.67. Cronbach's alpha ranges from .90-.93, demonstrating high reliability (Burgin et al., 2012; Fahd & Hanif, 2019; Kring et al., 1994). EES is highly correlated with other measures of emotional expressivity. These measures include the EEQ (r = .64, p < .001) for assessing expression of positive and negative emotion and the ACT (r = .45, p < .001) utilized for assessing styles of expressiveness (Kring et al., 1994).

Emotional Availability Self-Report (Prenatal Version; EA-SR)

The postnatal EA-SR includes 36-questions to assess the parent's perception of EA in their relationship with their child. For the purposes of this study, the postnatal version was adapted for use during pregnancy. Total scores were determined by reverse coding negatively worded items, then adding all scores together. Higher scores equate to higher self-reported EA. Since this is the first study to utilize this measure in a prenatal sample, information for reliability and validity is not available. However, this study utilized split half reliability as a first measure for the prenatal version of this scale.

Posttest Measures

The same battery of pretest questionnaires was administered at post-intervention except for the Demographics Questionnaire and the addition of two measures: (1) Adverse Childhood

Experiences (ACEs) Questionnaire (Dube et al., 2003; Felitti et al., 1998); and (2) Observed Prenatal EA (Salo et al., 2019a).

Adverse Childhood Experiences (ACEs) Questionnaire

The ACEs 16-item measure asks respondents to select '*yes*' or '*no*' to questions relating to experiences in their first 18-years of life. Questions inquire about adverse experiences related to abuse (physical, emotional, and sexual), neglect (physical and emotional), and family hardships (parent's divorce/separation, violence, substance abuse, self-harm, suicide attempts, and incarceration). A score is obtained by totaling the number of times respondents marked '*yes*' with a score of 4 or more, marking the threshold for high ACEs exposure. Moderate test-retest reliability is evidenced ($r = .71$, $p < 001$), and the ACEs measure have been validated against the Adult Attachment Interview and the Childhood Trauma Questionnaire (CTQ) (Danese & McEwen, 2012; Dube et al., 2003; Feltitti et al., 1998; Murphy et al., 2014; Schmidt et al., 2018; Zanotti et al., 2018).

Observed Emotional Availability

Observed Prenatal-EA is adapted from the EA Scales 4th edition, the most worldwide (25 countries, 5 continents) utilized system to date. Our study is the second, in addition to Salo et al.'s (2019a) study, to utilize the Prenatal EA Scales. Therefore, this study will be utilized to further determine reliability and validity for this scale. Prenatal EA focuses on the affective quality and attunement the mother has with her unborn baby and not the actual performance or words spoken (Salo et al., 2019a). In Prenatal-EA, only two of the original four caregiver dimensions, Sensitivity and Nonhostility, are rated according to maternal affect and interactions with her unborn baby. Observed Prenatal-EA is assessed only by certified prenatal EA-coders

during a filmed, secure Zoom session in which the mother responds to four short interview questions described below.

1 – '*Draw a picture of yourself and the baby*.'

- '*Can you explain what you drew and why?*'

2 – '*Play a musical instrument to your baby*.'

- '*Why did you play this tune?*'

3 – '*Tell your baby something without using words and then do the same with words*.'

- '*What did you say to the baby?*'

4 – '*Tell your baby about the people s/he were meet after birth*.'

Recordings were coded according to the Prenatal EA Scales to determine the mother's level of prenatal EA towards her fetus. High ratings included positive affective expressions in face and tone and gentle touching of, or turning head towards, her tummy. Mothers who displayed instances of waiting for a response from their baby rate high in Sensitivity. Mothers in the mid-range of Prenatal-EA may be bland. In contrast, mothers with the lowest scores exhibited immature behavior or appear emotionally shut down, depressed, or withdrawn. Optimal Nonhostility was rated according to the mother's ability to control ambivalence about her pregnancy and situations around her. Nonhostile mothers lack bored, anger, or disinterest facial features of physical expressions (Salo et al., 2019a).

Prior to completing analyses for this study, SPSS' reliability analysis function was utilized to determine intraclass correlations (ICCs) among the two observed Prenatal EA coders. ICCs were calculated utilizing observed Prenatal EA data from 32% (n = 7) of the study participants. Both total scores and direct scores from the two Prenatal EA subscales (sensitivity, nonhostility) were used to establish ICC's. Agreement was set to 95% and ICCs for both observed Prenatal EA variables indicated good interrater reliability. Total scores for sensitivity

were $\alpha = .85$ and direct scores were $\alpha = .77$; for nonhostility, total scores received an ICC of $\alpha = .78$ and an ICC of $\alpha = .76$ for direct scores.

CHAPTER 3 – RESULTS

Statistical Analyses

Data analyses were conducted using the *Statistical Package for Social* Sciences (IBM SPSS, version 27) and R statistical software (R Core Team, 2020). Preliminary analyses were conducted using SPSS to determine correlations between main variables of interest at pretest and posttest. Correlations were also computed to assess bivariate relationships between demographic variables; demographic variables and outcomes for main variables were also correlated at pre- and posttest utilizing SPSS. Paired samples *t*-tests were conducted in SPSS to determine if differences exist between pre-and posttest for the main study variables. R was utilized to perform regression analyses among the key variables and gestational age to determine if the number of weeks in pregnancy directly influenced any main study variables. Regressions were computed with change scores created for each primary variable (i.e., anxiety, depression, flourishing, emotional expressivity, and self-reported emotional availability).

Descriptive data was gathered for the demographic variables (reported in Table 1) prior to analyses. Overall, participants in the study were married, White Americans between the ages of 25-34, around 26 weeks in gestational age with a post-graduate degree. Level of education and ethnicity were non-normally distributed with a left skew of -1.57 (*SE* = .49) and -2.28 (*SE* = .49) respectively. Positively skewed non-normal distributions were also found for relationship status (b_1 = 3.82, *SE* = .49), race (b_1 = 2.73, *SE* = .49), and previous experience in movement or dance (b_1 = 2.28, *SE* = .49).

Preliminary Analyses

Correlational analyses were conducted among the main study variables depression, emotional expressivity, anxiety, flourishing, self-reported emotional availability, and observed emotional availability (sensitivity, nonhostility); all variables displayed expected correlations between pretest and posttest. A summary table of these correlations can be found below in Table 2. It should be noted that the pre- and post-EA-SR, pre-EES, and post-ACEs variables contain missing values that caused some of the participant's results to be eliminated from analyses. There was also an expected finding of a positively strong correlation between pretest anxiety and pretest depression, and a moderately positive correlation between pre-anxiety and post-depression, and posttest anxiety and posttest depression. These findings were expected since depression and anxiety typically display comorbidity throughout the research literature (Khoury et al., 2021).

Very strong, negative correlations were shown between pretest flourishing and pretest depression, pretest anxiety and pretest self-reported EA, and pretest depression and pretest self-reported EA. This indicates that higher levels of flourishing and self-reported EA are significantly related to lower levels of depression and anxiety respectively at pretest. Similar results were found for these variables at posttest, with significance decreasing slightly. Moderately negative associations were found between post-depression and pretest EA-SR, post-depression and post-EA-SR, and post-anxiety and pre-EA-SR. These results indicate that as depression and anxiety decrease, self-reported emotional availability improves.

A strong, positive correlation was found between pretest flourishing and pretest EA-SR and a moderately positive correlation was found between pre-flourishing and post-EA-SR. These results indicate that as levels of flourishing increase, so do levels of perceived EA. Although it did not reach significance, there was also a decrease in observed post-hostility when levels of

Table 1

Descriptive Statistics for Study Participants

	N	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Std. Error
Participant Age (years)	22	2.23	.53	.26	.49
Participant Gender	22	2	.00	-	-
Highest Education Level	22	6.05	1.33	-1.57	.49
Relationship Status	22	3.09	.68	3.82	.49
Race	22	1.55	1.50	2.73	.49
Ethnicity	22	1.86	.35	-2.28	.49
Biological Mother	22	1	.00	-	-
First Pregnancy	22	1.41	.50	.40	.49
Gestational Age	22	26	6.96	-.35	.49
Other Children Ages	8	1.88	.84	.28	.75
Background in Movement/Dance	22	1.14	.35	2.28	.49
Valid N (listwise)	8				

Note . Statistics generated according to variable values entered in SPSS. Each of the variables and their associated numbers are: Participant Age (1="17-24", 2="25-34", 3="35-44", 4="45-54", 5="55-64, 6="65-74", 7="75 or older"); Participant Gener (1="Male", 2="Female", 3="Transgender", 4="Other/unspecified"); Highest Education Level (1="Did not finish high school", 2="High school/GED", 3="Some college", 4="Associated Degree", 5="College Degree", 6="Some post-graduate education", 7="Post-graduate Degree"); Relationship Status (1="Single", 2="Committed Relationship", 3="Married", 4="Divorced", 5="Separated", 6="Widowed", 7="Polyamorous"); Race (1="White American", 2="Black or African American", 3="American Indian or Alaska Native", 4="Asian American", 5="Native Hawaiian or Other Pacific Islander", 6="Other"); Ethnicity (1="Hispanic or Latino", 2="Not Hispanic or Latino"); Biological Mother (1="Mother", 2="Father", 3="Other"); First Pregnancy (1="Yes", 2="No"); Background in Movement/Dance (1="Yes", 2="No")

participants pre-flourishing were high. This implies that individuals who were flourishing earlier were less likely to be rated as hostile post-intervention. Interestingly, the ACEs measure was not significantly correlated with any other variables utilized in this study. A lack of findings was surprising given the somewhat high prevalence of ACEs in our sample (M = 3.14, SD = 2.83) since high ACEs scores typically correlate with increased depression and anxiety (Murphy et al., 2014). Additionally, pre- and post-EA-SR and observed EA were not correlated for this sample, however, results may be different if researchers obtained a larger sample.

Demographic Variables

Correlations were conducted to assess bivariate relationships between demographic variables for mother's age, level of education, relationship status, race, ethnicity, number of previous pregnancies, weeks along in pregnancy, age of other children, and any dance or movement experience. As expected, race (White American and Black or African American) and ethnicity (not Hispanic or Latino) were moderately, negatively correlated. An unexpected finding was the strong, positive correlation between relationship status (married) and having previous dance experience. This finding is likely due to that fact that most of our sample classified as married.

Correlational analyses were also used to examine the relationship between mothers' demographic variables and the following study variables: maternal anxiety, flourishing, depression, emotional expressivity, adverse childhood experiences, self-reported prenatal EA, and observed prenatal EA. A summary table of demographic variable correlations can be found in Table 3. Analyses show that a mother’s first pregnancy was strongly, negatively correlated with pretest and posttest anxiety. This indicates that a mother's first pregnancy was associated with higher anxiety levels, but this anxiety decreased the further the sample progressed in their

pregnancies. Similarly, moderately negative correlations were found between the number of weeks along in current pregnancy and pretest and posttest anxiety. In other words, as the weeks along in pregnancy progressed, the mother's anxiety decreased. Additionally, strong, negative correlations were found between dance background and pretest and posttest emotional expressivity. These findings were not necessarily expected but are defensible since dancers typically utilize more nonverbal emotional expressiveness than the average "non-dancer". Further unexpected findings include moderately negative correlations between a married relationship status and observed nonhostility and observed sensitivity, in addition to pre-EES and movement and dance experience.

Comparisons and Means: Paired Samples t-Tests

A paired-samples *t*-test was conducted to compare differences in study variables prior to study participation and after participation in the study components. There was a significant difference in anxiety scores prior to participants starting the study ($M = 23.68$, SD = 6.07) and after completing the study ($M = 21.77$, SD = 5.63) ($t(21) = 2.51$, $p = .02$). These results suggest that, as related to participants completing our program, regardless of the study arm (dance-only, dance-plus-psychosocial), they become significantly less anxious. There was also a significant difference in self-reported EA between pretest ($M = 91.06$, $SD = 10.55$) and posttest ($M = 99.19$, $SD = 8.45$) ($t(17) = -3.56$, $p < .01$). These results again indicate that, regardless of intervention type completed, self-reported EA increased. Paired samples t-tests for the remaining variables (depression, flourishing, and emotional expressivity) were not significant, however, the numbers were trending in the right direction.

Table 2

Correlations among Main Study Variables at Pretest and Posttest

	Pre-EA-SR	Pre-Anxiety	Pre-Flourishing	Pre-Depression	Pre-EES	Post-EA-SR	Post-Anxiety	Post-Flourishing	Post-Depression	Post-EES	Post-ACEs	Post-Sensitivity
Pre-EA-SR	-											
Pre-Anxiety	-.69**	-										
Pre-Flourishing	.76**	-.36	-									
Pre-Depression	-.82**	.52*	-.71**	-								
Pre-EES	.15	-.25	.2	.02	-							
Post-EA-SR	.55*	-.4	.48*	-.42	-.03	-						
Post-Anxiety	-.57*	.82**	-.2	.35	-.11	-.38	-					
Post-Flourishing	.43	-.18	.67**	-.41	-.13	.61**	-0.25	-				
Post-Depression	-.51*	.44*	-.17	.5*	.18	-.5*	.44*	-.26	-			
Post-EES	.14	-.29	.2	.05	.95**	-.03	-.11	-.13	0.17	-		
Post-ACEs	-.43	.02	-.28	.35	.05	-.14	.19	-.36	0.32	0.16	-	
Post-Sensitivity	.18	-.21	.18	-.01	.31	.07	.15	-.14	0.06	0.42	0.24	-
Post-Nonhostility	.16	-.11	.1	.12	.25	.23	.18	-.02	0.05	0.34	0.22	.88**

Note. ** Correlation is significant at the .01 level (two-tailed)

* Correlation is significant at the .05 level (two-tailed)

N was 22 for all variables except the following: Pre-EA-SR (n = 18); Pre-EES (n = 21); Post-EA-SR (n = 21); Post-ACEs (n = 21)

Table 3

Correlations among Participant's Demographic Variables at Pretest and Posttest

	Age	Highest Education	Relationship Status	Race	Ethnicity	First Pregnancy	Gestational Age	Other Children Age(s)
Age	-							
Highest Education	.32	-						
Relationship Status	.34	.21	-					
Race	-.16	.15	-.05	-				
Ethnicity	-.08	-.09	.05	-.48*	-			
First Pregnancy	.35	.4	.3	.01	.06	-		
Gestational Age	.14	.32	.05	-.32	.00	.23	-	
Other Children Age(s)	-.16	-.55	.06	-.42	.42	c	-.52	-
Experience w/ Movement/Dance	.34	.09	.54**	-.15	.16	.21	.08	-.28

Note. ** Correlation is significant at the .01 level (two-tailed)

* Correlation is significant at the .05 level (two-tailed)

c = could not be computed

Comparisons and Means: Independent Samples t-tests

An independent samples t-test was conducted to determine if there was a difference between participation in the dance-only or dance-plus-psychosocial arm of the study. Results were not significant ($t(21) = .06$, p = n.s.), indicating that dance alone, without the additional psychosocial component, improved self-reported EA while decreasing anxiety during the late second and early third trimesters of pregnancy.

Comparisons and Means: Regressions

Regression analyses were performed using R's statistical package (R Core Team, 2020). Change scores were created for the anxiety, depression, flourishing, emotional expressivity, and emotional availability self-report variables to provide a summary measure of the average change in variables between pretest and posttest. Gestational age was utilized as a covariate to statistically control for differences in main variables that may be attributed solely to weeks along in pregnancy. The number of weeks along in pregnancy was regressed ($M = 26$, $SD = 6.96$) on change scores for anxiety ($M = -1.91$, $SD = 3.57$), depression ($M = -.95$, $SD = 3.58$), flourishing ($M = 1.45$, $SD = 3.4$), emotional expressivity ($M = .43$, $SD = 4.98$), and self-reported emotional availability ($M = 7.67$, $SD = 9.13$). Notably, weeks along was not significant in any of the regression analyses for the variables.

Significant results were again found for both anxiety and self-reported EA even with weeks along as a covariate. Anxiety significantly decreased from pre-to posttest ($B_0 = -1.91$, $SE = .78$, $t(20) = -2.46$, $p < .05$, $R^2 = .01$, $F(1,20) = .18$). This corroborates with results from the Paired Samples *t*-test that also show a decrease in anxiety from pre-to posttest. Since weeks along ($B_1 = .05$, $SE = .11$, $t(20) = .42$, p = n.s.) was controlled for, these results indicate that decreased anxiety is an outcome directly related to mothers completing either the dance-only or

dance + psychosocial intervention versus being closer to giving birth. Alternatively, there was an extremely significant increase in self-reported EA from pretest to posttest (B_0 = .76, *SE* = 2.27, $t(16) = 3.36$, $p < .01$, $R^2 = .00$, $F(1,16) = .02$). Weeks along (B_1 = -.04, *SE* = .34, $t(16) = .13$, p = n.s.) were also controlled for this variable, indicating that improved self-reported EA is directly related to mothers participating in our study. Results for flourishing (B_0 = 1.45, *SE* = .74, $t(20) = 1.91$, p = n.s., $R^2 = .01$, $F(1,20) = .11$), depression (B_0 = -.95, *SE* = .78, $t(20) = -1.23$, p = n.s., $R^2 = .01$, $F(1,20) = .15$, and emotional expressivity (B_0 = .43, *SE* = 1.11, $t(19) = .39$, p = n.s., $R^2 = .00$, $F(1,19) = .01$) were all not significant. A summary of significant regressions can be found in Table 4.

Table 4

Regressions on Pretest and Posttest Changes among Anxiety and Self-Reported Emotional Availability

Outcome (pre-post change)	Intercept			Weeks_Along (*B* 1)		
	Est.	*SE*	*p*	Est.	*SE*	*p*
Anxiety	-1.91	.78	.02*	.05	.11	.68
EA-SR	7.60	2.27	<.01**	-.04	.34	.90

Note. ** Correlation is significant at the .01 level
* Correlation is significant at the .05 level

CHAPTER 4 – DISCUSSION

The goal of this study was to determine if Emotional attachment/emotional availability, that is EA movement activities would be successful at enhancing maternal EA, mental health, and wellbeing prior to giving birth. Specifically, two questions were proposed: (1) Does the dance-only intervention improve maternal prenatal EA, mental health, and wellbeing as much as the dance + psychosocial intervention, and (2) Does the dance + psychosocial intervention improve prenatal maternal EA, mental health, and wellbeing more than the dance-only intervention? It was hypothesized that the dance + psychosocial participants would yield greater improvements than the dance-only group in all dimensions due to the additional workshop that provided up-to-date research on EA and developing a healthy parent-child relationship. To test this hypothesis, participants were assigned to one of the two intervention arms, and independent and paired samples *t*-tests along with regression analyses were conducted. Paired samples *t*-tests revealed a significant decrease in participants' anxiety and significant improvements in self-reported EA from pretest to posttest, regardless of intervention arm completed. These findings support the use of EA-based dance for decreasing anxiety prior to giving birth while improving self-reported EA during pregnancy. Independent samples *t*-tests did not reveal any differences between study arms, indicating that dance alone, without the additional psychosocial component, may increase self-reported EA while decreasing anxiety during the later second and early third trimesters. Analyses regressing gestational age across the study variables revealed no significant findings, indicating that *t*-test results can be attributed to the interventions themselves versus being related to being farther along in pregnancy. Also promising is the variables that, although they did not reach significance, were trending in the right direction

Qualitative comments (Appendix II) from the last portion of the second dance workshop help explain our quantitative findings of decreased anxiety and improved self-reported EA. During discussions, all mothers noted an increased connection and rhythm with their unborn babies. Most even mentioned having a better understanding of what their baby was trying to communicate by thinking intentionally about the baby's movements. Mothers without much dance experience especially noted their new ability to communicate nonverbally. More optimistically, all mothers reported intentions of continuing these exercises after study completion. Plans for use ranged from using movements and activities to control discomfort during birth, regulating emotions during times of stress, soothing the baby in the womb, and interpreting the baby's feelings postpartum to assist with their child's development of nonverbal expression.

Several expected correlations were also found, including a moderate to a strong positive correlation between pre-flourishing and pre- and post-self-reported EA. This finding is as expected because as levels of flourishing increase, so do levels of self-reported EA. Additionally, a mother's first pregnancy was strongly, negatively related to pretest anxiety. Interpreted, this means that mothers who experienced their first pregnancy reported higher anxiety levels, but posttest results revealed that self-reported anxiety decreased as mothers progressed farther into pregnancy. The regression analyses between weeks along in pregnancy and pre- and post-anxiety elucidates that this finding is likely related to participation in one of the intervention arms versus being closer to giving birth. All pretest and posttest study variables were regressed with gestational age as a covariate to determine if findings of decreased anxiety were directly attributed to the intervention versus being farther along in pregnancy. These analyses determined that weeks along in pregnancy was not directly related to our finding of decreased anxiety,

allowing results to be attributed directly to completion of one of the interventions. Furthermore, regardless of whether it was a mothers first pregnancy or not, all mothers reported decreases in anxiety from pretest to posttest.

These findings are significant because previous research on observed EA has associated optimal and nonoptimal EA with positive and negative impacts on children and mothers (Winston & Chicot, 2016). Given the commonly experienced stressors associated with becoming a new parent in combination with increased anxiety and depression related to the ongoing COVID-19 pandemic, addressing anxiety and depression during pregnancy is now more critical than ever. Our results prove helpful for promoting dance-based activities that aim to decrease levels of anxiety while improving mother-fetus bonding prior to birth.

Although participants did indicate decreased levels of depression and increased levels of flourishing at posttest, these results did not yield high enough improvements to reach statistical significance. Unfortunately, recordings to code observed EA were not completed at pretest, only at posttest, limiting our ability to analyze improvements in observed EA from prior to post intervention. Promisingly, respondents did report improvements in self-reported EA after study completion. Demographic data was also not collected for participant's sexual orientation; however, such information was gleaned from conversations with participants throughout the workshops. Overall, our sample contained individuals who identified as heterosexual, however, there were a few mothers who identified as gay. All participants in our study were in a committed relationship with most participants being married and one participant was widowed.

Limitations

As this was a pilot study, several limitations should be considered. One of the most significant limitations may be a lack of random assignment due to time limitation concerns.

Since participants were assigned to intervention arms on a first-come, first-served basis, care was not taken to even out intervention groups according to participant age, dance background, relationship, or educational status. Furthermore, a control group was not utilized since our sample was small due to recruitment procedures. It should also be noted that the sample consisted of mainly married, educated, Caucasian women. Findings may differ if recruitment procedures are expanded to gain a larger sample and improve reach to other ethnic groups, SES backgrounds, and relationship statuses.

This study did not obtain outcomes for observed prenatal EA at pretest; results were only obtained at posttest. Future studies should replicate these procedures and perform observed EA both pretest and posttest to determine if observed EA follows the same trend as self-reported EA from pretest to posttest. Future studies should also include maternal and fetus health measures that may impact flourishing, depression, and anxiety outcomes. Use of these measures may be valuable tor assisting expectant mothers with mental health concerns and promotion. Our study did not utilize such a measure, so anxiety levels could not be attributed to anything directly. Although not considered a limitation, future studies may consider gathering mothers into an in-person format to determine if findings from the online format are improved in a live group setting. While results may differ in-person, it should be noted that significant findings were achieved utilizing an online platform. In fact, the online format may assist with removing several known implementation barriers such as transportation, childcare, and stigma.

Conclusion

Overall, our findings promote the use of online EA-based dance and movement workshops for promoting maternal self-reported EA and decreasing anxiety during pregnancy. A future study replicating and improving upon this study's processes by taking the mentioned

limitations into account is currently in development and set to launch in 2022. Recruitment practices were be expanded to achieve a larger, more diverse sample, a control group and random assignment protocols will be utilized, the demographics form will be improved to be more inclusive of interesting variables, such as sexual orientation, and the number of pretest and posttest measures will be decreased to reduce participant time and burden.

REFERENCES

Ainsworth, M. D. S. (1969). Maternal sensitivity scales. *Power, 6*, 1379-1388.

American Dance Therapy Association [ADTA] (2020). *What is dance/movement therapy?* https://adta.memberclicks.net/what-is-dancemovement-therapy#:~:text=Dance%2Fmovement%20therapy%20(DMT)%20is%20defined%20by%20the%20American,improving%20health%20and%20well%2Dbeing.

Araji, S., Griffin, A., Dixon, L., Spencer, S-K., Peavie, C., & Wallace, K. (2020). An overview of maternal anxiety during pregnancy and the postpartum period. *Journal of Medical Health and Clinical Psychology, 4*(4), 47-56. https://doi.org/10.20471/acc.2018.57.01.05

Aran, P., Lewis, A., Watson, S. & Galbally, M. (2021). Major depression and generalised anxiety disorder: An analysis of the effects of remission status and comorbidity on mother-infant emotional availability in the perinatal period. *Journal of Clinical Psychology,* 1-20. https://doi.org/10.1002/jclp.23235

Beyond Blue LTD (2022). *Perinatal Anxiety*. Beyond Blue. https://healthyfamilies.beyondblue.org.au/pregnancy-and-new-parents/maternal-mental-health-and-wellbeing/anxiety

Biringen, Z (1987). *The emotional availability (EA) scales* (1st edition). Boulder, CO. www.EmotionalAvailability.com

Biringen, Z., Robinson, J. L., & Emde, R. N. (1993). *The emotional availability (EA) scales* (2nd edition). Boulder, CO. www.EmotionalAvailability.com

Biringen, Z., Robinson, J. L., & Emde, R. N. (1998). *The emotional availability (EA) scales* (3rd edition). Boulder, CO. www.EmotionalAvailability.com

Biringen, Z. (2000). Emotional availability: Conceptualization and research findings. *American Journal of Orthopsychiatry, 70*(1), 104-114.

Biringen, Z. (2008). *The emotional availability (EA) scales and EA zones evaluation 4th edition: Infancy/early childhood version*, Boulder, CO. www.EmotionalAvailability.com

Biringen, Z., Derscheid, D., Vliegen, N., Closson, L., & Easterbrooks, M. A. (2014). Emotional availability (EA): Theoretical background, empirical research using the EA Scales, and clinical applications. *Developmental Review, 34*(2), 114-167. https://doi.org/10.1016/j.dr.2014.01.002

Behrends, A., Müller, S., & Dziobek, I. (2012). Moving in and out of synchrony: A concept for a new intervention fostering empathy through interactional movement and dance. *The Arts in Psychotherapy, 39*, 107-116. https://doi.org/j.aip.2012.02.003

Bowlby, J. (1958). The nature of the child's tie to his mother. *International Journal of Psycho-analysis, 39*, 350-373.

Brenan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. *Attachment Theory and Close Relationships*, 46-76. The Guilford Press.

Bretherton, I. (2000). Emotional availability: An attachment perspective. *Attachment and Human Development, 2*(2), 233-241. https://doi.org/10.1080/14616730050085581

Britner, P. A., Marvin, R. S., & Pianta, R. C. (2005). Development and preliminary validation of the caregiving behavior system: Association with child attachment classification in the

preschool strange situation. *Attachment and Human Development, 7*(1), 83-102. https://doi.org/10.1080/1416730500039861

Burgin, C. J., Brown, L. H., Royal, A., Silvia, P. J., Barrantes-Vidal, N., & Kwapil, T. R. (2012). Being with others and feeling happy: Emotional expressivity in everyday life. *Personality and Individual Differences, 53*(3), 185-190. https://doi.org/10.1016/j.paid.2012.03.006

Centers for Disease Control and Prevention. (2020). *Preventing adverse childhood experiences.* Centers for disease control – violence prevention. https://www.cdc.gov/violenceprevention/aces/fastfact.html

Cox, J., Holden, J. M., Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh postnatal depression scale. *British Journal of Psychiatry, 150*, 782-786.

Danese, A. & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior, 106*, 29-39. https://doi.org/10.1016/j.physbeh.2011.08.019

Devereaux, C. (2014). *Moving with the space between us: The dance of attachment security.* In C. A. Malchiodi & D. A. Crenshaw (Eds.), *Creative arts and play therapy. Creative arts and play therapy for attachment problems* (p. 84–99). Guilford Press. https://books.google.com/books?id=5R80CgAAQBAJ&pg=PA84&lpg=PA84&dq=Moving+with+the+space+between+us:+The+dance+of+attachment+security.&source=bl&ots=fBOjIsiBgl&sig=ACfU3U3g2yfW9viKSlecj-bCXGM9EQbe1A&hl=en&sa=X&ved=2ahUKEwj-5s60-5LwAhWCQc0KHWETApMQ6AEwBXoECAgQAw#v=onepage&q=Moving%20with%20the%20space%20between%20us%3A%20The%20dance%20of%20attachment%20security.&f=false

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2009). New measures of wellbeing: Flourishing and positive and negative feelings. *Social Indicators Research, 39*, 247-266.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Dong-Won, C., Oishi, S., Biswas-Diener, R. (2010). New wellbeing measures: Short scales so assess flourishing and positive and negative feelings. *Social Indicators Research, 97*, 143-156. https://doi.org/10.1007/s11205-009-9493-y

Doonan, F. & Bräuuninger, I. (2015). Making space for both of us: How dance movement therapy enhances mother-infant attachment and experience. *Body, Movement, and Dance in Psychotherapy, 10*(4), 227-242. http://dx.doi.org/10.1090/17432979.2015.1063547

Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W., & Anada, R. F. (2003). Childhood abuse neglect and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics, 111*, 564-672. https://doi.org/10.1542/peds.111.3.564

Easterbrooks, M. A., Biesecker, G., & Lyons-Ruth, K. (2000). Infancy predictors of emotional availability in middle childhood: The roles of attachment security and maternal depressive symptomatology. *Attachment & Human Development, 2*(2), 170-187. https://doi.org/10.1080/14616730050085545

Fahd, S. & Hanif, R. (2019). Emotion expressivity and psychological flourishing of married individuals: Gender and type of marriage as moderators. *Journal of Human Behavior in the Social Environment, 29*(3), 415-429. https://doi.org/10.1080/10911359.2015.1543629

Felitti, V. J., Anada, R. F., Nordenberg, D., Wereiamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). The relationship of adult health status to childhood abuse and household dysfunction. *American Journal of Preventative Medicine, 14*, 245-258.

Hamilton, M. (1959). The assessment of anxiety states by rating. *Br J Med Psychol, 32*, 50-55.

Henrichs, J., Van Den Heuvel, M. I., Witteveen, A. B., Wilschut, J., & Van den Bergh, B. R. H. (2021). Does mindful parenting mediate the association between maternal anxiety during pregnancy and child behavioral/emotional problems? *Mindfulness, 12,* 370-380. https://doi.org/10.1007/s12671-019-01115-9

Huizink, A. C., Mulder, E. J. H., Robles de Medina, P. G., Visser, G. H. A., & Buitelaar, J. K. (2004). Is pregnancy anxiety a distinctive syndrome? *Early Human Development, 79*, 81-91. https://doi.org/10.1016/j.earlhumdev.2004.04.014

IBM Corp. (2020). IBM SPSS statistics for windows, version 27.0. Armonk, NY: *IBM Corp*.

Johnstone, M. & Mulherin, K. (2020). From distress to flourishing: Towards a strengths-based approach for young mothers. *Journal of Reproductive and Infant Psychology, 38*(2), 166-183. https://doi.org/10.1080/02646838.2019.1621277

Kerns, K. A. & Brumariu. (2014). Is insecure parent-child attachment a risk factor for the development of anxiety in childhood or adolescence? *Child Development Perspectives, 8*(1), 12-17. https://doi.org/10.1111/cdep.12054

Khoury, J. E., Atkinson, L., Bennett, T., Jack, S. M., & Gonzalez, A. (2021). COVID_19 and mental health during pregnancy: The importance of cognitive appraisal and social support. *Journal of Affective Disorders, 282*, 1161-1169. https://doi.org/10.1016/j.jas.2021.01.027

Kim, B., Chow, S., Bray, B., & Teti, D. M. (2017). Trajectories of mothers' emotional availability: Relations with infant temperament in predicting attachment security. *Attachment & Human Development, 19*(1), 38-57. https://doi.org/10.1080.14616734.2016.1252780

Kluczniok, D., Boedeker, K., Attar, C. H., Jaite, C., Bierbaum, A. Fuehrer, D., Paetz, L., Dittrich, K., Herpertz, S. C., Brunner, R., Winter, S., Heinz, A., Roepke, S., Heim, C. & Bermpohl, F. (2018). Emotional availability in mother with borderline personality disorder and mothers with remitted major depression is differently associated with psychopathology among school-aged children. *Journal of Affective Disorders, 231*, 63-73. https://doi.org/10.1016/j.jad32018.02.001

Koch, S. C., Riege, R. F. F., Tisborn, K., Biondo, J., Martin, L. & Beelmann, A. (2019). Effects of dance movement therapy and dance on health-related psychological outcomes: A meta-analysis update. *Frontiers in Psychology, 10*, 1-28. https://doi.org/10.3389/psyg.2019.01806

Kring, A. M., Smith, D. A., & Neale, J. M. (1994). Individual differences in dispositional expressiveness: Development and validation of the emotional expressivity scale. *Journal of Personality and Social Psychology, 66*(5), 934-949.

Licata, M., Zietlow, A. L., Träuble, B., Sodian, B., & Reck C. (2016). Maternal emotional availability and its association with maternal psychopathology, attachment style insecurity and theory of mind. *Psychopathology*, *49*(5), 334-340. https://doi.org/10.1159/000447781

Lyddon, W. J., Bradford, E., & Nelson, J. P. (1993). Assessing adolescent and adult attachment: A review of current self-report measures. *Journal of Counseling and Development, 71*(4), 390-395. https://doi.org/10.1002/j.1556-6676.1993.tb02654x

MacMillan, K. K., Lewis, A. J., Watson, S. J., & Galbally, M. (2020). Maternal depression and the emotional availability of mothers at six months postpartum: Findings from the mercy pregnancy and emotional wellbeing study (MPEWS) pregnancy cohort. *Journal of Affective Disorders, 266*, 678-685. https://doi.org/10.1016.j.jad.2020.01.109

Maier, W., Buller, R., Philipp, M., & Heuser, I. (1988). The hamilton anxiety scale: Reliability, validity, and sensitivity to change in anxiety and depressive disorders. *Journal of Affective Disorders, 14*, 61-68. https://doi.org/10.1016/0165-0327(88)90072-9

Mappa, I., Distefano, F. A., & Rizzo, G. (2020). Effects of coronavirus 19 pandemic on maternal anxiety during pregnancy: A prospectic observational study. *Journal of Perinatal Medicine, 48*(6), 545-550. https://doi.org/10.1515/jpm-2020-0182

Mikulincer, M., & Shaver, P. R. (2016). The Attachment Behavioral System: Basic concepts and principles. In *attachment in adulthood: Structure, dynamics, and change* (2nd ed., pp. 3-26). Guilford Press.

Monteiro, F., Fonesca, A., Pereira, M., & Canavarro, M. C. (2020). Is positive mental health and the absence of mental illness the same? Factors associated with flourishing and the absence of depressive symptoms in postpartum women. *Journal of Clinical Psychology, 77*, 629-645. https://doi.org/10.1002/jclp.23081

Murphy, A., Steele, M., Dube, S. R., Bate, J., Bonuck, K., Meissner, P., Goldman, H., & Steele, H. (2014). Adverse childhood experiences (ACEs) questionnaire and adult attachment interview (AAI): Implications for parent child relationships. *Child Abuse & Neglect, 38*, 224-233. https://doi.org/10.1016/j.chiabu.2013.09.004

Petfield, L., Startup, H., Droscher, H., Cartwright-Hatton, S. (2015). Parenting in mothers with borderline personality disorder and impact on child outcomes. *Evidence Based Mental Health, 18*(3), 67-75.

Pierce, L. (2014). The integrative power of dance/movement therapy: Implications for the treatment of dissociation and developmental trauma. *The Arts in Psychotherapy, 41*, 7-15. https://doi.org/10.1016/j.aip.2013.10.002

R Core Team (2020). R: A language and environment for statistical computing. *R Foundation for Statistical Computing*, Vienna, Austria.

Rados, S. N., Tadinac, M., & Herman, R. (2018). Anxiety during pregnancy and postpartum: Course, predictors and comorbidity with postpartum depression. *Acta Clinica Croatica, 57*(1), 39-51. https://doi.org/10.2047/acc.2018.57.01.05

Salo, S. J., Flykt, M., Isosävi, S., Punamäki, R., Kalland, M., Biringen, Z., Pajulo, M. (2019a). Validating an observational measure of prenatal emotional availability among mothers with depressive symptoms. *Journal of Prenatal and Perinatal Psychology and Health, 34*(1), 55-77. https://doi.org/hdl.handle.net/10138/308936

Salo, S. J., Flykt, M., Biringen, Z. (2019b). *Emotional Availability (EA) Prenatal*. www.emotionalavailability.com

Salo, S. J., Flykt, M., Biringen, Z., Kalland, M., Pajulo, M., & Punamäki, R. L. (2019c). The effectiveness of nurture and play: A mentalisation-based parenting group intervention for prenatally depressed mothers. *Primary Health Care Research & Development, 20*(157), 1-11. https://doi.org/10.1017/S1463423619000914

Saunders, H., Kraus, A., Barone, L., & Biringen, Z. (2015). Emotional availability: Theory, research and intervention. *Frontiers in Psychology, 6*, 1069-1073. https://doi.org/10.3389/fpsyg.2015.01069

Schahhosseini, Z., Pourasghar, M., Khalilian, A., & Salehi, F. (2015). A review of the effects of anxiety during pregnancy on children's health. *Materia Scoio-medica, 27*(3), 200-202. https://doi.org/10.5455/msm.2015.27.200-202

Schmidt, M., Narayan, A. J., Atzi, V. M., & Rivera, L. (2018). Childhood maltreatment on the adverse childhood experiences (ACEs) scale versus the childhood trauma questionnaire (CTQ) in a perinatal sample. *Journal of Aggression Maltreatment and Trauma, 29*(3), 1-19. https://doi.org/10.1080/10926771.2018.1524806

Smith-Nielsen, J., Matthey, S., Lange, T., & Vaever, M. S. (2018). Validation of the edinburgh postnatal depression scale against both DSM-5 and ICD-10 diagnostic criteria for depression. *BMC Psychiatry, 18*(393). https://doi.org/10.1186/s12888-018-1965-7

Spruit, A., Goos, L., Weenink, N., Rodenburg, R., Niemeyer, H., Stams, G. J., & Colonnesi, C. (2020). The relation between attachment and depression in children and adolescents: A multilevel meta-analysis. *Clinical Child and Family Psychology Review, 23*, 54-69. https://doi.org/10.1007/s10567-017-00299-9

Schindler, A. (2019). Attachment and substance use disorder – Theoretical models, empirical evidence, and implications for treatment. *Frontiers in Psychiatry, 10*, 727-739. https://doi.org/10.3389/fpsyt.2019.00727

Thompson, E. (2015). Hamilton rating scale for anxiety (HAM-A). *Occupational Medicine, 65*, 601. https://doi.org/10.1093/occmed/kqv054

Trupe, R. D., Macfie, J., Skadberg, R. M, & Kurdziel, G. (2016). Patterns of emotional availability between mothers and young children: Associations with risk factors for borderline personality disorder. *Journal of Infant & Child Development, 27*, 1-17. https://doi.org/10.1002/icd.2046

Van Bakel, H. J. A., Maas, A. J., Vreeswijk, C. M., & Vingerhoets, A. J. (2013). Pictorial representation of attachment: Measuring the parent-fetus relationship in expectant mothers and fathers. *BMC Pregnancy and Childbirth, 13*(138), 1-9. https://doi.org/1471-2393/13/138

Van Niel, M. S. & Payne, J. L. (2020). Perinatal depression: A review. *Cleveland Clinic Journal of Medicine, 87*(5), 273-277. https://doi.org/10.3949/ccjm.87a.19054

Van Rosmalen, L., Van der Veer, R., & Van der Horst, F. (2015). Ainsworth's strange situation procedure: The origin of an instrument. *The History of the Behavioral Sciences, 51*(3), 261-284. https://doi.org/10.1002/jhbs.21729

Vankatesh, K. K., Nadel, H., Blewett D., Freeman, M. O., Kaimal, A. J., & Riley, L. E. (2016). Implementation of a universal screening for depression during pregnancy: Feasibility and impact on obstetric care. *American Journal of Obstetrics & Gynecology, 215*(4), 517. https://doi.org/10.1016/j.ajog.2016.05.024

Vliegen, N., Luyen, P., & Biringen, Z. (2009). A multimethod perspective on emotional availability in the postpartum period. *Parenting Science and Practice, 9*, 228-243. https://doi.org/10.1080/15295190902844514

Waters, E. & Deane, K. E. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behavior in infancy and early childhood. *Monographs of the Society for Research in Child Development, 50*(2) 41-65. https://doi.org/3333826

Winston, R. & Chicot, R. (2016). The importance of early bonding on the long-term mental health and resilience of children. *London Journal of Primary Care, 8*(1), 12-14. https://doi.org/10.1080/17571472.2015.1133012

Zanotti, D. C., Kaier, E., Vanasse, R., Davis, J. L., Strunk, K. C., & Cromer, L. D. (2018). An examination of the test-retest reliability of the ACE-SQ in a sample of college athletes. *Psychol Trauma, 10*(5), 559-562

Zhang, L., Wang, L., Yuan, Q., Huang, C., & Zhou, X. (2021). Prenatal depression in women in the third trimester: Prevalence, predictive factors, and relationship with maternal-fetal attachment. *Frontiers in Public Health, 8*. https://doi.org/10.3389/fpubh.2020.302005

APPENDIX I

Movement Through Motherhood: Dance Workshop I Process

All dance workshops for this pilot study were developed in collaboration with EA-based principles by Dr. Zeynep Biringen, Madeline Jazz Harvey, and students from CSU's dance education department. All workshops were conducted online via a secure Zoom link containing a participant waiting room. Pregnancy worksheets asked participants to consider their experiences during pregnancy and post-partum, considering emotional and physical aspects. Questions asked were used to create several of the dance prompts and activities, in addition to coding prompts included in the Prenatal EA manual. In addition to utilization of the pregnancy worksheets and Prenatal EA manual, other EA concepts were considered, like ease, mindfulness, stillness, non-verbal expression, and trust.

The first dance workshop started with body articulations to warm-up participants and assist with the mind-body connection before beginning the activities. Afterward, participants introduced themselves by name and with a gesture for each of the following prompts, (1) how are you feeling today; (2) one sensation your baby might be feeling; (3) one prominent feeling throughout your pregnancy; and (4) one emotion you hope to share with your baby once born. Participants were then asked to smooth these four movements into one fluid sequence to introduce them to the "choreographic" process of the intervention. Participants continued this flow by using three positive adjectives (through gestures) to describe their baby and three gestures to describe themselves as mothers. Once each mother performed her sequence, feedback and comments were shared via Zoom's typed group chat function.

After feedback was provided, mothers participated in a "*Name Game*" activity where they chose a prospective baby name and inscribed their initials (1) on their belly, (2) using their belly as a "pen tip," (3) using small belly movements, then large, whole-body movements, (4) from a static pose to motion using the whole body, and (5) using as much space as possible. In the second activity, "*Mirroring*," participants took turns leading and following as though looking in a mirror. This activity asked participants to talk to their babies and describe their nonverbal messages through movement. Participants then utilized the mirror or camera to tell their baby a nursery rhyme through movement. The final portion of this activity included mothers telling themselves a positive message. After each mother performed, all other participants and dance facilitators narrated the message they perceived the mother to be saying. The goal was to allow mothers an opportunity to be silly and vulnerable while furthering their nonverbal expressiveness. Mothers were instructed to keep the messages to their babies to themselves until after "performances" and feedback were completed.

After a short bathroom break, mothers moved into the next activity, "*Baby Led Moving,*" where they were asked to close their eyes to bring attention to their baby and allow them to lead her movements. Mothers responded to the weight or directionality of the baby, movements or rhythms felt, or their baby's heartbeat. Next, nonverbal emotions were expressed through movement in the "*Release of Emotions*" activity. Mothers were provided with five emotion prompts to explore and create nonverbal expressions. Prompts included utilizing facial and body movements to move through the participant's expressions of the following emotions (1) happiness, (2) nervousness, (3) excitement, (4) frustration, and (5) love. Participants were then asked to sit on the floor or in a chair to complete the "*Sharing the Load*" exercise. Once seated, participants were asked to keep their spine in alignment while imagining their weight sinking

into the floor or chair. As participants shifted their weight into the ground, they began rocking movements, and self-paced arm stretches. Focus then moved to the participants' breathing as they moved to their hands and knees or in an upward prone position on a pillow. Participants were asked to focus on their breath, alignment, and moving their weight into the floor during this time. After a few moments of prone breathing, the participants practiced weight distribution in a standing position by using a stable surface and rocking side-to-side and back-and-forth while visualizing and connecting with their baby. Finally, the participants used a sturdy wall to push their hands or back on to gain momentum to press and release their weight into the wall. The final activity for workshop one was "*Show your Support,*" where the participants thought of their greatest strength in motherhood and created a short phrase or movement to display that strength. Afterward, participants were asked to write a message to their baby or create another attribute or strength as a mother. Workshop one closed by asking participants to share and explain their process and thoughts behind their actions and select a song for the second workshop.

The second dance workshop opened with a review of the first workshop and asked participants to share any activities they revisited between workshops one and two. Body articulations and the "*Baby Lead Moving*" activity were utilized as warm-ups. Participants then moved into the first activity, "*This is Baby,*" where they were asked to demonstrate a pose or gesture for the following questions, and (1) how does baby feel; (2) what is baby's energy; (3) how much space is your baby taking (room in your womb). Participants then shared their movements with the group for feedback and interpretation. To further elucidate mothers' "silly" side, participants were asked to think about what animals they most associate with themselves and their baby and move like those animals. Participants were then asked to move like they were teaching their baby about this animal and asked how they would move like this animal to ease

their baby's distress. The mind-body connection was explored by asking participants to explain any differences they noticed in their bodies between prompts.

Participants were then assigned to breakout rooms for 20-minutes to create their movement sequence one-on-one with a dance facilitator. The choreographic aspect was not filmed, and mothers were provided with feedback and guidance by the dance facilitator during points of frustration. Constructive feedback was provided to mothers from the dance facilitators to improve their use of their body, energy, space, time, and outward expressiveness. Prompts included (1) show your greatest strength as a mother in a single pose; (2) create or improvise about the moment when you first found out you were pregnant (where you were, what happened, emotions felt, physical sensations); (3) show your relationship with baby in a single pose; (4) create or improvise about the moment when you first heard or saw your baby's heartbeats, first saw your baby in the ultrasound, first felt baby move; (5) show a message baby is saying to you (today or throughout your pregnancy) in a single pose; (6) create or improvise to show how your baby were guide your future; and (7) a final long, slow bow or curtsy to signal completion. After a short break, participants gathered together to perform their "dance," receive feedback and interpretations and complete a closeout discussion. Qualitative findings from these discussions are described in Appendix II.

APPENDIX II

Qualitative Feedback from Participants in Dance Workshops

After completing the two dance workshops, mothers participated in a brief feedback session with Madeline Jazz Harvey and the contributing dance facilitators. The final 25-minutes of the second workshop was dedicated to obtaining this qualitative information about the participant's previous dance or movement experience, their positive and negative experiences throughout the intervention, and thoughts about utilizing information gleaned in these workshops. Four prompts were given to the participants during this portion: (1) Provide a brief review of any prior dance or movement experience; (2) Feelings pre- and post-completion of movement workshops; (3) Application of activities/experiences during remainder of pregnancy; and (4) Feedback for our continued intervention research. During wrap-up at the end of this discussion, participants were encouraged to utilize these activities to engage their partner or support person in building a healthy connection with their growing baby.

Participants ranged in previous dance experience, but most had at least some formative dance training in their early developmental years, and all mothers were active in some form. Overall, there were not many differences in stated experiences between the two groups. All mothers, even those with prior dance experience, expressed apprehension or anxiousness prior to starting the dance workshops, which was quickly soothed by the mirroring activities and positive interactions with the dance team. Mothers without much previous dance experience appeared to exhibit higher anxiety levels prior to the initiation of the dance workshops as they did not know what to expect. The main difference between experienced and non-experienced dancers was that mothers without much previous dance experience noted their enjoyment with learning to be

physically expressive, as this is not a form of expression they typically adopted. Both experienced and non-experienced dancers had preconceived notions about the format being similar to a dance class versus being based on creatively developing their own "choreography." As predicted, all mothers noted improvements in their connection with their developing baby, nonverbal expressiveness, and enjoyment with workshop movements and activities. Aditionally, all mothers noted their enjoyment with the dance workshops and found the activities and movements to be "super fun," intending to continue movement after study completion.

Participants in both intervention arms (dance-only, dance + psychosocial) shared unique but similar experiences and plans for their new knowledge. All mothers indicated that they would utilize the experiences and lessons gained to decrease discomfort during labor and develop a closer connection with their baby during pregnancy and postpartum. One mother mentioned coming from an athletic background and appreciating learning how to move her body differently. She felt that the "silly" movement activities in the workshop (i.e., creating a movement for describing an animal or nursery rhyme) would be especially useful in forming a connection with her baby postpartum. Additionally, she felt that these particular movements helped soothe her baby in the womb and mentioned employing these movements in times of stress and during labor. Both dancers and non-dancers mentioned plans to utilize the activities, music, and dance-like movements to "move through" physical sensations and emotions throughout their labor process. Several participants indicated involving their partners in activities outside of the workshops, ideally assisting partners with building a strong bond with their baby prior to birth.

All mothers, even those who felt they lacked dance knowledge or rhythm, noted their enjoyment in participating in the dance workshops. Almost all participants noted the positive

feedback and characteristics of the dance team that allowed them to push outside of their comfort zones to explore new emotional expressions. All discussed how the activities helped increase their connection and rhythm with their unborn baby. Most mothers noted their appreciation for developing a better understanding of what their unborn baby is trying to communicate by thinking about the intentionality of their baby's movements. Even mothers in their second pregnancies mentioned that it was invaluable to be reminded of the importance of creating a separate connection with each child. Several mothers mentioned utilizing the activities to help interpret their baby's feelings during pregnancy and assist them with nonverbal expressiveness after birth. Additionally, two mothers mentioned utilizing these techniques to stay in the moment when feeling overwhelmed, reminding themselves that this is just one moment in time.

Statements to take into consideration during the second, non-piloted phase of this study include: inclusion of negative and positive emotions experienced during pregnancy, a desire to receive more background on the dance team and their interests in pregnancy and motherhood, difficulty with Zoom and hearing workshop prompts over the music, and a desire to receive some insight into the dance workshops prior to the first dance meeting. Additionally, a few mothers expressed the desire for dance workshops to take place in-person versus online. Positively, mothers mentioned enjoying the dancers moving alongside them during movement activities as this assisted with participants' comfortability, improved openness, and creativity, especially for first-time "dancers." Unfortunately, due to the restrictions of the coronavirus-19 pandemic environment, in-person workshops were not an option but may be considered in future studies. All other criticisms were be addressed during the next study phase.