DOI: 10.1002/imhj.21831

ARTICLE

WILEY

Cognitively-Based Compassion Training for parents reduces cortisol in infants and young children

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Funding information
Dorothy A. O'Brien, Mary Sue and Mike Shannon, the Mai Family Foundation, and the Meyer Family Foundation

ABSTRACT

This study tests a group-based secular contemplative practice intervention, Cognitively-Based Compassion Training (CBCT), with parents of young children. We report on a randomized controlled preliminary efficacy study. Certified teachers administered CBCT for 20 hr across 8 to 10 weeks in two cohorts of parents with infants and young children. The intervention group was compared to a waitlist control group. Thirty-nine parents and their children, who ranged in age from 4 months to 5 years, were evaluated at pre- and postintervention ($n = 25$ intervention, $n = 14$ waitlist control) on hair cortisol concentration. Parents also completed self-administered questionnaires at both time points regarding demographics, physical symptoms of stress, parenting stress, self-compassion, and mindfulness. Children of parents in the CBCT group experienced significant decreases in cortisol at the postintervention assessment, as compared with the control group. However, parent cortisol and self-report measures did not significantly change other than a small effect on clinical levels of parenting stress. CBCT may be a positive new way to intervene with parents to lower infants' and young children's cumulative physiological stress.

KEYWORDS

cortisol, infants, intervention, parents, stress

1 | INTRODUCTION

Secular contemplative practices, including mindfulness and meditation, have been increasingly applied in both medical and community settings to improve mental and physical health, including decreasing depressive symptoms, stress, and pain as well as enhancing well-being (e.g., see meta-analyses by Chiesa & Serretti, 2009, and Goyal et al., 2014). The most well-known secular contemplative intervention is Mindfulness-Based Stress Reduction (MBSR), a group-based, 8-week mindfulness program (plus a daylong retreat) developed in 1979 at the University of Massachusetts Medical Center (Kabat-Zinn, 1991). Evaluated in numerous clinical trials, MBSR shows health and mental health benefits, including improvements in immune system functioning and physiological stress processes (Carlson, Speca, Patel, & Goodey, 2003; Davidson et al., 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Teasdale et al., 2000). In addition to MBSR, other secular contemplative interventions that focus on meditation and cultivation of compassion have shown promising effects for clinical and community adults and adolescents. For example, a recent systematic review has found that loving kindness and compassion meditation interventions, based on Buddhist compassion practices, improved participants' psychological distress, levels of positive and negative affect, frequency and intensity of positive thoughts and emotions, interpersonal skills, and empathic accuracy (Shonin, Van Gordon, Compare, Zangeneh, & Griffiths, 2015). The present study explores the effects of Cognitively-Based Compassion Training (CBCT), a secular, compassion-based meditation intervention, on parent and child stress processes in families of infants and young children.

1.1 | CBCT

CBCT, developed by Dr. Geshe Lobsang Tenzin Negi at Emory University, is a kindness- and compassion-based meditation practice that deliberately and systematically works to cultivate compassion through progressive exercises beginning with the development of attentional stability (i.e., mindfulness) and progressing further through analytical meditations focusing on equanimity, self-compassion, and kindness (Mascaro, Negi, & Raison, 2017). Participants gain insight into how their attitudes and behaviors support or hinder compassionate responding, intensifying their desire to help others, allowing compassion to become more natural and spontaneous in their everyday lives, and grounding them in realistic expectations of self and others. Although there appear to be multiple cognitive mechanisms involved in meditation, MBSR and other mindfulness programs fall in the "attentional family" of meditation, with a goal of attaining attentional stability and awareness, leading to better attentional control and self-regulation (Dahl, Lutz, & Davidson, 2015). CBCT, however, is an example of the constructive family of meditation, which builds on attentional stability and awareness while also emphasizing constructive processes related to the self, with a specific analytic focus on decreasing barriers to experiencing empathy and envisioned and enacted compassion (Dahl et al., 2015; Mascaro et al., 2017). Empathy, an individual's ability to recognize others' emotions and perspectives and produce a response that is affectively and cognitively similar to the observed emotions or perspectives (Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008; Roth-Hanania, Davidov, & Zahn-Waxler, 2011), provides a basis for compassion. Compassion is defined in this study as having an affective response to the suffering of others by feeling some measure of those emotions while also desiring to alleviate their suffering and actually engaging in prosocial responding to alleviate another's suffering. Compassion has become increasingly recognized as indicative of psychological resilience and may promote positive intergroup relationships across the life span (Greenberg & Harris, 2012; Neff & McGehee, 2010; Welker, Slatcher, Baker, & Aron, 2014).

Initially, CBCT was created as an intervention for college students and then later adapted for different populations such as women with breast cancer, medical students, and adolescents in foster care (e.g., Dodds et al., 2015; Mascaro et al., 2018; Pace et al., 2013). Early research demonstrated that CBCT improves immune function and physiological stress reactions in addition to enhancing neural activity related to empathy. For example, in an early study with college students who were randomized to CBCT or a health education condition, Pace et al. (2009) found that more time spent practicing CBCT meditations at home related to quicker return to baseline cortisol following a stressor as well as lower production of interleukin-6 (which is secreted by T cells and macrophages to stimulate immune response) in response to a stressor, although being assigned to the treatment condition in itself did not relate to outcomes measured. Similarly, when adolescents in foster care were randomized to a 6-week CBCT or waitlist condition, more practice time was associated with less resting-state inflammation (Pace et al., 2013). More recent studies have had mixed findings. For instance, in a study of healthy adults naïve to meditation who were randomized to CBCT, mindfulness, or health-discussion conditions, the CBCT group showed a trend: More home practice time was associated with higher hippocampal volume as well as increased amygdala activation in response to empathy-inducing stimuli, which in turn was associated with fewer self-reported depressive symptoms (Desbordes et al., 2012, 2014). However, in a larger replication study, preliminary results have revealed no effects of CBCT on behavioral or biological measures (Mascaro et al., 2017). CBCT has not been previously implemented with parents. In this study, we use CBCT as an intervention for parents of infants and young children, examining physiological measures of stress processes and self-reported changes in self-compassion, mindfulness, physical symptoms of stress, and parenting stress.

1.2 | Stress processes in adults and children

Although parenting stress is ubiquitous in families with young children (Heneghan, Mercer, & DeLeone, 2004), few interventions incorporating secular contemplative practices focus on parents of infants and young children. However, a range of mindfulness interventions are available for parents of older children (Coatsworth et al., 2015) and for expectant parents during the prenatal period (Duncan & Bardake, 2010). Such interventions encourage "mindful parenting," described as parents bringing intentional awareness of each moment to relationships with their children, in ways that can be observed during parent-child interactions (Duncan, Coatsworth, & Greenberg, 2009; Duncan, Coatsworth, Gayles, Geier, & Greenberg, 2015). In one example of a mindfulness program for parents and children aged 10 to 14 years, the Mindfulness-Enhanced Strengthening Families Program (MSFP; Coatsworth et al., 2015) was found to boost the effects of the original Strengthening Families Program (SFP) in some areas and to better sustain the effects of SFP in others, including positive effects on parental anger and positive behavior exhibited toward youth (Coatsworth, Duncan, Greenberg, & Nix, 2010). In addition to MSFP, several mindfulness interventions have been used to promote positive family relationships (Altmaier & Maloney, 2007; Blackledge & Hayes, 2006; Saltzman & Goldin, 2008; Singh et al., 2006; Wahler, Rowinski, & Williams, 2008), including reductions in parenting stress (Bögels, Hoogstad, van Dun, de Schutter, & Restifo, 2008; Dawe & Harnett, 2007).

Although the first two modules of CBCT focus on mindfulness and attentional stability, it is not considered a mindfulness intervention, per se, but rather a kindness- or compassion-based meditation intervention (Muscaro et al., 2017; Shonin et al., 2015). However, we expected positive direct effects on parenting stress and stress processes in adults, as well as effects on children, similar to interventions that promote mindful parenting and theories hypothesizing mechanisms for how parenting stress affects children's behaviors and development. Such theories suggest both a possible direct path and an indirect path, wherein parenting stress affects parents' interactions with children, which then affect children (Deater-Deckard, 1998; Deater-Deckard, Li, & Bell, 2016), with some supporting empirical evidence (e.g., Gerstein & Poehlmann-Tynan, 2015). Likewise, contemplative practice interventions offered to parents may improve parental well-being and decrease stress, which may lead to less perceived parenting stress and improved child well-being (indirect path) as well as having direct effects on parenting and child well-being (Duncan et al., 2015). In support of these direct and indirect paths, previous research has found that interventions implemented with parents and targeted toward improving parental well-being may have positive effects not only on parents but also on their children. For example, two recent meta-analyses focusing on treatment for maternal depression have found positive effects of such treatment for mothers and their parenting in addition to improvements in their children's mental health and stress (Cuijpers, Weitz, Karyotaki, Garber, & Andersson, 2015; Letourneau, Dennis, Cosic, & Linder, 2017). In the present study, we assessed parents' perceived stress as well as parent and child physiological stress. We expected the intervention to have direct effects on parental stress and parental mindfulness and compassion as well as on the child outcome of interest, hair cortisol concentrations (HCCs).

The glucocorticoid hormone cortisol plays an important role in stress-related health outcomes for children and adults. Cortisol, released by the neuroendocrine system when the body experiences stress, is an indicator of hypothalamic-pituitary-adrenal (HPA) axis activity. Acute cortisol reactions are normative and reflect the body's adaptation to stressors; however, longer term changes in hormone secretion under conditions of chronic or cumulative stress can affect children's developing brain circuits and stress hormone systems in ways that lead to dysregulated stress responses (Shonkoff, Boyce, & McEwen, 2009).

Elevated physiological stress responses can be measured by assessing cortisol in various ways, such as measuring cortisol in the blood, saliva, urine, or scalp hair (Bevans, Cerbone, & Overstreet, 2008, 2009; Xie et al., 2011). Compared to traditional measures of cortisol, such as those involving collection of saliva or urine, cortisol in scalp hair reflects months rather than hours of neuroendocrine activity, although there is some concordance among these cortisol measures in adults (Short et al., 2016). Repeated sampling is required when using more traditional indices (blood, saliva), which is not practical when sampling from young children. In contrast, sampling scalp hair can aid in understanding the role of longer term stress hormone changes because it is a reliable estimate of longer term cortisol output, and it has been established as a measure of central HPA activity that represents cortisol in the blood (Kapoor, Schultz-Darken, & Ziegler, 2018). Assessing scalp hair allows for a systemic measure of cumulative cortisol exposure that is noninvasive (Raul, Cirimele, Ludes, & Kintz, 2004; Russell, Koren, Rieder, & Van Uum, 2012; Staufenbiel, Penninx, Spijker, Elzinga, & van Rossum, 2013). Although human scalp hair grows at a variable rate across individuals, approximately 1 cm of hair growth most proximal to the scalp is often used to represent, on average, about 1 month's growth (Stalder & Kirschbaum, 2012). Therefore, by taking a hair sample and measuring glucocorticoids, basal HPA axis function and stress-reactive activity can be determined for the last couple of months.

Although a relatively new methodology for assessing stress processes, a growing literature has examined HCCs in children and adults (Bates, Salsberry, & Ford, 2017; Dettenborn, Tietze, Kirschbaum, & Stalder, 2012; Groeneveld, Vermeer, Linting, Noppe, van Rossum, & van IJzendoorn, 2013). For example, Yamada et al. (2007) first reported hair cortisol levels in newborns in a neonatal intensive care unit, with infants who experienced mechanical ventilation having higher hair cortisol levels than did full-term infants not experiencing ventilation. A subsequent study reported higher hair cortisol levels in Black 12-month-old infants compared to White infants of the same age, in addition to correlations among measures of prenatal adversity, maternal postpartum depression, parenting stress, and children's socioemotional development (Palmer et al., 2013). In an investigation of hair cortisol in children 1 to 8 years of age, a decrease in hair cortisol with increasing age was reported (Karlén, Frostell, Theodorsson, Faresjö, & Ludvigsson, 2013; Karlén et al., 2015). In addition, among preschool children, hair cortisol levels were negatively correlated with parental educational level, but not with family income (Vaghri et al., 2013), although a separate study has found a link with income (Henley & Koren, 2014). A recent meta-analysis of 66 studies (Stalder et al., 2017) has found that although hair cortisol was not consistently related to reports of perceived stress, there were significant elevations in hair cortisol when chronic stressors occurred. Similarly, a review by Vives et al. (2015) concluded that the effects of stress could be reliably assessed using a measure of change in hair cortisol.

Although representing relatively stable, longer term cortisol production is a potential strength of assessing hair cortisol, it is unknown how sensitive the measure is to change in children. Some scholars have discussed HCCs as representing a stable individual trait, especially in adults (Stalder et al., 2012) and increasingly so in children as they grow older (Karlén et al., 2013). However, very young children, who show more plasticity in their HPA axis system relative to older children and adults, may be more likely to experience change in their cumulative hair cortisol when levels of stress change. It is possible that such a change could be seen in response to intervention. In studies assessing acute or diurnal cortisol in saliva, a review of 19 articles (Slopen, McLaughlin, & Shonkoff, 2014) has suggested that high-risk children's cortisol regulation could be altered by psychosocial interventions, although much inconsistency existed in how the interventions influenced cortisol activity. In the present study, we assessed HCCs in parents and in their infants and young children prior to and after the CBCT intervention.

It is particularly important to study stress outcomes in infants and young children because the consequences of prolonged exposure to elevated cortisol levels in childhood can be profound (Danese & McEwen, 2012; McEwen, 2012), including implications for child psychopathology and health disparities (Karlén et al., 2015; Shonkoff et al., 2012). In addition to links between trauma exposure and elevated basal cortisol levels (Bevans et al., 2008, 2009) as well as lower cortisol reactivity in older children (Jaffee et al., 2015), quality of parenting is also associated with children's subsequent physiological stress response (e.g., Blair & Diamond, 2008; Murray, Halligan, Goodyer, & Herbert, 2010). Thus, we expected that parents in the intervention group would not only experience less stress but that their children would also experience a decrease in HCC from pre- to postintervention.

1.3 | Research question

The present study addressed one primary research question:

RQ1: What are the direct effects of CBCT on parent's perceived stress, mindfulness, and self-compassion and parents' and children's HCCs?

We hypothesized that parental participation in the CBCT intervention would be associated with decreases in parents' perceived symptoms of stress and parenting stress as well as parent and child HCCs and increases in parental mindfulness and self-compassion.

2 | METHOD

2.1 | Sample

The study evaluated CBCT with 39 parents of children aged 9 months to 5 years 4 months using a randomized controlled design (n = 25 intervention offered in two cohorts, n = 14 waitlist control), with assessments at pre- and postintervention. Thirty-nine families with children in university-affiliated preschools, in which the parents spoke and understood English, were recruited to participate in the study in two cohorts. In the first cohort, 14 parents were randomized to CBCT, and 14 parents were randomized to a waitlist control group. Control group participants from the first cohort were invited to participate in a second cohort of the intervention along with 11 new intervention parents. One family withdrew from the study and did not have preintervention assessments completed, and 2 additional families were lost to attrition, although they completed all preintervention assessments.

The analytic sample included 38 parents (33 mothers, 5 fathers) and their children. Almost all of the parents were married (36 of 38), and all parents had at least a bachelor's degree, although there was some economic diversity, with 11% of families using public assistance (and having incomes below the federal poverty line) and an additional 18% of families with incomes at 400% of the federal poverty line for family size. Median income fell between \$70,000 and \$100,000. The majority of participant parents were White (81%), and the average age of parents was 36 years. The children included 19 boys and 19 girls; they were slightly more diverse than their parents, with 68% White, 21% biracial or multiracial, 5% Asian, and 5% Latinx (for demographic information, see Table 1).

2.2 | Procedure

The study was approved by the Institutional Review Board and used written consent forms for parents and verbal assent for children. Parents were recruited through campus-affiliated preschools through flyers and word of mouth. Once parents were screened for inclusion criteria (affiliated with a campus preschool, have a child aged 9 months to 5 years, and speak and understand English), research assistants provided consent forms and randomly assigned parents to the intervention or control group and scheduled the pre-assessment sessions. The assessments were administered by a trained research assistant or intern in a university research lab. The assessments included self-report measures (discussed later) as well as video-recorded measures (described in Engbretson et al., under review). The preintervention and postintervention assessments were the same. Postintervention assessments were scheduled in the month following the end of the interven-

TABLE 1 Demographic information ($N = 38$)

Characteristics	Parents (n)	Children (n)
Age in years (M)	36.7	3.2
Female	33	19
Male	5	19
Race/ethnicity		
Black	0	0
Asian	3	2
Latinx/Hispanic	3	2
Native American	0	0
White	31	26
Biracial or multiracial	0	8
Other	1	0
Married	36	
Education		
Bachelor's degree	9	
Graduate degree	29	
Annual income		
<$20,000	2	
$20,000-40,000	2	
$40,000-70,000	7	
$70,000-100,000	10	
$100,000-150,000	10	
>$150,000	7	
Receiving public assistance	4	

tion. Each family was paid $25 for completion of assessments at each time point.

2.3 | Intervention description

The intervention condition consisted of implementing a CBCT class offered to parents of infants and young children. CBCT is typically administered as an 8-week intervention that meets for 2 hr per week plus a mini retreat (for a total of 20 hr of group instruction). Each session contains pedagogical material presented by trained instructors, a guided meditation of 20 to 30 min, and group discussion, with participants being asked to meditate daily using guided meditation recordings. The CBCT curriculum was slightly adapted to address parenting by tailoring examples to focus on parenting issues, similar to how it has been adapted for other special populations (e.g., adolescents in foster care).

CBCT-certified teachers were hired to administer the CBCT for each cohort. Each teacher had a Level One Certification through the Emory Tibetan Partnership, where CBCT was developed. The training consists of 65 hr of retreat and workshop, where trainees practice CBCT meditation and teaching skills. Following the retreat and workshop, trainees begin an 8-week practicum to develop their knowledge and understanding of the protocol through a variety of weekly exercises. To complete their teacher certification, trainees spend 10 weeks in a supervised coteaching environment.

Both cohorts had 20 hr of instruction. The first cohort met for 10 weeks for 2 hr in length whereas the second cohort met for 8 weeks for 2 hr in length plus a 4-hr mini retreat. These differences resulted from a combination of instructor and participant schedules. Each week focused on a different theme (e.g., cultivating mindfulness, self-compassion, equanimity, and compassion to others) and applications to parenting. The curriculum is as follows:

Module 1: Developing Attention and Stability of Mind: Introduction to meditation techniques for focused attention (practiced in all compassion meditations).

Module 2: Awareness of Sensations, Feelings, Emotions, and Reactions: Practice attending to subjective experience and separating emotions and reactions.

Module 3: Cultivating Self-Compassion: Practice techniques for developing awareness of thoughts and actions and how these contribute to happiness or suffering.

Module 4: Cultivating Equanimity: Examine thoughts and feelings regarding categories of friends, enemies, and strangers, and relating to all people from a deeper perspective.

Module 5: Developing Appreciation and Gratitude: Practice interdependence with countless others and the benefits we receive daily from them.

Module 6: Developing Empathy: Learn techniques for developing empathy, including identifying happiness and suffering.

Module 7: Wishing and Aspirational Compassion: Examine the wish that all beings be happy and free from suffering.

Module 8: Active Compassion for Others: Practice working to actively alleviate the suffering of others.

2.4 | Intervention fidelity

In addition to the training and supervision provided by the Emory Tibetan Partnership, a trained research assistant attended each of the sessions for both cohorts to observe and take notes to ensure that the sessions were as identical as possible, as recommended by Bellg et al. (2004). All sessions were conducted in the same room at the same institution. All participants in both cohorts were given the same materials and shown the same presentations. The only differences between the two cohorts were the examples used by the two different instructors and the days on which the 20 hr of instruction were scheduled. Toward the end of each session, participants were asked to meditate on that week's topic and ask any clarifying questions to ensure their comprehension of the material. Sometimes the questions differed between cohorts. At the end of each session, participants were given homework to practice that week's topic. An example of the homework given for Module 2 was that parents were prompted to observe their child playing for 5 min, then join their child and play together for an additional 10 min. Afterwards, parents completed a worksheet reflecting on their time with their child, responding to questions such as "What do you think was your child's emotional reaction to you joining his or her play?" Both cohorts received the same homework.

2.5 | Measures

2.5.1 | Perceived symptoms of stress

Parent reports of their physical symptoms of stress were assessed using the Calgary Symptoms of Stress Inventory (C-SOSI; Carlson & Thomas, 2007), a 56-item measure of physical, psychological, and behavioral responses to stressful situations that has been used to assess stress following mindfulness-based interventions (e.g., Garland et al., 2014). The C-SOSI has eight subscales, each consisting of six to nine items: Depression, Anger, Muscle Tension, Cardiopulmonary Arousal, Sympathetic Arousal, Neurological/GI, Cognitive Disorganization, and Upper Respiratory Symptoms. Cronbach's αs for subscales range from .80 to .95, and were .72 to .95 in the present study. Previous research has supported the measure's convergent and discriminant validity (e.g., Labelle, Campbell, Faris, & Carlson, 2015). In this study, we used the Depression and Anger subscales because they were most relevant to the study hypotheses. Means and *SD*s at pre- and posttest for all self-report measures completed by parents and hair cortisol are reported in Table 2.

TABLE 2 Means and *SD*s by measure ($N = 38$)

Measure	Intervention group *M*	Intervention group *SD*	Control group *M*	Control group *SD*
Preintervention				
C-SOSI: Depression	5.07	2.53	2.69	2.69
C-SOSI: Anger	10.00	2.86	8.54	4.68
PDH: Intensity	24.57	9.98	20.54	8.82
PSI-SF: Total Stress	81.93	19.56	69.46	20.17
SCS Total	3.16	0.97	3.40	0.66
FFMQ: Observing	23.69	6.36	25.92	5.78
FFMQ: Describing	29.92	6.34	28.46	8.47
FFMQ: Acting with Awareness	26.23	5.51	24.31	7.22
FFMQ: Nonjudging	26.38	5.42	27.77	6.78
FFMQ: Nonreactivity	20.92	5.68	20.31	4.13
Parent Cortisol[a]	7.73	8.76	15.75	18.18
Child Cortisol[a]	202.24	619.05	97.01	211.19
Postintervention				
C-SOSI: Depression	3.08	2.18	2.64	1.86
C-SOSI: Anger	6.92	3.10	5.64	3.38
PDH: Intensity	32.23	15.58	20.54	7.87
PSI-SF: Total Stress	81.93	19.56	71.00	18.63
SCS Total	3.50	0.85	3.71	0.53
FFMQ: Observing	26.92	5.09	27.18	6.34
FFMQ: Describing	28.85	5.57	30.55	6.73
FFMQ: Acting with Awareness	26.00	4.87	25.09	7.48
FFMQ: Nonjudging	29.46	6.88	31.09	6.02
FFMQ: Nonreactivity	23.85	3.76	22.73	3.29
Parent Cortisol[a]	10.29	12.56	32.05	73.85
Child Cortisol[a]	54.26	95.16	238.22	690.81

[a]Variables were transformed prior to analysis.

2.5.2 | Perceived parenting stress

Parent reports of perceived stress were assessed using the Parenting Daily Hassles Scale (PDH; Crnic & Greenberg, 1990) and the Parenting Stress Index-Short Form (PSI-SF; Abidin, 1990; Haskett, Ahern, Ward, & Allaire, 2006). The PDH is a self-report questionnaire consisting of 20 items related to parenting tasks that can be trying or challenging for parents. Examples of items include cleaning up messes, difficulty getting privacy, finding babysitters, and having to change plans because of an unplanned child need. For each item, parents report both how often the hassle occurs (rarely, sometimes, a lot, constantly) and the perceived intensity of that hassle (rated on a 5-point scale ranging from 1 = low to 5 = high). Two summary scores are created: the frequency of parenting hassles and the perceived intensity of those hassles. The perceived intensity score reflects appraised stressfulness by the parent whereas frequency reflects the presence of stressors. Prior research has indicated that cognitive appraisal of significant events as stressful best predicts the stressors' impact (Lazarus, DeLongis, Folkman, & Gruen, 1985), so we used PDH Intensity scores in this study. The PDH Intensity subscale had high internal consistency, Cronbach αs = .86–.87, pre- and postintervention.

The PSI-SF, third edition, is the 36-item short form (Abidin, 1990) of a widely used, 120-item self-report questionnaire that assesses parenting stress across both child and parent domains, appropriate for parents of children ages 12 and younger. The parent rates each item on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*); in the present study, we used a total score; higher scores indicate more parenting stress. The PSI includes items such as "My child does a few things which bother me a great deal" and "Most of my life is spent doing things for my child." The PSI has been widely used in behavioral research with parents (e.g., Clark, Tluczek, & Wenzel, 2003; Feldman, Weller, Sirota, & Eidelman, 2003), and reliability coefficients for the total score tend to be high, including the short form (Haskett et al., 2006; Whiteside-Mansell et al., 2007). For the present study, Cronbach's α for the PSI-SF Total Stress score was .93 at both time points. At preintervention, 23.1% of control group participants and 28.6% of intervention group participants fell within the clinical range on the PSI-SF (≥90th percentile). At postintervention, 30.8% of control group participants and 7.1% of intervention group participants fell within the clinical range.

2.5.3 | Parental self-compassion and mindfulness

Parents completed the 24-item version of the Self-Compassion Scale (SCS; Neff, 2003). The SCS assesses the six facets (three positive, three negative) of the self-compassion construct. Sample items include: "When I'm feeling down I tend to obsess and fixate on everything that's wrong," and "When I'm going through a very hard time, I give myself the caring and tenderness I need." Response options are presented on a Likert scale of 1 (*almost never*) to 5 (*almost always*). The positive subscales (Self-Kindness, Common Humanity, and Mindfulness) were summed with the reverse-coded negative scales (Self-Judgment, Isolation, and Over-Identified), with higher total SCS scores indicating more self-compassion (Raes, Pommier, Neff, & Van Gucht, 2011). In this sample, the total score had high internal consistency at both time points, αs = .96–.97.

The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) was used to assess multiple aspects of parental mindfulness. The FFMQ is a 39-item self-report measure that is based on a factor analytic study of five independently developed mindfulness questionnaires. Items are rated by respondents on a scale of 1 (*never or very rarely true*) to 5 (*very often or always true*). The negative items of the FFMQ (e.g., "I tell myself I shouldn't be feeling the way I'm feeling" on the Non-Judgement subscale) are reverse-scored so that higher scores equal more positive aspects of mindfulness. The factor analysis yielded five factors, or facets: observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience. In a study with meditators and nonmeditators, Baer et al. (2008) found that most mindfulness facets of the FFMQ significantly related to participants' meditation experience, psychological symptoms, and well-being. Several of the facets predicted well-being and even functioned as mediators of the relation between meditation and well-being. In the present study, Cronbach's α for each subscale was high at both time points, α = .80–.95.

2.5.4 | HCC

To assess cumulative physiological stress in both the parents and children, hair samples were collected from individuals in each dyad at pre- and postintervention. Hair was collected from the same approximate region pre- and postintervention, ensuring that the hair collected postintervention grew during the intervention and is therefore reflective of the time period of interest. In this study, we cut 10 mg of hair closest to the scalp to be assayed for cortisol using mass spectrometry. This relatively new method was utilized because it offers a systematic and noninvasive account of an individual's cortisol levels, and it relates to cumulative stress (Bates et al., 2017) and is correlated with other cortisol collection methods such as urine and saliva (D'Anna-Hernandez, Ross, Natvig, & Laudenslager, 2011; Sauve, Koren, Walsh, Tokmakejian, & Van Uum, 2007).

Using a collection method for young children created by Dr. Lindsay Weymouth and colleagues at the Wisconsin National Primate Research Center (WNPRC; Weymouth, 2016; Muentner, Weymouth, Kapoor, & Poehlmann-Tynan, 2019), approximately 1 cubic cm of scalp circumference was measured, and hair from the section was divided into four sampling areas. Hair was cut as close to the scalp as possible with stainless steel scissors from the four areas within the child's posterior vertex, the area of the scalp with the most consistent hair growth rates (Pragst & Balikova, 2006). The hair was then measured, and up to 3 cm most proximal to scalp (1-3 months of hair growth) was stored in aluminum foil at room temperature for analysis. The scissors were wiped with ethanol swabs before and immediately following each sample to diminish cross contamination (Vaghri et al., 2013).

Technicians at the Wisconsin National Primate Center were blinded to the intervention condition. Hair was assayed for cortisol using a liquid chromatography-tandem mass spectrometry approach (Kapoor, Lubach, Hedman, Ziegler, & Coe, 2014) at the WNPRC under the direction of Dr. Amita Kapoor. Hair samples were placed into tubes and washed twice with 2-propanol. Hair was dried and then ground into a fine powder using a ball mill (Retsch, Haan, Germany). The powdered hair was precisely weighed and placed into a glass culture tube and stored in the dark at room temperature until extraction. For the extraction, methanol and internal standard were added to the tube of ground hair, and then it incubated overnight. After incubation, the tubes were vortexed and centrifuged and the supernatant was removed and run through solid-phase, followed by liquid-phase extraction. The organic phase was placed in a clean test tube until it evaporated to dryness and was then resuspended in mobile phase.

All samples were analyzed using a QTRAP 5500 quadrupole linear ion trap mass spectrometer (Sciex, Framingham, MA). Chromatographic separation was performed using a Kinetex C18 column (Phenomenex, Torrance, CA). All data were processed with Analyst software (Sciex). Intra and interassay coefficients of variation for this method are 4.3 and 9.2, respectively. Hormone levels are expressed as pg/mg hair accumulated across 1 to 3 months. The Poehlmann-Tynan lab has used this method in infants as young as 4 months and children as old as 8 years, and with parents. Weymouth (2016) examined HCCs using the same methodology in a relatively small group of high-risk children, ages 2 to 6 years; on average, their cortisol levels were extremely high (M = 990.72 pg/mg, SD = 2435.26), as compared to previous research with lower risk samples of children (e.g., Noppe et al., 2014; Vanaelst et al., 2013) (for *M*s and *SD*s for the present sample, see Table 2).

2.5.5 | Family demographic variables

Families reported on their age, income, education, marital status, race ethnicity, gender, number of children, use of public assistance, and number of hours worked per week. We standardized and combined three variables to create a family assets index: family income, parental education, and parental marital status. We also asked study participants if they were familiar with or they currently (or in the past) engaged in contemplative practices such as meditation, mindfulness, yoga, or other practices or if they or their spouse had previously taken any courses in mindfulness. Fifteen of the 38 participants reported that they or their spouse or target child had some level of exposure to contemplative practices (e.g., yoga, mindfulness, meditation) before the study began, with equal proportions in the control and CBCT groups.

2.6 | Analytic plan

For 1 participant, some variables were lost at postintervention because of a failure of the ipads or laptops used for data collection. In addition, there were some missing data for 5 (14%) of the other participants not lost to attrition, which appeared to occur "at random" across seven study variables. To address missingness, we implemented a multiple imputation procedure (Raghunathan, Lepkowski, van Hoewyk, & Solenberger, 2001; Van Buuren, 2007), involving generating five data sets in which missing values were randomly produced conditional upon other variables in the analysis. Subsequent analyses were applied to all five data sets, with aggregated results reported (Findings were similar in the original and aggregated data sets.) Child age (in months) and family assets were used as control variables because of the wide age range of children in the study and because stress variables related to the assets variable. Additional demographic variables and parental prior engagement in contemplative practices were also evaluated as controls, but were unrelated to outcome variables and thus not included in the final models. HCC variables were skewed, and thus a square root transformation was performed prior to analysis.

To assess the study hypothesis, we conducted one-way analyses of covariance (ANCOVAs) on the six stress postintervention variables (parent HCC, child HCC, C-SOSI depression, C-SOSI anger, PDH intensity, PSI-SF total), and the self-compassion and mindfulness variables (SCS total, FFMQ) with preintervention scores and child age and family assets entered as controls. Because the study was a preliminary trial with parents of infants and young children, we examined effect sizes using partial η^2 and set our α level to .10. Bivariate correlations among study variables are shown in Table 3.

3 | RESULTS

3.1 | What are the direct effects of CBCT on parental perceived stress and parents' and children's HCCs?

The first one-way ANCOVA, conducted on postintervention parent HCC, revealed no significant intervention effect, $F(1, 33) = 1.625$, $P = .211$, $\eta_p^2 = .03$. The only control variable that was statistically significant was the preintervention parent HCC variable, $F(1, 33) = 49.047$, $P < .001$, $\eta_p^2 = .59$ (Table 4a, Figure 1a). Although average parent HCC increased somewhat in both groups, the pooled mean change scores were 2.88 pg/mg for the intervention group and 15.10 pg/mg for the control group.

The second one-way ANCOVA, conducted on postintervention child HCC, revealed a significant intervention effect, with children of CBCT intervention parents experiencing less cortisol at postintervention, as compared to children of control group parents, $F(1, 33) = 4.515$, $P = .041$, $\eta_p^2 = .12$ (Table 4b, Figure 1b). Average child HCC in the intervention group decreased, whereas the average child HCC in the control group increased. The pooled mean change scores were −143.26 pg/mg for the intervention group, indicating a large decrease in child HCC, and 102.56 pg/mg for the control group, indicating an increase in child HCC. Statistically significant control variables were preintervention child HCC, $F(1, 33) = 20.238$, $P < .001$, $\eta_p^2 = .380$, and child age, $F(1, 33) = 10.886$, $P = .002$, $\eta_p^2 = .248$. Older children had higher HCCs over time, on average, as compared to younger children, effect size = .27, $P = .055$. Other controls were not significant.

When continuous parental self-report measures of stress were examined, participation in CBCT was not associated with significantly different postintervention scores across groups, on average. Specifically, participation in CBCT did not relate to an average decrease in parents' perceived physical symptoms of stress (C-SOSI Depression, Anger), or their perceived parenting stress (PDH Intensity, PSI-SF total), or their self-compassion (SCS Total) and mindfulness (FFMQ), contrary to study hypotheses. Controls were not significant in any of these analyses. Using categorical PSI scores, we also calculated the relative risk (RR) of intervention parents reporting nonclinical levels of parenting stress from pre- to

TABLE 3 Correlations among study variables at pre- and postintervention

Variable		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 Pretest CSOSI Depression	r	.434	−.068	.173	−.136	−.178	−.358	−.365	−.093	−.156	.030	.216	.518	.211	.004	−.004	−.055	−.184	−.006	−.075	−.174	−.209	.119	−.051
	p	.003	.341	.150	.208	.145	.015	.013	.293	.178	.430	.107	.001	.112	.491	.491	.379	.157	.486	.335	.159	.114	.248	.385
2 Pretest CSOSI Anger	r	1	.282	.436	−.166	−.471	−.410	−.502	−.192	−.349	.108	−.086	.327	.383	.567	.356	.224	−.274	−.099	−.316	−.348	−.311	.005	−.141
	p		.043	.003	.160	.002	.006	.001	.127	.017	.262	.312	.028	.012	.000	.018	.101	.065	.285	.032	.020	.035	.489	.209
3 Pretest PDH Intensity	r		1	.480	−.199	−.315	−.107	−.176	−.080	−.217	−.089	−.251	−.063	.000	.652	.330	.076	−.159	−.136	−.308	−.176	−.336	−.102	.022
	p			.001	.116	.029	.264	.149	.319	.098	.301	.073	.361	.500	.000	.027	.335	.192	.218	.036	.157	.024	.279	.451
4 Pretest PSI TOTAL	r			1	−.442	−.276	−.388	−.451	−.323	−.188	−.064	−.257	.060	.186	.456	.792	.074	−.278	−.398	−.301	−.346	−.406	−.278	−.068
	p				.003	.049	.009	.003	.025	.133	.354	.068	.367	.142	.003	.000	.338	.062	.009	.040	.021	.008	.053	.349
5 Pretest SCS TOTAL	r				1	.492	.332	.307	.515	.693	.216	.117	.020	.021	−.022	−.542	.097	.214	.819	.421	.286	.388	.428	.493
	p					.001	.022	.032	.001	.000	.100	.251	.455	.451	.449	.000	.293	.120	.000	.006	.048	.011	.005	.001
6 Pretest FF Observe	r					1	.282	.363	.282	.587	.194	.239	.000	−.117	−.331	−.214	.066	−.031	.316	.686	.117	.289	.217	.302
	p						.046	.014	.045	.000	.128	.086	.499	.255	.028	.113	.357	.434	.034	.000	.256	.049	.109	.041
7 Pretest FF Describe	r						1	.423	.366	.389	.054	−.015	−.052	−.224	−.052	−.162	.033	.099	.120	.265	.774	.213	.383	.195
	p							.005	.013	.009	.377	.466	.385	.102	.384	.179	.428	.299	.249	.065	.000	.113	.013	.135
8 Pretest FF Act w/Awareness	r							1	.493	.459	.029	.171	−.352	−.163	−.311	−.346	.018	.069	.217	.434	.287	.790	.279	.307
	p								.001	.002	.434	.167	.021	.178	.037	.023	.460	.356	.109	.005	.050	.000	.055	.039
9 Pretest FF Nonjudge	r								1	.589	.116	−.195	−.133	−.101	−.213	−.239	.157	.007	.333	.276	.272	.299	.627	.345
	p									.000	.250	.135	.227	.285	.113	.087	.192	.484	.027	.057	.060	.043	.000	.023
10 Pretest FF Nonreactivity	r									1	.124	.163	−.122	−.108	−.225	−.286	−.009	.277	.541	.468	.290	.461	.395	.647
	p										.236	.178	.246	.271	.100	.051	.480	.066	.000	.003	.048	.003	.010	.000
11 Pretest Parent Cortisol	r										1	.362	.062	.014	.001	−.029	.836	.222	.144	.152	.019	.040	.072	.105
	p											.016	.364	.469	.497	.436	.000	.112	.207	.195	.458	.412	.343	.278
12 Pretest Child Cortisol	r											1	.326	.207	−.139	−.238	.140	.350	.108	.231	.116	.271	−.076	.159
	p												.034	.128	.224	.094	.223	.027	.279	.101	.264	.067	.339	.192
13 Posttest CSOSI Depression	r												1	.645	.034	.119	.082	−.099	−.032	−.126	−.073	−.222	.014	−.154
	p													.000	.423	.248	.322	.296	.427	.236	.338	.100	.468	.188
14 Posttest CSOSI Anger	r													1	.273	.247	.132	−.282	−.127	−.048	−.274	−.074	−.226	−.265
	p														.056	.076	.228	.059	.233	.391	.056	.337	.095	.062

(Continues)

TABLE 3 (Continued)

Variable		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
15 Posttest PDH Intensity	r														1	.323	.076	−.214	−.149	−.116	−.166	−.249	−.082	−.015
	p															.029	.335	.120	.197	.253	.170	.074	.320	.465
16 Posttest PSI Total	r															1	.142	−.368	−.569	−.364	−.307	−.454	−.303	−.279
	p																.211	.019	.000	.016	.037	.003	.038	.052
17 Posttest Parent Cortisol	r																1	−.018	.047	.091	−.048	.007	.112	−.025
	p																	.460	.395	.304	.393	.483	.264	.445
18 Posttest Child Cortisol	r																	1	.259	.005	.208	.250	.127	.447
	p																		.076	.489	.127	.084	.244	.005
19 Posttest SCS Total	r																		1	.286	.312	.465	.549	.659
	p																			.048	.034	.002	.000	.000
20 Posttest FF Observe	r																			1	.220	.531	.321	.317
	p																				.102	.001	.030	.032
21 Posttest FF Describe	r																				1	.249	.416	.287
	p																					.075	.007	.047
22 Posttest FF Act w/Awareness	r																					1	.434	.418
	p																						.005	.006
23 Posttest FF Nonjudge	r																						1	.478
	p																							.002
24 Posttest FF Nonreactivity																								1

Note. C-SOSI = Calgary Symptom of Stress Inventory; PDH = Parenting Daily Hassles; PSI-SF = Parenting Stress Index-Short Form; SCS = Self-Compassion Scale; FF = Five Facet Mindfulness Questionnaire.

TABLE 4 Analysis of covariance testing the effects of Cognitively-Based Compassion Training on parent and child stress ($N = 38$)

Source	Type III sum of squares	*df*	*M* square	*F*	*P*-value	Partial η^2
(a) Outcome: Parent HCC						
Intercept	5.255	1	5.255	1.976	.169	.057
Parent preinterv HCC	130.427	1	130.427	49.047	.000	.598
Child age	4.804	1	4.804	1.807	.188	.052
Family assets	0.110	1	0.110	0.041	.840	.001
Intervention group	4.321	1	4.321	1.625	.211	.047
Error	87.754	33	2.659			
Total	648.705	38				
Corrected total	242.696	37				
(b) Outcome: Child HCC						
Intercept	547.694	1	308.482	16.935	.000	.339
Child preinterv HCC	654.525	1	547.694	20.238	.000	.380
Child age	352.073	1	654.525	10.886	.002	.248
Family assets	2.957	1	352.073	0.091	.764	.003
Intervention Group	146.008	1	2.957	4.515	.041	.120
Error	1067.252	33	146.008			
Total	3802.442	38				
Corrected total	2301.178	37				

Note. Preinterv = preintervention. HCC = hair cortisol concentration.

postintervention relative to the control group, RR = 1.59, $p < .01$, 95% CI: 1.14 to 2.20. The RR here represents the ratio of the probability of parents decreasing in their reports of clinical levels of parenting stress in the intervention group to the probability of that occurring in the control group. The RR statistic indicated that intervention parents were about *one and a half times as likely to report parenting stress below the clinical cutoff at postintervention as the control group*, suggesting a small positive effect of the intervention on clinical levels of parenting stress.

4 | DISCUSSION

The results of our preliminary study testing the effects of CBCT with parents of infants and young children suggest that a 20-hr kindness-based, secular contemplative intervention affected child physiological stress from pre- to postintervention. However, there were no intervention effects on parent hair cortisol or parent self-report measures, other than a small effect on clinical levels of parenting stress.

4.1 | Effects on child cortisol

Our findings were partially consistent with prior research as well as theory. Previous research examining CBCT with adults and adolescents has found improvements in physiological stress reactions, immune function, and neural activity related to empathy based on more practice time at home, but generally not based on assignment to the CBCT condition (e.g., Desbordes et al., 2012, 2014; Pace et al., 2009, Pace et al., 2013). In the present study, we did not examine home practice time (discussed later); however, we nevertheless found a moderate effect size for the effect of CBCT training on child cortisol, but not parent cortisol. On average, the HCCs of the infants and children of parents in the CBCT group decreased significantly over time whereas the cortisol of infants and children of the parents in the control group slightly increased over time. The increase in HCCs in the control group was unexpected. For the age range of children in this study, salivary cortisol has been shown to decrease from high levels in the first year of life to relatively stable prepubertal values (Kiess et al., 1995). For example, in an investigation of hair cortisol in children between 1 and 8 years of age, a decrease with age was reported (Karlén et al., 2013; Karlén et al., 2015). Normative data on hair cortisol levels in children, however, have not been determined. Although the average cortisol of parents in both groups increased, the difference between intervention and control parents was nonsignificant. This finding is partially consistent with a new large study that found no effects of CBCT on adult participants' behavioral or biological measures (Mascaro et al., 2017). In addition, a recent meta-analysis of the effects of mindfulness interventions on salivary cortisol in healthy adults has found only a small effect size, with more pronounced effects for younger adults (Sanada et al., 2016).

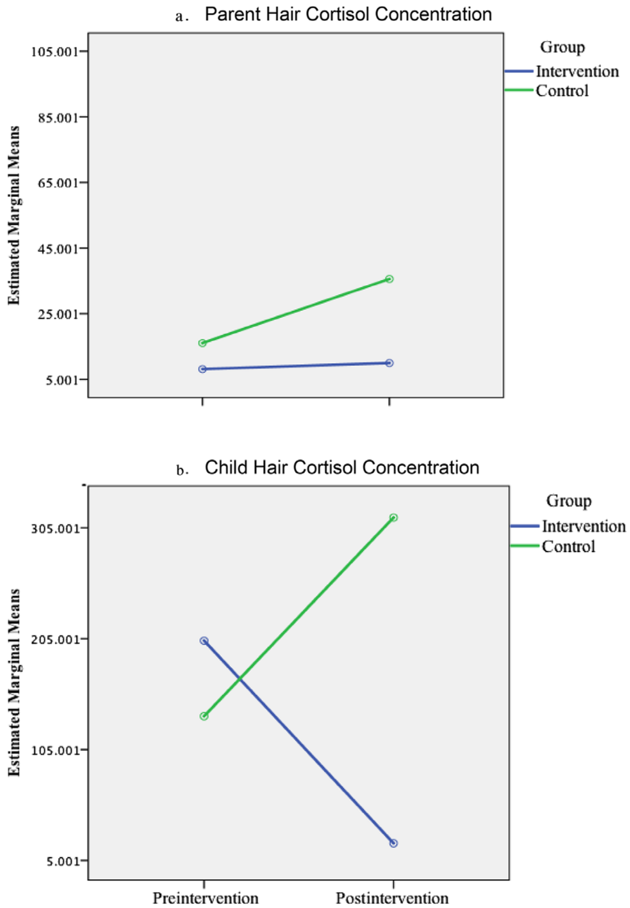

FIGURE 1 Change in parent and child hair cortisol concentration from pre- to postintervention

Although differences in study populations and measures can explain some of the mixed findings for CBCT, additional research can help clarify for whom and how it is more or less beneficial. It is possible that some familiarity with mindfulness concepts and techniques may help "set the stage" for gaining maximal benefits from CBCT, which falls in the constructive family of meditation, in that it seeks to replace cognitive mechanisms related to the self with kindness- and compassion-oriented content that is related to the self (e.g., self-compassion) and others (e.g., aspirational and enacted compassion) (Dahl et al., 2015). Attentional stability and regulation are prerequisites for such change, and thus attentional stability is the focus of the first two modules of CBCT. However, we did not find that having a prior contemplative practice related to our outcomes of interest in our sample of parents.

In examining the effects of parental interventions on children, theories suggest both direct and indirect paths (Deater-Deckard, 1998), with some empirical evidence for effects on children's well-being and mental health even when children are not the participants in the intervention sessions (e.g., Cuijpers et al., 2015; Letourneau et al., 2017). Similar to studies focusing on interventions for parental depression, we found that the CBCT intervention administered to parents had positive effects for children's stress. This finding is particularly encouraging because the negative effects of prolonged heightened cortisol on young children's development are well-documented. In light of the positive findings in this preliminary study, future research could examine effects of CBCT on higher risk families, with the hope that it may be a new way to intervene to reduce stress for young children. It will also be important to determine mechanisms of such effects in the future.

A history of exposure to chronic or toxic stress, and the accompanying extended activation of the body's HPA axis systems, can have a lasting impact not only on children's future stress reactivity, but also their physical development. Chronic and toxic stress affects children's brain architecture and processes as well as other organs, and it increases children's risk for stress-related health problems even into the adult years. For example, many studies have found that stress affects hippocampal function (McEwen, Nasca, & Gray, 2016). Because the hippocampus is implicated in learning, memory, and mood regulation, cumulative stress can have profound negative effects on children's development, including cognitive skills related to attention and memory, and behaviors, self-regulation, and emotions. Although experiencing prolonged stress early in life can alter children's learning and adaptation to stressful situations, sensitive and responsive parenting can buffer the negative effects of stress on children's development (National Scientific Council on the Developing Child, 2005/2014). Thus, improving parenting is one way to help protect young children from the effects of chronic stress.

4.2 | Effects on parental reports of stress and self-compassion

We did not find significant effects of CBCT on parent self-reported parenting stress or perceived physical symptoms of stress other than a small effect on clinical levels of parenting stress. In the future, mechanisms of effects on child physiological stress should be examined, such as documenting self-reported parental aspirational and enacted compassion, including compassion toward children and others, as well as observations of parental compassionate behaviors and verbalizations in the home. Documenting parental behaviors during stressful situations may be particularly salient, as previous research has found that parents help regulate children's cortisol, especially early in development (e.g., Gunnar & Donzella, 2002). In the group discussions, many parents reported feeling calmer in stressful situations with their children; they also reported thinking and feeling differently about certain issues, including self-compassion and gratitude, following participation in CBCT modules on these topics. These reports suggest future possible mechanisms to examine when implementing CBCT or other kindness- or compassion-based interventions with parents.

There hass been mixed evidence regarding correspondence between perceived stress and hair cortisol in the literature. For example, O'Brien, Tronick, and Moore (2013) studied 135 diverse adults and found that hair cortisol was not correlated with any single perceived index of chronic stress (e.g., chaos in the home), but it was correlated with a global chronic stress composite. Moreover, a recent meta-analysis of 66 studies using hair cortisol (Stalder et al., 2017) has found no consistent association between hair cortisol and self-reports of perceived stress, depressive symptoms, or mood disorders. Similarly, in the present study, the only variables that were correlated with parental postintervention hair cortisol were parental and child preintervention cortisol. Parental hair cortisol was not correlated with any of the self-report measures, although we did not assess chronic stress or perceived chaos in the home.

4.3 | Limitations

The study has many limitations, including its small sample size and the limited generalizability of the sample because most participants were from married, educated families affiliated with the early childcare centers at a major university. Although there was variability in family income, having a large proportion of higher income and well-educated families is problematic, especially because these variables have been related to hair cortisol in children (e.g., Henley & Koren, 2014). In addition, there was a large age range of children, from infancy to prekindergarten, and hair cortisol appears to change with age, although there is no normative data for the age range in the current study (e.g., Noppe et al., 2014). Thus, some behavioral child outcomes could not be explored easily because of measurement limitations with such a wide age range. Moreover, because only 20 hr of instruction were provided to CBCT participants (although this is the CBCT standard), some scholars have suggested that encouraging enacted compassion, without a lengthier focus on equanimity and coping with the pain that can come when empathizing with others' suffering, is not enough training to prevent the possibility of compassion burnout (Shonin et al., 2015). As Shonin et al. (2015) noted, those who engage in compassion meditation often practice equanimity and recognition of their own suffering for years prior to taking on alleviation of others' suffering. It is important to keep this in mind when implementing CBCT in the future, especially with vulnerable or traumatized groups.

Another limitation of the present study involves our inability to examine practice time in relation to participant outcomes in the intervention group. Midway through our study, we had to relocate our lab; in the process, some of the participants' practice logs were inadvertently destroyed. Future research examining CBCT with parents should systematically measure practice time, especially because not having enough time to practice was a common theme throughout the sessions with the present groups of parents. However, Mascaro et al. (2017) found that while some biological effects of CBCT were related to practice time, many other studies did not find a relation between practice time and CBCT outcomes. They speculated that practice time may be more important for particular populations and particular outcomes of CBCT. Although instructors were creative and encouraging about ways that participants could incorporate the lessons from CBCT in their lives, such as finding daily routines that were amenable to the addition of listening to guided meditations (e.g., when doing "mindless" tasks such as washing the dishes or vacuuming), it would be important to examine how participants arranged to do this on a daily basis, especially for parents of young children.

Moreover, we did not have funding to complete a third or fourth round of data collection with parents and children. Such longer term follow-up is particularly important to determine if effects of the intervention are maintained over time or to document if there are any effects that take longer to emerge. This may be particularly true for an intervention involving aspirational and enacted compassion, as practice is likely important—not just with guided meditations but also practice through interactions in the world. In addition, HCCs are notoriously difficult to modify in adults, but less so in children, and it would be beneficial to examine if the change rates that occurred were similar or different for children and their parents.

4.4 | Implications

Future research could examine CBCT with both parents and children, as CBCT has been modified for children as well as adolescents (Ozawa-de Silva & Dodson-Lavelle, 2011). When parents and children participate in parallel interventions with similar messages and methods, they may support change—including new behaviors and discussions—in each other. Additional studies could expand inclusion to younger children as well. Mindfulness interventions have been examined in children as young as 3 years old, with positive effects on attention and self-regulation (e.g., Poehlmann-Tynan et al., 2016), and evaluating adapted versions of CBCT with children could contribute to this literature. Empathy development occurs beginning in infancy (Davidov, Zahn-Waxler, Roth-Hanania, & Knafo, 2013; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992), and it is important to encourage and support this process, as well as the development of compassion and self-regulation, as children grow older. In addition, it is critical to find and evaluate interventions that can reliably decrease stress processes in young children, as they are particularly sensitive to the effects of cumulative physiological stress over time. It is also essential to engage parents in this process, as they provide a key proximal context for children, especially early in life. Some proponents of engaging children in secular contemplative training have chosen schools and education systems as the primary context for implementing such interventions (e.g., Flook, Goldberg, Pinger, & Davidson, 2015). Although such approaches may have positive effects, it is also likely necessary to engage parents as well, especially when children are very young.

CONFLICT OF INTEREST

The authors report no conflict of interest.

ACKNOWLEDGMENTS

This research was supported by grants to the first author and gifts to the School of Human Ecology from Dorothy A. O'Brien, Mary Sue and Mike Shannon, the Mai Family Foundation, and the Meyer Family Foundation. Special thanks to the families who generously gave of their time to participate in the study, the instructors (Leslie Langbert and Jennifer Knox) who expertly and compassionately ran the intervention sessions, the early childcare administrators and staff (Jill Riley, Paula Evenson, Jenny Lee) who supported the work, and the many graduate and undergraduate students who helped collect and code the data. Human subjects approvals were approved by the University of Wisconsin-Madison Institutional Review Board.

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How to cite this article: Poehlmann-Tynan J, Engbretson A, Vigna AB, et al. Cognitively-Based Compassion Training for parents reduces cortisol in infants and young children. *Infant Ment Health J*. 2019;1–17. https://doi.org/10.1002/imhj.21831