

# Mindfulness-Based Childbirth and Parenting Education: Promoting Family Mindfulness During the Perinatal Period

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**Abstract** We present the conceptual and empirical foundation and curriculum content of the Mindfulness-Based Childbirth and Parenting (MBCP) program and the results of a pilot study of  $n = 27$  pregnant women participating in MBCP during their third trimester of pregnancy. MBCP is a formal adaptation of the Mindfulness-Based Stress Reduction program and was developed and refined over the course of 11 years of clinical practice with 59 groups of expectant couples. MBCP is designed to promote family health and well-being through the practice of mindfulness during pregnancy, childbirth, and early parenting. Quantitative results from the current study include statistically significant increases in mindfulness and positive affect, and decreases in pregnancy anxiety, depression, and negative affect from pre- to post-test ( $p < .05$ ). Effect sizes for changes in key hypothesized intervention mediators were large ( $d > .70$ ), suggesting that MBCP is achieving its intended effects on maternal well-being during pregnancy. Qualitative reports from participants expand upon the quantitative findings, with the majority of participants reporting perceived benefits of using mindfulness practices during the perinatal period and early parenting. Our future research will involve conducting a randomized controlled trial of MBCP to test effects on psychophysiological stress mechanisms and to examine

effects on birth outcomes, family relationship quality, and child development outcomes.

**Keywords** Mindfulness · Meditation · Stress · Coping · Emotion · Pregnancy · Childbirth · Parenting

## Introduction

The life course perspective on human development (Elder 1998) suggests that each major period of development during the life span brings a unique set of opportunities and challenges. Human pregnancy is a remarkably dynamic period of growth and development that poses significant physical and psychological challenges for pregnant women and their partners. There is variability in how people respond to identical situations and one's individual interpretation or appraisal of chronic or acute stressors can shape physiological stress reactivity. Under the framework of Stress and Coping Theory (Folkman 1997; Lazarus and Folkman 1984), when the challenges of the developmental transition to parenthood are appraised as stressful and are not met with adaptive coping, there is the potential for expectant parents to experience distress that poses a risk to their own health and well-being, as well as that of the developing child.

Beginning with the earliest stages of development in utero, stress can have serious negative effects on the health of a pregnant woman and her infant (Lupien et al. 2009). Maternal stress is linked with adverse birth outcomes including preterm birth (IOM 2007), and although adverse birth outcomes have an etiology of multiply determined complex factors, maternal psychological and physiological stress mechanisms are consistently implicated as significant risk factors (Hogue and Bremner 2005; Holzman et al. 1998; Lederman et al. 2004; Livingston et al. 2003; Lockwood

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1999; Misra et al. 2001; Rich-Edwards and Grizzard 2005; Schulkin 1999; Stein et al. 2000; Wadhwa et al. 2001). In addition to its relation to adverse birth outcomes, maternal stress is a significant factor in the etiology of postpartum depression, postpartum increases in couple conflict, and the quality of mother-infant attachment (Austin and Leader 2000; Austin et al. 2005; Leung et al. 2005; Miller et al. 2006; Ruiz and Avant 2005). Further, parenting stress has been associated with a wide array of maladaptive parenting characteristics, is highly prevalent among abusive and neglectful parents (Deater-Deckard 2004), and has been linked to long-term adverse health outcomes for offspring, including morbidity and mortality. An integrative approach to stress reduction that infuses mind-body practices into developmentally-appropriate behavioral interventions administered during the perinatal period may help promote healthier pregnancy and birth outcomes (Beddoe and Lee 2008). This approach may also encourage qualities beneficial for promoting healthy parenting and overall positive child social-emotional development and physical health.

Existing empirical evidence suggests that mindfulness-based interventions can reduce the impact of stress, improve psychological well-being and increase positive affect, alleviate anxiety and depression, prevent relapse or recurrence of major depressive disorder and substance abuse, and improve immune function when delivered to a variety of adult populations (Astin 1997; Baer 2003; Davidson et al. 2003; Kabat-Zinn 2003; Lazar 2005; Segal et al. 2002; Shapiro et al. 1998; Speca et al. 2000; Williams et al. 2001; Witkiewitz et al. 2005). Mindfulness practices have been successfully applied in interventions for non-distressed married or cohabiting couples to enhance relationship functioning (Carson et al. 2004, 2006), in treatment for parents on methadone maintenance to reduce risk for child abuse (Dawe and Harnett 2007), and in programs for caregivers of people with multiple disabilities and for parents of children with autism (Singh et al. 2004, 2006, 2007).

Studies of the effects of these applications of mindfulness have shown that mindfulness-based interventions can enhance interpersonal relationship functioning and stress coping efficacy among relatively happy couples (Carson et al. 2004, 2006), improve metacognitive awareness among previously depressed adults (Ma and Teasdale 2004; Teasdale et al. 2002), and increase satisfaction with parenting (Singh et al. 2006). Furthermore, the study of dispositional mindfulness indicates that greater mindfulness is related to greater self-regulated behavior and mental health (see Baer et al. 2004, 2006, 2008; Brown and Ryan 2003, 2004; Brown et al. 2007a, b). Although still in need of further study, when taken together, these findings suggest that mindfulness-based interventions targeting pregnant women and their partners may be expected to enhance participants' ability to cope with the stress of the developmental transition

to parenthood, and that they therefore may experience more adaptive functioning with regards to their positive and negative affect. This positive adaptation may in turn influence stress responses that can impact long-term physical and mental health outcomes for parents and their children.

According to Stress and Coping Theory (Lazarus and Folkman 1984), not everyone has the same experience when faced with a stressful event. Some individuals make appraisals of an event as threatening or harmful while others may appraise the same event as a challenge. The stress appraisal of an event, such as the transition to parenthood, prompts the coping process and produces affective responses that are associated with physiological reactivity. Threat appraisals tend to lead to negative affect, and exaggerated physiological stress reactivity (hypothalamic-pituitary-adrenal axis and autonomic nervous system reactivity) (Maier et al. 2003) and are linked to patterns of chronic physiological arousal that are in turn related with poor health. In contrast, if the same event is appraised as a challenge instead of a threat, the individual may experience more positive affect (e.g., excitement) and thus engage in more adaptive coping. As stated by Folkman in her revision of Stress and Coping Theory (Folkman 1997), positive affect provides a psychological "time-out" from distress and helps to motivate and sustain ongoing coping efforts. For a pregnant woman, mindfulness practice may facilitate more challenge than threat appraisals, leading to more proactive and adaptive coping efforts, and more positive affect, thus reducing stress responses that can be harmful to her own well-being and that of the developing fetus. During pregnancy, positive affect may also prevent the mother from feeling overwhelmed and may result in her being more receptive to learning new stress coping strategies. Employing adaptive coping is particularly important in this critical and sensitive developmental period when maternal stress and anxiety can adversely affect fetal health and influence both short and long term developmental outcomes (Bergman et al. 2007; Dunkel Schetter 2009; Lupien et al. 2009).

The 10-session Mindfulness-Based Childbirth and Parenting (MBCP) program was developed by Nancy Bardacke, RN, CNM, MA, in 1998 as a formal adaptation of the Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn 1990, 2003). The goal of MBCP is to ameliorate the impact of stress related to the challenges of pregnancy, childbirth, and early parenting through the use of mindfulness meditation practices, with the ultimate aim of promoting family health and well-being. MBCP offers parents-to-be the opportunity to use the transformative time of pregnancy and childbirth to learn the practice of mindfulness for working with the stress, pain, and fear that are often a normal part of this developmental transition. MBCP is designed to reduce the perception of pregnancy, childbirth, and parenting-related stressors as threatening or

harmful and to promote awareness from which to select appropriate coping strategies, including the use of mindfulness skills. The hypothesized mechanisms of action of MBCP are consistent with revised Stress and Coping Theory (Folkman 1997) and Eastern and Western perspectives on mindfulness (Brown et al. 2007a, b; Goldstein 2002; Kabat-Zinn 2003; Wallace and Shapiro 2006).

As in the MBSR program, the MBCP program provides systematic instruction in mindfulness meditation as a self-regulation approach to physical and emotional health and well-being. Although fundamentally a normal, healthy process for most women, pregnancy itself has inherently challenging elements that may be perceived as stressful. It is a time of rapid physical and emotional change with an irreducible element of uncertainty regarding the outcome of the birth process for the mother, the baby, the family, and life beyond. Depending on the physical and psychological health of a particular woman and the unfolding normalcy (or lack thereof) of a particular pregnancy and fetus, the pregnant state is more or less stressful. The same can be said of the birth and postpartum experience. To have inner resources to navigate the physiological changes of pregnancy and birth, and emotional tools to navigate the developmental change in the life course may have benefit for both expectant parents and their care providers. The MBCP program is intended to help participants practice being in the present moment so that they may develop greater confidence and a deeper sense of well-being during this normative life transition. Mindfulness practice then becomes a resource for birthing, parenting, and living with awareness, kindness, connectedness, and care.

The purpose of our pilot study was to describe the changes in the dimensions of the stress and coping process observed in pregnant women participating in MBCP with their partners during their third trimester of pregnancy. Using an evaluation framework based on revised Stress and Coping Theory (Folkman 1997), we expected participants to demonstrate a reduction in stress appraisals (levels of perceived stress and pregnancy-related anxiety), increases in mindfulness and positive affect, and decreases in negative affect and depression. We also anticipated that they would adopt the formal and informal mindfulness practices taught in MBCP as ways of coping with salient stressful aspects of pregnancy, childbirth, and the early postpartum period.

## Method

### Participants and Procedures

We conducted a mixed-method observational pilot study of MBCP with four cohorts of expectant couples from an

urban context who self-selected to participate in MBCP in 2008. All study procedures were approved by an academic medical center Institutional Review Board. The course instructor invited all course enrollees to participate in the research study and informed consent procedures were conducted by study staff at the beginning of the introductory class meeting. Pregnant women ( $N = 35$ ) in the late second or early third trimester of pregnancy (mean age 34.6; 92.6% first-time parents; 70.4% reported experiencing a major stressful life event during pregnancy; 92.6% with prior yoga or meditation experience) enrolled in MBCP with their partner or support person and all agreed to participate in some portion of the study even though study participation was not a requirement for course enrollment (see Table 1 for more detailed sample demographics). Study participants completed self-report questionnaires pre-intervention (late 2nd trimester/early 3rd trimester) and post-intervention (late 3rd trimester). Participants also provided qualitative descriptions of their experiences of pregnancy, childbirth, and early parenting and their use of course skills. The developer of MBCP (the senior author) was the instructor for all four groups. Two groups were held in a university integrative medicine clinic and two were held in an off-site location that was more geographically proximal to participants.

### Description of the MBCP Program

The MBCP course is held for 3 h once a week for 9 weeks. In addition, there is a 7 h silent Retreat Day on the weekend between Class 6 and Class 7 and a Reunion Class four to 12 weeks after all the women have given birth. The recommended class size ranges from eight to 12 expectant couples. Although the course is expressly designed for expectant couples to attend together, pregnant women without a partner or whose partner cannot attend are welcome and are invited to bring a support person, if so desired.

In the MBCP program, formal mindfulness meditation instruction is given and practiced in each class. In addition, participants are asked to commit to practicing meditation at home using guided meditation CDs for 30 min a day, 6 days a week, throughout the course. The teaching of mindfulness is fully integrated with the current knowledge of the psychobiological processes of pregnancy, labor, birth, breastfeeding, postpartum adjustment, and the psychobiological needs of the infant. A wide variety of mind-body pain coping skills for childbirth and awareness skills for coping with stress in daily life are also included. Course materials are *Full Catastrophe Living* by Jon Kabat-Zinn (1990), two guided meditation CDs and a workbook with selected readings and resource lists. The MBCP method of childbirth preparation is unique in its focus on teaching mindfulness meditation and the necessary commitment that

**Table 1** MBCP pilot study sample characteristics

| Indicator   | Pregnant women ( $n = 27$ ) |
|---|-----------------------------|
| Age in years: M(SD)   | 34.61 (4.22)                |
| Education (%)   |                             |
| Some college  | 7.41                        |
| Bachelor's degree   | 29.63                       |
| Some graduate school  | 11.11                       |
| Master's/Doctoral degree  | 51.85                       |
| Race/Ethnicity (%)  |                             |
| White/Caucasian   | 88.89                       |
| Asian/Pacific Islander  | 3.7                         |
| Latina  | 3.7                         |
| Other (not African American)  | 3.7                         |
| Total household income (%)  |                             |
| Below area median   | 18.52                       |
| Above area median   | 81.48                       |
| Multiparous (%)   | 7.4                         |
| Primiparous (%)   | 92.6                        |
| Difficulty conceiving: (% Yes or Somewhat)  | 33.33                       |
| Medical problems during pregnancy (% Yes)<br>(e.g., bleeding, hypertension, gestational diabetes) | 22.22                       |
| Experienced major stressful life event during pregnancy (% Yes)                                   | 70.37                       |
| Prior experience with meditation or yoga (% Yes)  | 92.59                       |

participants must make to practice meditation outside of class.

In addition to teaching mindfulness practice, an essential element of the course is to encourage a sense of community among the expectant parents to reduce the potential negative impact of social isolation on the mental health of the new parents in the postpartum and early parenting period. Toward this end, each class includes a 15 min snack break to allow for relationship building among participants.

*MBCP class one* The first meeting is devoted to sharing the history of MBCP as an adaptation of MBSR and the beginning of themes that are interwoven throughout the 9 week course: that the capacity to be fully present for labor and delivery can support the normal physiology of childbirth, and that attentive, present-moment parenting can be key to the development of a healthy, empathetic relationship between parent and child. A definition of mindfulness is given—“paying attention in a particular way: on purpose, in the present moment, non-judgmentally” (Kabat-Zinn 1994), and the relationship between the stress appraisal process and change is explored. Group sharing provides couples the opportunity to normalize the stress they may be experiencing, such as changes in the physical body, living space, finances, work life, hormonal and emotional changes, self-identity, and couple and family relationships. The group process allows couples the chance to hear that these stressors are shared by others and to learn that, if they are

approached as a challenge, they can provide an opportunity for self-learning and growth. Partner concerns, such as worry about how to support a woman during childbirth, are addressed.

A portion of this first meeting is devoted to an eating meditation in which one raisin is eaten mindfully. Using the senses of sight, smell, touch and taste, this exercise serves to demystify meditation practice through the participant's direct experience of paying attention to one's unfolding, moment-to-moment experience. The theme of interconnectedness is introduced through looking at the “bellybutton” (stem end) of the raisin, seeing that the soil, sun, rain, clouds, and workers who picked and trucked the raisins all contributed to the health and well-being of their body and the body of their unborn baby through the nutrients in the raisin. This exercise can heighten awareness of food and nutrition and begins the conversation about how many of life's moments can be missed, including moments with our children, because the mind is pulled into thoughts about the future or past. Participants are taught that, with the practice of mindfulness, the choice to be more present in our lives becomes available.

*MBCP class two* Group bonding and community-building deepen in session two. A guided reflection on the question “Why are you here?” provides expectant parents an opportunity to share hopes and fears around pregnancy, childbirth, and parenting.

The first formal meditation practice, the Body Scan, is taught in session two. Not to be confused with progressive relaxation exercises that are often taught in childbirth education classes, the Body Scan is an awareness practice. The instruction is to slowly and systematically move one's attention through the body from the top of the head down to the feet, becoming aware of physical sensations in various parts of the body. Whenever the mind wanders, the instruction is to bring the attention back to sensations in the body.

During the Body Scan unpleasant or painful sensations may arise. This experience offers an opportunity to begin developing the skill of uncoupling the sensory component of pain from its emotional and cognitive components right in the present moment. This skill enables participants to become aware of habitual, reactive patterns to discomfort or pain that add the mind's layer of suffering to intense physical sensations. With repeated and regular practice of the Body Scan before childbirth, participants are encouraged to increase their capacity to "be with" and even accept that which is unpleasant, challenging, difficult, painful, or unwanted. Participants are taught that during labor, this skill is invaluable: with mindfulness, pain can be experienced as it is: intense physical sensation arising and passing, moment-by-moment. Moments *between* painful sensations (e.g., those experienced between contractions) can be experienced with calm and ease rather than with fear or worry about future pain or recalling the memory of past pain. The Body Scan is also intended to increase body awareness, concentration, and is an opportunity to connect with the unborn baby.

*MBCP class three* Class three is intended to prompt a fundamental shift in perception of the childbirth experience. The physiology of childbirth from a mind-body perspective is described with an emphasis on how present moment awareness can be a critical skill for supporting the normal physiology of labor. With this description, participants are encouraged to consider how fearful appraisals of pain by the mind may trigger the stress reaction during childbirth and negatively affect the labor process through psychophysiological pathways of the neuroendocrine system.

Participants are asked to describe their home experiences practicing the Body Scan during the previous week. Common challenges such as finding time to practice, falling asleep during meditation practice, and questions about what to do when pain or discomfort arises during the Body Scan are addressed.

In addition to the Body Scan, participants are asked to begin a daily sitting practice of 10 min per day and to begin to bring present moment awareness into the ordinary activities of daily living such as washing dishes, brushing teeth, and preparing meals. This sets the foundation for

bringing mindfulness into everyday life as a more responsive and less reactive parent.

*MBCP classes four, five, and six* Yoga is introduced as a formal meditation practice in class four. Over the next 2 weeks, mindful movement/yoga practice is alternated with the Body Scan as the at-home formal meditation practice. Practiced mindfully, yoga is a meditative discipline. Noticing and moving into sensations during yoga practice, particularly sensations of stretching and contracting *and* noticing the times of ease and rest between poses, is mindfulness preparation for noticing the sensations of contractions and the moments of ease between sensations during the labor process. In class six, open awareness sitting meditation is taught. Sitting meditation is alternated with yoga or the Body Scan in the home practice assignment for the week.

Using ice cubes to induce unpleasant sensations, couples are taught a variety of pain practices in classes four, five, and six. They are taught that simple awareness of breathing, moving directly into the sensations, counting the breaths, and vocalizing low-pitched sounds are all ways to focus attention, accept and even welcome intense body sensations. Participants are encouraged to understand how the non-reactive, concentrated, calm, and focused state of mind that is being cultivated in meditation practice can be used to open to and allow unpleasant sensations to arise and pass, moment by moment. Partners are taught the pain practices along with the pregnant women, and in this way are able to bring empathetic understanding to their partners during the pain of childbirth.

In class five, the baby's journey through the pelvis during childbirth is demonstrated and couples are taught and spend time practicing various positions for labor. Partners receive instruction in a variety of ways to use mindful touch to calm and support their partner. Class six focuses on making wise choices for childbirth, including selection of a care provider, place of delivery (home, hospital, birth center), and additional labor support such as the use of a doula. It is emphasized that the future is unknown, there is no one "right way" to give birth and that with practice, couples will have a variety of tools to work with pain and whatever comes their way during the birth process.

Throughout weeks four, five, and six, couples are asked to bring awareness to stressful experiences in everyday life, noticing how the body and mind "contract" in response to stress. They are asked to practice "being with" (or responding rather than reacting to) these stressful experiences, just as they are learning to do with the ice in the formal pain practices.

*MBCP retreat day* The day of silent practice is framed as an opportunity to deepen one's meditation practice, increase awareness of one's patterns of mind, and practice living in the present moment for an extended period of

time, much as they will do during labor and birthing. All the practices are revisited—the Body Scan, mindful movement/yoga, sitting meditation, and mindful eating. Walking meditation is introduced and practiced. In the afternoon, silence is suspended and participants are led through a mindful speaking and listening practice around fears about the future. In this way, participants are encouraged to bring mindful presence into their most intimate relationships.

*MBCP class seven* In class seven lovingkindness meditation (Salzberg 1995) is introduced. Lovingkindness practice is a practice of open-hearted friendliness and well-wishing for oneself and others. As a variation on the traditional practice of lovingkindness meditation, in the MBCP course lovingkindness practice begins with extending well-wishing to one's baby, then to oneself, followed by those nearest and dearest, then to all the babies and parents in the room, followed by well-wishing to a neutral person, a difficult person, to one's neighbors, community, and finally to all beings everywhere.

Also in class seven, participants are invited to share their experiences of the Retreat Day including experiences that were inspiring or challenging, and any insights they had about themselves or mindfulness practice. Participants are reminded that just as they did not know how the day of silence would unfold, so too, they do not know how the day (or night) of labor will unfold. They are instructed that as with the Retreat Day, all that is needed during childbirth is *to simply be present* as fully as possible as the labor process unfolds, moment-by-moment.

The biological, emotional, and social needs of the newborn and the needs of the postpartum family are covered in this class and the couple's plans for the postpartum period are reviewed. Sitting meditation is continued as the formal practice for the week.

*MBCP class eight* Class eight is devoted to reviewing the previous week's experiences of meditation practice and exploring how mindfulness skills support the normal physiology of breastfeeding. Emphasis is on optimizing conditions for the establishment of the breastfeeding relationship and how mindfulness practice may be used to promote attachment and bonding in the immediate postpartum period. The symptoms of postpartum depression in both women and men are reviewed, including how to seek help if depressive mood is experienced. As practice for maintaining a sustained mindfulness practice after the class ends, participants are invited to practice without the CDs in the coming week.

*MBCP class nine* In class nine, an MBCP alumni couple and their new infant visit the current MBCP class to share how they used their mindfulness practice during childbirth and how they are continuing to use mindfulness in the often intense and challenging postpartum period. The remainder of the class is devoted to a course review and a closing

graduation ceremony. Contact information is exchanged that serves to keep new parents connected between the time the course ends and the class reunion.

Participants are encouraged to continue their practice in the days and weeks before birth—and for the days, weeks, months and years after the birth of their child. Participants are referred to Myla and Jon Kabat-Zinn's description of how mindfulness practices can be readily applied to parenting (Kabat-Zinn and Kabat-Zinn 1997) and they are also encouraged to continue meeting after the formal course ends to support each other and their continued practice of living and parenting mindfully.

*MBCP class reunion* The class reunion provides an opportunity for participants to reconnect with each other, meet each others' babies, and reflect on what they learned from their birth experience. The couples are invited to share how they are learning and growing themselves as new parents, how they are applying mindfulness skills in parenting, and to express appreciation to and about their partner and themselves. MBCP participants are again encouraged to continue gathering, to provide support for each other and their continued use of mindfulness practice as a foundation for a way of parenting mindfully: with present moment attentiveness, nonreactivity, emotional awareness, nonjudgmental acceptance, and compassion for oneself and one's baby (Duncan et al. 2009).

#### Adherence

Three couples who signed up for the course did not attend after the first session due to logistical (work hours, transportation) issues. Because no exclusion criteria were applied, five women enrolled in MBCP too late in their pregnancies to complete the course prior to birth. These women did not provide post-intervention survey data because their babies were born prior to completion of the course (including one woman who delivered twins prematurely), but they did agree to participate in the qualitative post-birth follow-up. One couple declined to participate in the post-birth follow-up data collection. Among all engaged course participants (i.e., women and their partners who attended more than one session), the average attendance during pregnancy was 8.3 sessions out of a possible 10 sessions (class sessions 1–9, and the retreat day). Only data collected from the mothers is reported here.

#### Quantitative Measures

##### *Appraisals*

*Perceived stress* was measured with the 10-item version of the Perceived Stress Scale (Cohen 1988). This scale was designed for use with community samples and is now the

most widely used self-report measure of psychological stress. Participants respond how often (0 = never; 4 = very often) during the past month they experienced thoughts and feelings such as “felt that you were unable to control the important things in your life,” “been unable to control irritations in your life,” ( $\alpha = .89$ ).

*Pregnancy anxiety* was assessed with the revised Pregnancy Anxiety Scale (Levin 1991) containing 10 items regarding the degree of anxiety the mother feels during pregnancy about her own health: “I am worried about developing medical problems during my pregnancy,” the health of her developing fetus: “I have a lot of fear regarding the health of my baby,” and healthcare during parturition: “I am afraid that I will be harmed during delivery.” Participants respond about how often they have these thoughts and feelings (1 = never; 5 = always). The Pregnancy Anxiety scale has been shown to have good internal consistency ( $\alpha = .80$ ).

#### *Positive and Negative Affect*

*Frequency* The Differential Emotions Scale (DES; Izard 1977), modified, was used to assess the frequency of positive and negative affect during the previous week. This version of the DES was modified by Fredrickson (Fredrickson et al. 2008) to include additional positive affect items. The full scale assesses interest, enjoyment, surprise, sadness, anger, disgust, contempt, fear, guilt, shame, shyness, amusement, awe, contentment, gratitude, hope, love, pride, sympathy, and sexual feelings. The scale can be scored for total positive and negative affect. This modified DES has shown acceptable reliability with the positive emotions subscale,  $\alpha = .79$ , and the negative emotions subscale with  $\alpha = .69$ .

*Intensity* The Positive and Negative Affect Schedule (PANAS; Watson et al. 1988) was used to assess the intensity of positive and negative affect. The PANAS was designed to assess high activation positive affect (interested, excited, enthusiastic) and high activation negative affect (upset, irritable, ashamed). Moskowitz supplemented the original PANAS with lower activation positive and negative affect items. The final scale consists of 29 items (20 from the original PANAS; 9 additional). Respondents are asked to indicate how strongly they felt each affect during the past week on a scale from 0 = not at all to 4 = extremely. The modified version has been used in two ongoing studies (Moskowitz, 2008, Personal communication), where it showed good reliability ( $\alpha$ 's = .88, .92 for positive affect and .92, .93 for negative affect).

#### *Mindfulness*

Three of the subscales from the Five Factor Mindfulness Questionnaire (FFMQ) (Baer et al. 2006) were used to

assess mindfulness: acting with attention and awareness, nonjudging, and nonreactivity. Subjects were asked to indicate agreement (1 = “never or very rarely true” to 5 = “very often or always true”) with a list of 19 statements about their general tendency to be mindful of experiences of daily life. Example items are: “I pay attention to how my emotions affect my thoughts and behavior,” and “I think some of my emotions are bad or inappropriate and I shouldn't feel them” (reverse-scored). The FFMQ subscales have been shown to have adequate to good internal consistency (subscale  $\alpha$ 's = .75 to .91) and convergent and discriminant validity in meditating and non-meditating samples (Baer et al. 2006, 2008). The Observing and Describing subscales of the FFMQ were not as central to study hypotheses as the other three facets, and were thus excluded to reduce participant burden.

#### *Coping*

An expanded version of the Ways of Coping, (WOC; Folkman and Lazarus 1988) was used. The WOC is among the most widely used coping inventories. Participants were asked to respond in relation to one stressful event or aspect of the pregnancy. One item was added to gauge whether/how often participants used meditation to cope with the pregnancy-related stressful event identified by the participant.

#### *Depression*

The widely used Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff 1977) was employed to measure depressive mood. The CES-D consists of 20 items which are rated on a 4-point scale according to how frequently they were experienced in the previous week.

#### *Qualitative Analysis*

Post-birth, participants were asked to respond to a series of open-ended questions designed to elicit descriptions of their experiences of pregnancy, labor and delivery, and the early postpartum period. Questions included the following: “Did you continue to practice mindfulness, formally or informally, during the remainder of your pregnancy?,” “Did you use what you learned in the program to help you during your birth experience?,” “Was anything you learned helpful for managing emotional states, such as fear, during labor, delivery, or postpartum?,” and “How have you used what you learned in the program during your postpartum experience?”

Using a team-based, interpretive phenomenological approach to analysis (Benner 1994; MacQueen et al. 1998), we created a coding protocol that was expanded until both coders were satisfied that saturation had been achieved (i.e.,

all themes in the participant responses had been assigned a particular code). Both coders independently coded all responses, achieving an inter-rater agreement rate of 91.8% for agreement on 257 of 280 total codes assigned to participant response for these four questions. Disagreements were resolved through discussion. The first author identified key themes present within and across questions, both coders nominated representative quotes for each major theme, with final reporting of quotes determined by consensus.

## Results

Quantitative results from paired *t*-tests conducted with data from the sample with complete data ( $n = 27$ ) are presented in Table 2. Table 2 includes means for perceived stress, pregnancy anxiety, depression, mindfulness, and the frequency and intensity of positive and negative affect at pre- and post-test. Mean differences, indicating changes in the hypothesized directions for all variables, and effect size estimates (calculated as Cohen's *d*) are also listed. All mean differences were either statistically significant ( $p < .05$ ) or represented a marginal trend towards significance ( $p$ -values between .051 and .062).

Large effect sizes were observed in the decrease in pregnancy anxiety ( $d = .81$ ) and increase in mindfulness ( $d = .74$ ), and in particular, in the increase in the nonreactivity subscale of mindfulness ( $d = .85$ ). In addition, 85.18% of the pregnant women reported using meditation to cope with a salient stressful aspect of pregnancy at post-intervention, more than double the frequency at pre-test (37.04%). All but one of the women reported an elevated level of perceived stress at baseline (average of 26.41 in comparison to the community norm for women of 13.7) that was observed to decrease, on average, by post-test

(from  $M = 26.41$ ,  $SD = 6.73$ , to  $M = 24.11$ ,  $SD = 4.99$ ). When the single outlier was removed (the only woman below the norm on perceived stress at baseline), the marginal statistical significance of this medium-sized effect became statistically significant ( $p = .04$ ).

Our coding of the qualitative descriptions yielded an overarching theme of participant use of formal and informal mindfulness to cope with salient stressful aspects of pregnancy, labor and delivery, and the postpartum experience. A majority of participants described continuing to practice formal mindfulness during the remainder of pregnancy including sitting meditation, breath awareness, body scan, and mindful movement/yoga. Those who did not keep up a regular formal practice described engaging in informal mindfulness practice, such as reported by one participant:

I didn't do much formal practice, but I did remind myself to be present often at the end of my pregnancy. Simply experiencing the last weeks of pregnancy made me feel calm and grounded going into the birth.

Staying in the present moment was a core element of informal practices during pregnancy, and was the most often listed aspect of the course teachings employed to cope with the labor and delivery. Many women reported using the specific skills taught in MBCP to stay in the present moment during the birth experience to cope with pain and fear, such as focusing on the breath, on mindfulness of physical sensations, or on touch and verbal reminders from their partners.

There was also an element of maintaining an expanded awareness of the process of labor that allowed some women to experience positive emotions right in the midst of the intensity of the labor process itself:

**Table 2** Pre- to Post-intervention mean differences (paired *t*-tests) among  $n = 27$  pregnant women participating in MBCP

| Variable                | Pre-MBCP level:<br>M(SD) | Post-MBCP level:<br>M(SD) | Mean change<br>(SD) | <i>t</i> -value | <i>p</i> -value | Effect size,<br>Cohen's <i>d</i> |
|-------------------------|--------------------------|---------------------------|---------------------|-----------------|-----------------|----------------------------------|
| Perceived stress (PSS)  | 26.41 (6.73)             | 24.11 (4.99)              | -2.30 (6.13)        | -1.95           | .062            | .40                              |
| Pregnancy anxiety       | 2.49 (.58)               | 2.09 (.41)                | -0.39 (.32)         | -6.36           | <.0001          | .81                              |
| Depression (CES-D)      | 1.63 (.45)               | 1.48 (.34)                | -0.15 (.30)         | -2.59           | .016            | .38                              |
| Mindfulness             | 3.14 (.44)               | 3.44 (.38)                | 0.30 (.27)          | 5.66            | <.0001          | .74                              |
| Attention/Awareness     | 3.10 (.44)               | 3.25 (.35)                | 0.16 (.42)          | 1.95            | .062            | .38                              |
| Nonjudging              | 3.50 (.57)               | 3.78 (.60)                | 0.28 (.36)          | 4.13            | .0003           | .49                              |
| Nonreactivity           | 2.85 (.59)               | 3.31 (.51)                | 0.46 (.45)          | 5.35            | <.0001          | .85                              |
| Positive affect (PANAS) | 3.30 (.70)               | 3.58 (.69)                | 0.28 (.60)          | 2.4             | .024            | .41                              |
| Negative affect (PANAS) | 2.03 (.58)               | 1.83 (.47)                | -0.20 (.31)         | -3.35           | .003            | .39                              |
| Positive affect (DES)   | 3.64 (.67)               | 3.91 (.69)                | 0.27 (.56)          | 2.47            | .020            | .40                              |
| Negative affect (DES)   | 1.97 (.50)               | 1.83 (.50)                | -0.14 (.36)         | -2.04           | .051            | .29                              |

Note Bold type indicates statistical significance and/or large effect sizes



My husband helped me focus on my breath by saying, “Come back to your breath” at times when the labor got intense. I also remembered that each contraction was getting me closer to delivery and that it was part of a cycle. There would be a time of joy between contractions and I was able to experience that.

Many of the participants described using mindfulness to deal with stress related to the demands of the birth and the postpartum experience of new motherhood:

Yes, I definitely am aware of trying to be in the moment and that each moment, good or bad, will pass. When I got really worried about the birth, I would just breathe to stop my mind from going all sorts of bad places. And in postpartum, I have tried to use the practice to deal with stressful situations whether it be a crying baby or just accepting my new role as a mother who doesn't have much time for herself. Being mindful is always at the back of my mind, no matter what I am doing, even if it isn't a formal practice.

The importance of partners participating fully in the course, and being mindfully present during the birth and subsequent postpartum experience was another theme found in many women's descriptions of their experiences. One participant reported:

I felt very connected to my partner, the class taught us how to work as a team and be fully present in the moment and that connection got me through delivery and the post-partum period...

Finally, bringing mindful presence to interactions with babies and partners, and mindful awareness of emotional reactivity, were often described as beneficial skills learned through MBCP course participation. One participant described her experience with mindful presence as follows:

...I frequently think about being mindful when I am with my baby—when I'm holding him, nursing, or walking around soothing him. During these times, I take in the experience at that moment and think about the smells, sounds, and sensations of being a new mother. I have also used mindfulness to notice when emotions crop up such as feeling overwhelmed, sad, or resentful of my husband as he sleeps and I get up in the wee hours to nurse. Instead of reacting to these emotions I'm able to just note them in a non-judgmental way. From there I can either think through what made me feel that way or bring them up and talk with my husband about them...

Other themes coded in the qualitative descriptions were subsumed under these main categories and included

detailed descriptions of the ways in which formal and informal mindfulness practices aided the women in coping with the unexpected during labor and delivery, achieving a state of calm or relaxation during stressful perinatal/postpartum events, non-judgmentally accepting things as they are—even when a desired outcome was not attained (e.g., an intended vaginal birth evolving into a Cesarean birth), staying present in the body, slowing down to be in the moment, and experiencing positive emotions by being present with the baby.

## Discussion

The results of our small observational pilot study demonstrated a number of significant improvements in quantitatively assessed central components of the stress and coping process, including stress appraisals and positive affect. The qualitative findings illustrate ways in which participants used MBCP course skills to maintain present moment awareness and nonjudgmental acceptance of their experiences during the perinatal period and early parenting.

Quantitative results of this non-controlled pilot provide initial empirical support that the intervention is operating in the way it was intended. Large effect sizes were observed for the decrease in pregnancy anxiety and the increase in mindfulness, with a particularly large improvement in the nonreactivity dimension of mindfulness. Modest improvements were also demonstrated for both the frequency and intensity of positive affect. These results indicate a consistent pattern of change that fits clearly with the hypothesized mechanisms of change of the MBCP intervention that we posited based upon revised Stress and Coping Theory (Folkman 1997) and mindfulness theory (Brown et al. 2007a, b; Goldstein 2002; Kabat-Zinn 2003; Wallace and Shapiro 2006).

In addition, both quantitative and qualitative results indicated that the pregnant women participating in MBCP used mindfulness more frequently to cope with salient stressful aspects of pregnancy and family life post-intervention, suggesting that teaching mindfulness during the perinatal period may expand pregnant women's repertoire of adaptive strategies for coping with stress. Participants reported staying in the present moment and taking a process view of their unfolding experience, mindfully acknowledging that each moment will pass and be replaced by the experience of the next moment throughout pregnancy, childbirth, and parenting. Participants found this core aspect of mindfulness to be beneficial for their emotional well-being, their relationship quality with their baby and partner, and for promoting a sense of calm.

A meta-analysis of 21 studies of MBSR and MBSR-related interventions (Baer 2003) provides comparison

information for gauging the quantitative results of this study in terms of post-intervention effect sizes on targeted outcomes. Across all 21 studies, the average post-treatment effect size for all outcome variables (weighted by sample size) was Cohen's  $d = 0.59$ . Dependent measures included assessments of anxiety, depression, general psychological functioning, and medical symptoms (e.g., pain). The largest effect sizes found in the meta-analysis, those that were approaching large (i.e.,  $> .7$ ), were found in randomized controlled trials. This meta-analytic finding suggests the possibility that larger effects may result when mindfulness-based interventions are carried out under more tightly controlled conditions. However, the results of the current study show that even without the benefit of more tightly controlled conditions, MBCP can be delivered effectively in a public program setting.

As with any small, uncontrolled pilot study, we must be careful about drawing conclusions from the current findings. Results of this study should be interpreted with appropriate caution given the lack of a comparison group, selection effects (including possible participant expectancies), reliance solely upon self-report data, and the relatively high SES of the participants. It is notable, however, that even with design limitations and a small sample, numerous hypothesized effects were found to be statistically significant, large effects were found for changes in central hypothesized mechanisms of action, and qualitative descriptions mirrored and expanded upon the quantitative results.

There is a common conception that samples such as ours, comprised of relatively well-educated, predominantly European-American people who are above median income for the geographic region, are likely to experience less stress than lower SES samples comprised predominantly of people from racial/ethnic minority groups. Our results demonstrate that all but one of the women in our sample reported an elevated level of perceived stress at baseline that was observed to decrease, on average, by the post-course assessment. It is possible the changes in perceived stress reflected regression to the mean, but this possibility must be weighed against the likelihood that high levels of stress are common during the perinatal period.

The majority of the participants had some prior yoga or meditation experience and the majority reported experiencing a major stressful life event during the pregnancy, prior to course enrollment. It is possible that the participants in these four cohorts sought out a mindfulness-based approach to stress reduction for their childbirth preparation because they had some prior introduction to the potential for mindfulness to ease stress, and they had experienced a stressful event that may have affected their coping with the normal developmental challenges of pregnancy.

A key aspect of the MBCP model is making explicit how mindfulness skills may be helpful for parenting the infant

and nurturing the partner relationship after birth. Pregnant women most often participate in MBCP with their partners, and there is an emphasis on learning ways of incorporating mindfulness practices in the context of partner relationships and parent-infant relationships. Our qualitative results suggest that partner involvement in the women's use of mindfulness skills during the birth and postpartum experience was viewed as essential by the women, and that they attributed improvements in the couple relationship to their MBCP course participation. A recent pilot test of a different mindfulness program targeting pregnant women without the inclusion of their partners yielded reductions in state anxiety and negative affect, but no statistically significant improvements in mindfulness or positive affect (Vieten and Astin 2008). It is possible that a family-focused, relationship-oriented approach to teaching mindfulness skills to couples during the perinatal period (vs. an individual approach) may impact a wider array of outcomes.

Mindfulness-based interventions delivered to the family unit during pregnancy may be one way to effectively influence aspects of the stress response that can in turn influence maternal-fetal health and family relationships. Laying a foundation of healthy coping through mindfulness instruction during the perinatal period of family formation may promote family resilience across the life span, effectively placing new families on a healthier developmental trajectory than they might otherwise have experienced. Other than interventions targeting specific demographic groups known to be at risk for maladaptive family functioning (e.g., *Incredible Years*; Webster-Stratton 2005), relatively little attention has been given in family-focused preventive intervention programs to the role of stress and parents' psychological functioning as determinants of parenting behavior. Teaching expectant parents mindfulness skills that can be employed to promote adaptive coping with contextual demands (e.g., poverty, major life events, work-related stress, interpersonal tensions) or particularly salient parenting challenges specific to normative developmental changes (e.g., the short sleep-wake cycle of a young infant) may prevent poor outcomes later in the family life course (e.g., child abuse/neglect).

Great advances have been made in developing, evaluating, and disseminating family-focused preventive interventions in recent years, including those successfully targeting the health of pregnant women and long-term child functioning (e.g., *Nurse Home Visiting Program*; see Olds et al. 2007) and co-parenting and parent/infant well-being during family formation (e.g., *Family Foundations*; see Feinberg and Kan 2008). We believe that MBCP expands the view of what is possible to teach and be learned in the open, receptive window of time that occurs during pregnancy. Teaching mindfulness skills for childbirth and parenting preparation during the perinatal period may provide

psychological and physical benefits for maternal-child health by promoting healthier stress responses in both the psychological (perceived stress and coping) and physiological (neuroendocrine and autonomic) pathways of the stress response.

Our future research will employ a more rigorous RCT design to experimentally test the effects of MBCP on an array of outcomes. We hypothesize that MBCP may improve birth outcomes, attachment and child development outcomes, partner well-being, and the quality of family relationships. We plan to test physiological pathways of the stress response (e.g., maternal-fetal HPA axis functioning) as mechanisms of action for the effects of MBCP on outcomes. We also hypothesize that MBCP will have a substantial impact on parenting and co-parenting quality.

In the meantime, clinical observation of the potential for MBCP to expand the scope of childbirth preparation to include inner skills for mindful parenting has led to the course being offered in three geographic regions of the United States. A formal MBCP teacher training program began in early 2009 at the Osher Center for Integrative Medicine at the University of California, San Francisco. The continued interplay between clinical research and clinical practice will serve to further refine and test the MBCP model of integrative stress reduction during the perinatal period and early parenting.

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