



The Slow Down Program: A mixed methods pilot study of a mindfulness-based stress management and nutrition education program for mothers



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ABSTRACT

Objective: Stress levels have been associated with a broad range of adverse health outcomes, particularly for mothers and subsequently, their children. Mindfulness-based stress management is a tool that has effectively been utilized in several disciplines and has potential applications to eating behaviors. This paper describes the effects of an exploratory mindfulness-based stress management and nutrition education program, the Slow Down Program, on mothers' perceived stress, eating behavior, and self-efficacy.

Design & setting: This study used a mixed methods quasi-experimental design. Nineteen mothers with young children (five or younger) participated in the study. The SDP consisted of four consecutive weekly 1.5 h sessions focused on experiential learning and facilitated discussion.

Main outcome measures: Quantitative data were collected pre- and post-intervention and included: the Perceived Stress Scale; Mindfulness Self-Efficacy Scale; and the Three-Factor Eating Questionnaire Revised-18. Qualitative data included a focus group post-intervention and an individual interview 4–6 weeks post-intervention.

Results: The SDP showed significant improvements in participants' perceived stress ($p = .04$), uncontrolled eating ($p < 0.01$), cognitive restraint ($p < 0.01$), and mindfulness self-efficacy ($p < 0.01$). Qualitatively, participants also reported changes in self-efficacy and eating behaviors – specifically improvements in mindful eating, and sensory and satiety awareness.

Conclusions: The results of this pilot study demonstrate that nutrition programs incorporated with mindfulness strategies may offer positive, short-term impacts on stress reduction and eating behaviors. Additional studies are warranted across a variety of populations with more rigorous study designs to assess long-term effects.

1. Introduction

Maternal stress contributes to a broad range of outcomes among mothers, influencing appetite, the drive to eat, and the types of food they are likely to select. For example, one recent review and meta-analysis found that higher maternal stress altered a wide variety of parenting behaviors, including parent sensitivity to attachment bond and meal preparation, resulting in children's lower ability to utilize or learn self-regulation skills.¹ Maternal stress can be caused by a multitude of factors, including perceived social support, socioeconomic status, number of children, and health status, among many others.²

Compared to fathers, mothers report higher levels of stress and a belief that they are not optimally or successfully managing their stress.^{3,4} Correspondingly, they report sleeplessness and other physical symptoms of chronic stress, such as depression, anxiety, and unhealthy eating patterns.^{3,5}

Mindfulness has long been utilized to successfully improve stress management, through programs like Mindfulness-Based Stress Reduction (MBSR).^{6,7} Mindfulness can be defined as a “moment-to-moment, non-judgmental awareness of the present moment”.⁸ More recently, it has been put forward as a strategy to improve eating habits and has been termed ‘mindful eating’ (ME), which includes sensory

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Abbreviations and acronyms

| | |
|-------|--|
| IM | Fishbein's integrated model of behavior change |
| ME | Mindful eating |
| MBSR | Mindfulness-based Stress M Reduction |
| MSE | Mindfulness self-efficacy scale |
| PSS | Perceived stress scale |
| SDP | The Slow Down Program |
| SMART | Specific, measurable, achievable, relevant, time-bound goals |
| TFEQ | Three-factor eating questionnaire |

experiences, mental and emotional states, and internal processes related to eating behavior.⁹ The application of ME to address potential dietary outcomes, particularly related to stress, is relatively new despite research demonstrating that higher scores on mindfulness and ME measures are associated with lower weight status, smaller portion sizes of energy-dense foods, and less disordered eating patterns.^{10–13} A 2014 review of the effects of mindfulness-based interventions found support for their use with improving obesity-related eating behaviors (emotional eating, external eating, etc.).¹⁴ Moreover, a number of studies have demonstrated the effectiveness of mindfulness-based interventions on eating behavior and diet with women, though none have specifically targeted mothers of young children.^{15,16}

Although the relationship between maternal stress and eating behaviors is compelling, currently there are no published nutrition interventions specifically attempting to affect maternal stress and eating behavior among mothers of young children. The purpose of the present study was to pilot-test a mindfulness-based stress management and nutrition program on mothers' eating behavior, perceived stress, and self-efficacy.

2. Program description

The Slow Down Program (SDP) was developed based upon previously published intervention research and MBSR-based programs.^{17,18} Fishbein's Integrated Model (IM) of behavior served as the theoretical framework of the SDP's weekly session activities.¹⁹ The IM includes behavior change constructs related to social norms, attitudes, self-efficacy, and behavioral intention. Each session was delivered by an experienced public health educator who was certified in the Professional Mindfulness-Based Eating Awareness Training program.¹⁸ During each session, participants completed an empirically sound experiential mindfulness activity and nutrition education. See [Table 1](#) for details about each program session.

Facilitated dialogue was used in all program sessions, which encourages participants to share their own experiences and recognizes everyone present as equals.²⁰ SDP participants were asked to attend four weekly 1.5-h sessions, as opposed to the typical MBSR-based programs that stretch over 8–12 two-hour sessions. The intention was to create a more accessible program for those with limited resources, like time, that could maintain similar outcomes to a longer, more

intensive program. Each participant was asked to develop specific, measurable, achievable, relevant, and time-bound (SMART) goals related to nutrition or the practice of mindfulness.²¹ Although they were not required to complete homework as part of the program, they were invited and encouraged to share and discuss the status of their goals at the beginning of each session from Week 2 through Week 4, as well as at the end of each session. During the final program session, participants spent time developing an action plan based on the goals they had developed and achieved thus far.

3. Methods

3.1. Participants

Participants were recruited in a university town in rural Virginia using snowball sampling techniques. As early childhood is an important intervention point, particularly before a child begins school,²² mothers were included if they were at least 18 years of age or older and had one child aged 5 or younger living in their home. They were excluded from participation if they were pregnant, breastfeeding, participating in a structured weight loss or diet program, or had been diagnosed with an eating disorder in the last five years.

The intervention took place in two waves. Thirteen mothers participated in the first wave and six mothers in the second wave (n = 19). Data were excluded from analysis if mothers did not attend at least three out of four program sessions or other data collection sessions.

3.2. Study design

This study was a non-randomized, quasi-experimental mixed-methods pilot study. All participants received the same intervention, with some content adjusted minimally for individual group differences. All participants provided informed voluntary consent to participate in the study. All aspects of the study were approved by the [Blinded for Review] Institutional Review Board.

3.3. Measures

The Mindfulness Self-efficacy Scale (MSE) was used to assess whether participants believe they can maintain non-judgmental awareness during different stressful situations.²³ Participants are asked to rate their confidence in being able to maintain nonjudgmental awareness using percentages on a scale, with 0 percent indicating 'no confidence', 50 percent indicating 'moderate confidence', and 100 percent indicating 'complete confidence'. The participant's score is then calculated by averaging the percentage of each of the 15 items. This measure was previously tested in a sample of mostly Caucasian/White women and demonstrated good internal consistency. The authors of the MSE ensured content validity of the measure by including items that characterize common sources of adult stress that may also interfere with maintenance of non-judgmental awareness, including frustration during goal-oriented activities (i.e. shopping, driving, work) or interpersonal problems (i.e. fatigue, sleep, hunger).

Table 1

Outline of the mindfulness topics, activities, and nutrition discussion topics covered during each of the four weeks in the Slow Down Program.

| | Key Mindfulness Topics | Experiential Mindfulness Activity | Nutrition Topics |
|------------|---|--|--|
| Week One | Introduction to mindfulness; inner wisdom vs. outer wisdom; definition of mindfulness | Mindful Eating Raisin Exercise | Mindful eating |
| Week Two | Emotional/stress eating; pausing mid-meal for hunger and satiety checks; deep breathing | Progressive muscle relaxation | Sugars (added sugars, artificial sweeteners, Nutrition Facts Label) |
| Week Three | Mind-body connection; taste satiety; sensory awareness | Guided Imagery; Mindful Eating Raisin Exercise using other foods | Fats (solid fats, oils, Nutrition Facts Label) |
| Week Four | Stress management, nonjudgmental awareness, critical self-talk | Self-forgiveness meditation | Picky eating, Healthy food selection, Healthy food selection on a budget |

Table 2
Participant sociodemographics.

| Participant characteristic | | N (%) |
|----------------------------|------------------------|---------|
| Marital Status | Single | 1 (5) |
| | Married | 17 (90) |
| | Separated | 1 (5) |
| Race | White/Caucasian | 14 (73) |
| | Black/African-American | 2 (11) |
| | Asian | 2 (11) |
| | Hispanic/Latina | 1 (5) |
| Number of children | 1 | 12 (63) |
| | 2 | 5 (26) |
| | 3 | 2 (11) |

The Perceived Stress Scale (PSS) was first published in 1982 and is used to measure psychological stress. The 10-item measure asks the participant general questions about their stress over the last month. Each item is rated on a 5-point scale ranging from never (0) to almost always (4). Positively worded items are reverse scored, and the ratings are summed. Scores can range from 0 to 40, with higher ratings indicating higher levels of stress. Scores ranging from 0 to 13 can be considered low stress, 14–26 moderate stress, and 26–40 represents high perceived stress. The PSS has been validated in multiple adult populations, mainly college students and adult workers.²⁴

The Three-Factor Eating Questionnaire (TFEQ) consists of 3 different scales corresponding to cognitive restraint, emotional eating, and uncontrolled eating.²⁵ There are 18 items on a 4-point response scale (definitely true/mostly true/mostly false/definitely false). Responses to each of the 18 items are given a score between 1 and 4 and item scores are summated into scale scores for cognitive restraint, uncontrolled eating, and emotional eating.²⁶ The raw scale scores are transformed to a 0–100 scale [(raw score – lowest possible raw score)/possible raw score range] X 100]. Higher scores in the respective scales are indicative of greater cognitive restraint, uncontrolled, or emotional eating.²⁷ Although the TFEQ-R18 scales were derived in obese subjects, factor analysis of the TFEQ-R21 conducted in an adult sample indicates that the instrument is valid also in nonobese individuals and it has been validated in the general population, also.^{25,27}

3.4. Qualitative methods

Participants were asked to participate in a focus group within 1–2 weeks after the conclusion of the program and a one-on-one interview 4–6 weeks after the focus group. Each focus group consisted of the same women who had participated together in that wave of the program and was facilitated by a trained research assistant. Each of the focus groups and the interview scripts contained questions on self-efficacy (confidence) and behavior change, both in regards to mindfulness, diet, and child feeding strategies. The focus group lasted between 60 and 90 min. Interviews were semi-structured and conducted 4–6 weeks after the

Table 3
Qualitative results of changes in mindful eating behaviors.

| Major theme | Sub-themes | Quotes |
|----------------|-----------------------------------|---|
| Mindful eating | Improved Mindful Eating Behaviors | <i>"I think I kind of had an inkling of that before this, but I think it's made it very clear to me that that's what I'm trying to do. I need to slow down and stop doing that because, yes, I do want a piece of the chocolate or whatever, but I'm trying to fill up everything with the chocolate; whereas, if I just take a few minutes and enjoy a piece of chocolate and try and figure out other ways to fill up the time or stress or whatever it is, that's good."</i> |
| | Taste Satiety | <i>"That thing that the facilitator [L.K.] said about chasing the first bite has really stuck with me. That's probably one of the things I do almost every time I eat now is that first whatever. The first sip of the fruit smoothie, the first bite of the whatever, I will sit and really enjoy that first bite. I've thought about it ever since she said it, that lady. It's so true. That's exactly what you're doing. It's like, that first bite is so good and you're like, Oh, I just want to hurry up and shove the rest of the whole sandwich on down, it tastes so good!" But it's never as good as the first bite.</i> |
| | Sensory Awareness | <i>"That's something that I noticed I was doing. Why do I eat this?" I learned through the raisin activity that I like certain flavors to go together. When I ate the raisin, I wanted something salty or I wanted cheese with it. Or if I eat pizza, I want a Coke with it. I've learned that there's similar flavors that I like.</i> |

focus group and lasted 30 min.

3.5. Program feasibility

Measures of program feasibility included the number of mothers approached, how many mothers agreed to participate, reasons for not participating, and participant retention. In addition, participants were asked to complete a brief acceptability form at the end of each program session that solicited written responses from participants. The questions included a satisfaction rating for that day's session on a scale of 1–5, with a selection of 1 indicating "Not at all satisfied" and a 5 indicating "Extremely satisfied". Participants were also asked to describe what was helpful/not helpful during each session and given an opportunity to provide written comments, ideas, or suggestions for improving the program.

4. Data analysis

4.1. Quantitative

Analyses for the MSE, PSS, and TFEQR-18 used in the SDP were carried out in JMP[®] (Version 11, SAS Institute Inc., Cary, NC, 2013) using matched pairs *t*-tests to determine effects of the intervention.

4.2. Qualitative

Audio files from each participant interview and both focus groups were transcribed and two researchers independently conducted an inductive thematic analysis, to capture the frequency of topics as well as the intensity and extensiveness of discussion in relation to each topic.^{28,29} The themes were discussed and a thematic framework developed, which was further refined by independently coding all text and then comparing and discussing coding decisions. Subsequently, the coding of all passages by both researchers reached an acceptable inter-coder reliability (Cohen's kappa = 0.81).^{30,31} After several iterative refinements, a satisfactorily robust coding scheme was established, and all transcripts were coded in detail by a single researcher using Microsoft Excel (for Mac, version 14, 2011).³²

5. Results

5.1. Subject characteristics

In total, nineteen mothers participated in the program and provided baseline and post-intervention data (Table 2). There were 13 mothers in Wave 1 and 6 mothers in Wave 2. Data from each wave of mothers were combined for analyses. The average age of the mothers was 34.16 (\pm 4.39) and they ranged in age from 24 to 43 years old. All mothers except one had at least a Bachelor's degree and more than half of the sample had advanced or terminal degrees (n = 12).

5.2. Quantitative

Participant scores for the TFEQR-18's uncontrolled eating subscale showed a statistically significant decrease in scores from baseline to post-intervention ($p < 0.01$). There was an increase in the participant scores for the cognitive restraint subscale on the TFEQR-18 for mothers after participating in the SDP ($p < 0.01$). There were no statistically significant changes from baseline to post-intervention for the emotional eating subscale of the TFEQR-18. Participants' mean score for the PSS at baseline was 20.63, representing a moderate level of stress. At post-intervention that mean dropped to 17.63, demonstrating a statistically significant decrease in participants' perceived stress ($p = .04$). In regards to scores on the MSE, participants reported a significant increase in their self-efficacy for mindfulness ($p < 0.01$), with mean scores increasing from 45.19 (range 11–78) at baseline to 58.31 at post-intervention (range 28–84).

5.3. Qualitative

5.3.1. Changes in eating behavior

Participants found new sensory experiences through the ME exercises that resulted in large concurrent changes in ME-related behaviors (see Table 3). For example, one mother stated:

"But I also learned that I can have some and then I say, 'Am I full? Do I really want another slice of pizza?' Because I just normally get it and eat and keep on going. Or, 'Am I full now?' I've been more mindful of, 'That one filled me up. I don't need it now.'"

In regards to taste satiety, sensory awareness, and slowing down while eating to savor a meal or the eating experience, one mother said:

"I have noticed that when I am eating, I do try to savor it more. It's not usually the first bite because I forget, but I remember at some point towards the beginning of the meal trying to remind myself to really taste it and enjoy it."

Participants reported changes in how they selected foods at the grocery store, how they involved their children in the shopping or food preparation processes, and how they fed their children. One mother stated:

"I think the program helped me realize some of the choices I was making were not good, some of the sugary stuff I was giving [my son] and I really wasn't thinking about how much sugar was in that. That's definitely been on my mind and something I am trying to cut back with him on."

Many of the mothers adapted ME skills like sensory awareness to introduce to their children. They often mentioned changing their feeding strategies for children that were picky eaters by encouraging them to taste or touch their foods as opposed to pressuring them to eat. One mother stated:

"We are, instead of making my little boy eat things, I tell him that it's okay to try it; to touch it or smell it or taste it, and if he doesn't want to eat that, that it's okay. But let's at least try a bite or get familiar with it, for him."

Several other mothers related stories about adding fruit or vegetables to their children's packed school or daycare lunches and some mothers mentioned replacing high-sugar snacks like fruit snacks or cookies with whole fruits.

5.3.2. Self-efficacy for mindfulness

The SDP is designed to provide mothers with resources and skills they can use for managing stress. Most mothers expressed high confidence in the focus group and their follow-up interview for making changes related to the program concepts and taking changes they had already initiated further. In spite of this improved self-efficacy, most of the moms also expressed conflicted emotions about the feasibility of

implementing frequent, consistent practice of mindfulness. For example, one mother felt she didn't have enough time alone to focus, saying:

"I would say my confidence that I could do it is maybe 75 percent, but finding the time to have that quiet time ... I would love to be able to just close my eyes, relax, relax my body. I like that one. Even if it's just talking to myself, 'okay, you've got this.' I would love to have that time. It's finding it, it's trying to figure out how I can have that moment to do that."

Still, other mothers expressed low self-efficacy for a variety of reasons, although they often felt conflicted. Some mothers felt that they had been given the tools they needed, but lacked the ability to plan, remember, or implement. For example, one mother stated:

"I'd say I lack confidence in that arena [practicing mindfulness], but as far as generally how to deal, I've got tools now so I feel a little more confident."

5.4. Program feasibility

In total, 59 mothers responded to the open call to participate in this pilot intervention. Two fathers responded, but were ineligible since this program was intended for mothers only. The most common reason for not participating among interested mothers was scheduling conflicts. The biggest challenge in retaining interested, eligible mothers was finding a convenient time for a majority of participants. Two mothers would have needed childcare in order to participate and that was not provided as part of the study. Several mothers were interested, but did not meet eligibility criteria, namely having a child aged 5 or younger. For mothers who were eligible and could meet at the most convenient time, one mother completed baseline data, but was dropped from the remainder of the study after not completing a minimum of three out of the four program sessions due to unexpected personal and professional time conflicts she experienced. Another mother's focus group and interview data were removed from the analysis after she revealed during her interview that she had recently become pregnant. One mother did not participate in the interview because a convenient time could not be determined. All other mothers ($n = 16$) participated in at least three of the four program sessions, the focus group, and the interview.

The overall average rating for satisfaction across all program sessions was 4.36, indicating a high level of satisfaction. For sessions 1, 2, 3, and 4 the average satisfaction ratings were 4.15, 4.26, 4.53, and 4.53, respectively. For each session, the majority of participants reported that the mindfulness practice and the nutrition education were helpful, but the opportunity to learn from each other and share their experiences with other mothers was also commonly reported as helpful. Participants occasionally found the nutrition discussions personally unhelpful, reporting that they already possessed some of the basic knowledge that was presented or because they felt that it did not apply to their lives (e.g. strategies to help picky eating). Other suggestions were related to wanting more time to be spent discussing nutrition topics and sharing experiences among the group. One participant felt that the meditation exercise in Week Three of the program was too "out there" and one participant described being surprisingly uncomfortable when trying to participate in mindfulness meditation on her own. Many participants expressed profound gratitude for the opportunity to focus on themselves, for being able to share experiences with other mothers, making them feel less alone, and for the meditations giving them a chance to relax and improve their self-worth.

6. Discussion

Stress has a major influence on eating behavior, not to mention overall health. Maternal stress may affect not only personal eating behaviors, but also their children's. The SDP showed promising results in a

small sample that mindfulness-based interventions may have measurable effects on maternal stress, in addition to eating behavior, child feeding, and self-efficacy. These results should be interpreted with caution, given the small size of the sample and the study design, but the success of this pilot study justifies additional research. Although it would be impossible to eliminate all stressors from participants' lives, these findings show that in a small sample, mindfulness-based stress management skills learned through only four sessions may help adjust the reaction to stress to be more manageable, more positive, and resilient.

The SDP also showed improvements in self-efficacy for mindfulness. This extends other preliminary findings showing that mindfulness-based stress reduction can help individuals acquire 'present-centered attention awareness,' which is considered foundational to mindfulness by some researchers,^{23,33} and likely contributed to stress reduction. For a brief program like the SDP, cultivation of self-efficacy for behavior and skills is crucial for lasting changes.^{34,35} More studies are needed with larger sample sizes that investigate how long the effects of the SDP can persist and if participants continue with behavior changes initiated during the program for longer than 4–6 weeks.

The uncontrolled eating subscale of the TFEQ-R18 is measuring the tendency to overeat because of subjective feelings of hunger and inability to control food intake and there was a statistically significant decrease in participant scores.²⁷ This is important because it demonstrates the improvements the SDP made on participants' self-regulation of hunger, satiety, and consumption. For the 'Cognitive Restraint' subscale, scores increased, which is a reasonable outcome, given that this subscale is measuring participants' conscious restriction of food. Although food restriction is not taught or discussed in the SDP, a ME practice could logically involve some conscious restriction of food, in order to better align with internal hunger and satiety cues.

Mothers also qualitatively reported making changes in their self-efficacy for practicing mindfulness and eating behavior, including their food selection and preparation decisions, child feeding strategies, and sensory and satiety awareness. In general, mothers felt the program had broad beneficial effects on their relationship to food, eating, and feeding their children. Moreover, they felt that the opportunity to meet and share with other mothers helped them feel less alone, improved their self-worth, and gave them valuable time to focus on their own life.

Despite the success of the SDP, there were several factors that limit the generalizability of this pilot study. This study was a non-randomized quasi-experimental study, so there was no control group to compare to the program participants. As such, causal inference cannot be made yet, regarding the program's effects. Although there were several statistically significant changes in stress and eating behavior demonstrated quantitatively, it was collected using self-report data. These instruments present significant difficulties in determining whether or not the changes are clinically significant.³⁶ The sample size was small and fairly homogenous with the majority of mothers being Caucasian/white and highly educated. More evidence of the use of mindfulness with a racially and ethnically diverse sample is needed. As most of the mothers in this study were highly educated, their incomes reflected this. It is important to investigate the effects of the SDP with populations that have lower incomes or limited resources to see if results are similar, particularly in regards to program feasibility. The follow-up length for this study was only 4–6 weeks and a longer follow-up could demonstrate the need for longer programs or additional training periods to maintain lasting effects.

The strengths of this program are that it is relatively short, compared to longer, more time-intensive and cost-intensive nutrition interventions.^{37–39} For example, one such intervention that focused on low-income mothers showed positive effects following an 8-week intervention with 2-h classes, compared to the SDP's 4-weeks and 1.5-h classes.⁴⁰ The relative brevity allows increased participation from working mothers and mothers who face constraints on their personal time. Early childhood, usually considered birth to eight years,^{41–43} is a

critical period during which taste preferences are developed and eating behavior patterns are established. Moreover, there is an association between maternal stress and child weight status during toddler years, as compared to infancy,¹ with dietary habits being the mediator, highlighting the need to plan interventions or education programs like the SDP that target mothers with young children.²² Future interventions should include dietary assessments of both mother and child to better understand the effects of the SDP on actual dietary consumption patterns.

The uniqueness of this study is the addition of stress management skills, like mindfulness, which have broader benefits than just dietary changes. Other interventions that include stress management skills have found improvements in weight status and eating behaviors that may mediate weight gain, like fruit and vegetable intake.^{44,45} SDP is also an interactive peer-education program, creating a program environment that fosters nonjudgmental discussion. It encourages mothers to act as peer educators, while also providing necessary instruction for skills and behaviors that mothers can retain as a 'toolbox' for future use.⁴⁶

7. Implications for research and practice

Mindfulness-based stress management skills, including ME skills, can have a significant effect on maternal eating behaviors, self-efficacy skills, and stress. This implies that the inclusion of mindfulness in practice-based public health programs continues to show value and that the focus of new studies, as well as nutrition and behavior change programs, should include mindfulness-based stress management skills. Including low-cost mindfulness-based stress management skills in future research and practice-based settings could benefit all mothers regardless of race, ethnicity, or socioeconomic status.

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