Published in final edited form as:
Int J Eat Disord. 2014 January ; 47(1): 1–12. doi:10.1002/eat.22178.

NURTURE: Development and Pilot Testing of a Novel Parenting Intervention for Mothers with Histories of an Eating Disorder

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Abstract

Objective—To describe the treatment development and pilot testing of a group parenting intervention, NURTURE (Networking, Uniting, and Reaching out To Upgrade Relationships and Eating), for mothers with histories of eating disorders.

Method—Based on focus group findings, extant research, and expert opinion, NURTURE was designed to be delivered weekly over 16 (1.5 hour) sessions via an interactive web conferencing forum. It comprises four modules: 1) laying the foundation, 2) general parenting skills, 3) eating and feeding, and 4) breaking the cycle of risk. Pilot testing was conducted with three groups of 3–6 mothers (N = 13) who had children ages 0–3 years to determine feasibility (e.g., retention), acceptability (e.g., feedback questionnaire responses), and preliminary efficacy. Maternal satisfaction with NURTURE and changes in mother-child feeding relationship measures, maternal feeding style, maternal self-efficacy, and maternal psychopathology (eating disorder, depression, and anxiety symptoms) across three time points (baseline, post-treatment, 6-month follow-up) were examined. All outcomes were exploratory.

Results—The intervention was well tolerated with a 100% retention rate. Feedback from mothers was generally positive and indicated that the groups provided an engaging, supportive experience to participants. We observed changes suggestive of improvement in self-reported maternal self-efficacy and competence with parenting. There were no notable changes in measures of maternal feeding style or psychopathology.

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Discussion—NURTURE is a feasible, acceptable, and potentially valuable intervention for mothers with eating disorder histories. Results of this pilot will inform a larger randomized-controlled intervention to determine efficacy and impact on child outcomes.

Although eating disorders can affect fertility,[1] women with eating disorders can and do become mothers. Mothers with eating disorder histories may face unique parenting challenges, especially with tasks related to feeding, growth, and development. Infants of mothers with eating disorder histories are at increased risk for feeding problems,[2,3] which can cause mothers distress over time.[3] In mothers with eating disorders, restrictive feeding practices,[4] conflict with infants during mealtime,[5] and concern about child weight and shape are more common than in mothers without eating disorders.[5] Critically, these mothers are concerned about offspring health but report lacking self-efficacy with regard to developing a healthy family feeding environment,[6–8] positive body image, and self-esteem in their children.[6,9] By providing mothers with the support they desire, we may be able to enhance their parenting self-efficacy and to assist them with creating a more protective environment for their children.[5,10] Our group previously published a review[9] on the topic of early intervention for mothers with eating disorders along with preliminary focus group results which represented formative work for the current study. Here, we present the treatment development and pilot testing of a parenting intervention for mothers with histories of eating disorders.

Early parenting interventions may benefit both mothers with eating disorders and their children, particularly with respect to growth, nutritional status, and parent-child feeding interactions.[5,6,11,12] However, there is a need for interventions for mothers with eating disorder histories[9,13] (not just active symptomatology) and in the first few years post-partum.[2,3,5] Intervening during the offspring's infancy is strategic. First, infants are completely dependent on the parent for nutrition and succor. As eating habits can be established as early as 2 years of age,[14] mothers have maximum effect on the emergence of their children's eating patterns during this early developmental stage. Second, a voluminous literature[14] supports that early intervention is critical to establish healthy lifestyle habits; changing unhealthy habits is harder than shaping initial healthy habits, and such change becomes increasingly difficult as children age. Further, mothers may be more receptive to learning information to plan for their child's healthy future than to altering entrenched parenting behaviors. Finally, mothers with eating disorder histories are often eager to receive parenting advice during their transition to motherhood, reporting concerns about breastfeeding, mealtime interactions, and the effect of their eating disorder on their child's early development.[6–8] Intervening early can capitalize on a mother's motivation for guidance and change.

We developed NURTURE (Networking, Uniting, and Reaching out To Upgrade Relationships and Eating), a 16-session group parenting intervention for mothers with histories of an eating disorder who had children 0 to 3 years of age, to address this need. Based on focus groups[9] and the extant parenting and eating disorder literature, the aims of the intervention were to enhance the mother/child feeding relationship, to empower mothers to establish healthy eating and weight environments for their children, and to support mothers in general parenting. We conducted a small pilot study of this intervention (N = 13)

to test the feasibility, acceptability, and preliminarily to explore efficacy of the intervention to inform a subsequent larger randomized-controlled trial. In line with our intervention aims, exploratory outcomes included measures of the mother-child feeding relationship (primary), maternal feeding style, and maternal self-efficacy with parenting skills (secondary). We also assessed maternal psychopathology (depression, anxiety, and eating disorder symptoms) to monitor for unfavorable outcomes across the intervention. Because parenting concerns might differ between mothers with binge eating disorder (BED) and mothers with anorexia nervosa (AN) and bulimia nervosa (BN), this study focused only on mothers with histories of AN or BN spectrum disorders.

METHODS

Participants and Procedure

Participants were mothers with eating disorder histories who had children ages 0 to 3 years old at the time of assessment recruited from the UNC Eating Disorders Program; Duke Center for Eating Disorders; obstetricians', pediatricians', and midwives' offices; public service announcements; email announcements for local university employees; and flyers posted in grocery stores, childcare centers, and health clubs between 2009 and 2012. After a brief telephone screening[15] to determine study eligibility an in-person diagnostic screening interview (i.e., baseline assessment) was scheduled. Consent and parental assent were obtained. Inclusion criteria were: i) a lifetime Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*) diagnosis of AN, BN, or eating disorder not otherwise specified (EDNOS)[16] excluding BED; ii) body mass index (BMI) > 18.5 kg/m^2 maintained for at least three months; iii) age 18 years or older; iv) had a child between the ages of 0 and 3 years old; and v) fluency in English. Exclusion criteria were: i) current threshold eating disorder diagnosis because the mixing of these women with recovered (or partially recovered) could trigger or exacerbate eating disorder behaviors in participants. Also, women who are still actively and acutely ill may be best served by addressing parenting issues in the context of individual treatment. Residual subthreshold symptoms did not warrant exclusion as we reasoned that the safest manner in which to strengthen skills to manage other uncontrollable environmental triggers (e.g., media portrayal of the thin ideal) is in a treatment context.; ii) alcohol or drug dependence in the past year; iii) current significant suicidal ideation; iv) developmental disability that would impair benefit from the intervention; v) psychosis, including schizophrenia or bipolar I disorder; or vii) the mother being the subject of social service inquiries regarding child neglect. Mothers were not excluded if they were receiving other psychological treatment.

Sixty-two mothers contacted us about the study. Of those mothers, 41 (66.1%) completed the phone screen; the remainder either failed to return our follow-up calls ($n = 14$), provided an inaccurate call back number ($n = 4$), or were no longer interested in participating in the study ($n = 3$). Of the mothers who completed the telephone screen, 32 (78%) met inclusion criteria. Nine were excluded for not having a lifetime diagnosis of AN, BN, or EDNOS ($n = 5$), low self-reported BMI (< 18.5; $n = 1$), or a child over the age limit ($n = 3$). Of the participants who screened eligible, 23 (71.9%) signed a consent form and parental assent form for their child and completed the baseline assessment. Nine mothers failed to return our

calls to schedule the baseline assessment or were no longer interested in participating. Following the screening/baseline interview, 22 women were eligible to participate and one was excluded for low BMI (< 18.5) measured at baseline. When recontacted to discuss group eligibility, nine (40.9%) of the eligible mothers were either no longer interested in participating in the group or failed to return research coordinator calls. Thus a total of 13 mothers participated in the NURTURE pilot.

Intervention

NURTURE is a manualized 16-session group parenting intervention that was delivered in weekly 1.5 hour sessions over a 4 month period. Development of the manual was based on focus group data,[9] extant research (in eating disorders, parenting interventions, obesity prevention, early child feeding and nutrition, and behavior change), and experts in parenting, feeding, eating disorders, and pediatrics (authors CB, NZ, SM, and EP). The intervention comprised four modules: (1) laying the foundation, (2) general parenting skills, (2) eating and feeding, and (4) breaking the cycle of risk (see Table 1 for details).

The intervention was grounded in Social Cognitive Theory (SCT).[17] SCT emphasizes the interaction among environmental, personal, and behavioral factors, and is widely used in prevention and health behavior modification interventions. The interaction of these factors and the influence of social learning on behavioral outcomes (e.g., parent's modeling of healthy behavior, society's modeling of ideal body types) was emphasized throughout the sessions. The sequence of topic presentation was based on the parenting literature in the context of child resiliency,[18] which highlights the importance of parenting style (i.e., authoritative) in preventing problematic child behaviors, weight,[19] dietary intake, and physical activity.[20] Thus, NURTURE first provides mothers with a general framework of parenting strategies and then helps them embed skills and information within this framework. Healthy parenting feeding styles (i.e., responsive vs. restrictive) and a general philosophy towards nourishment was emphasized based on Ellyn Satter's work,[21] which was cited by the American Academy of Pediatrics as a healthful approach to feeding that promotes the development of hunger and satiety.[22] As recommended in the literature,[23] the intervention focused on increasing overall resilience factors not just on reducing eating disorder-specific environmental exposures. The procedure for development of the intervention itself was based on the stage model of psychotherapy development.[24]

Group members actively participated in every session. Sessions followed a general format: homework review, interactive discussion of new material, and homework with personalized goal setting. Group leader scripts included activities, such as self-assessment of mealtime behaviors, that group members completed and reported to other group members during the group. In addition, all didactic content included discussion of examples from group members. Examples of skill building strategies included role plays (e.g., making requests of a spouse for more help with childcare) and guided visualizations (e.g., imagining the steps of more relaxed mealtime interactions). Discussion also centered on sharing thoughts, feelings, and reactions to the group material and providing feedback and support to other group members. Relevant readings and homework was completed between sessions to build mastery.

The study was originally designed as a small, randomized, delayed entry controlled trial with participants randomized to receive the intervention either immediately (immediate group) or at a later time point (16 week delayed entry control group) in a face-to-face group format. However, our initial experiences with recruitment (high interest but lack of uptake) indicated that two modifications to the study design were needed. First, many mothers who expressed interest in the program reported that time constraints, scheduling conflicts, and babysitting challenges precluded their participation in an out-of-home group. Thus, to improve uptake, the intervention was modified to take place through an online web conferencing program offered by FuzeBox (www.fuzebox.com). This software program enabled therapists to present all the same information in web conferencing that they could face-to-face. Group sessions were conducted in a password-protected chat room where participants communicated with each other and the therapist via both chat and telephone. Video was not used and participants could use an agreed-upon pseudonym in the meeting space to remain completely anonymous. Second, because of recruitment delays, we directed resources into an uncontrolled pilot to demonstrate feasibility and uptake. Our results now reflect pre-test, post-test, and follow-up assessments of all mothers who participated in the web conference version of the intervention.

Group facilitators were highly experienced PhD psychologists with experience in the provision of psychotherapy for eating disorders and group interventions (NZ, FU). Facilitators were specifically trained in the delivery of the NURTURE intervention and followed the therapist manual. All sessions were audiotaped and reviewed throughout the study by the primary investigator (CB), who co-developed the treatment manual, to monitor protocol fidelity. Treatment groups comprised three to six participants each (Group A: $n = 3$; Group B: $n = 6$; Group C: $n = 4$). Two therapists lead each session.

Assessment Protocol

Assessments were conducted at baseline (T1), post-treatment (T2), and 6-month follow-up (T3) and included face-to-face semi-structured interviews (T1 only), video coding of a feeding interaction (T1 and T2 only), and self-report measures (all time points). Baseline assessments and videotaped sessions were conducted in the participant's home or at the participating university clinic. T2 and T3 self-report assessments were mailed to the participant. Trained master's level therapists administered all assessments.

A detailed description of the videotaped maternal child feeding session protocol has been published elsewhere.[25] In short, two study staff filmed mothers feeding their child at a typical mealtime in either their home environment (>80% of recordings) or in the UNC biobehavioral lab observation room. The UNC biobehavioral lab includes a nutritional research and behavioral observation suite, which consists of a room equipped with dining room furniture and home equipment to provide a space for family interactions and feeding sessions while conducting non-invasive monitoring. Six in-wall cameras span the room, and an adjacent monitoring studio includes camera navigation equipment and video recording. Study staff recorded the entire feeding interaction, including 10 minutes before the meal to increase mothers' comfort with being videotaped. If the mother felt the mealtime was "not typical," another meal was filmed on a different day. The feeding videos were coded by two

research assistants who underwent extensive training (7-day workshop) in the observational coding system described below (*Responsiveness to Child Feeding Cues Scale)*.[26] Criterion coders achieved intraclass correlation coefficients of ≥0.80 during practice codings.

Participants were reimbursed $20 for completing T2 assessments and $25 for completing T3 assessments. There was a 100% completion rate from eligible participants. The Biomedical Review Board of the University of North Carolina at Chapel Hill approved all study procedures.

Measures

Biographical and Anthropometric Data—A self-report survey gathered information on age, sex, race and ethnicity, parity, and index child birth weight. Weight and height were measured at baseline to calculate maternal BMI (kg/m^2).

Eating Disorder Examination (EDE).[27]—The EDE, a widely used semi-structured interview, was administered at baseline to determine whether participants met current threshold criteria for an eating disorder in the last 28 days.

Structured Clinical Interview for DSM-IV Axis I Disorders - Patient Edition (SCID-I/P), selected modules.[28]—The SCID-I/P, a widely used semi-structured diagnostic interview, was used to assess lifetime eating disorder history and other psychopathology involved in study exclusion.

Acceptability

Exit Interview—A self-report feedback survey (administered at T2), designed for this study, assessed acceptability of the intervention. Mothers reported the degree to which they liked/disliked the intervention on a scale ranging from 0 to 6, and responded to questions about the duration and number of sessions, the topics covered, perceived benefits of participation, comfort level, and overall satisfaction with the intervention.

Mother/child feeding relationship observational ratings

Responsiveness to Child Feeding Cues Scale (RCFCS).[26]—The RCFCS is an observational coding system that was used to assess parent-child interaction during meal times. Raters code the presence, frequency, duration, and strength of both child feeding cues and appropriateness of maternal response to these cues. The coding system yields three scores representing maternal responsiveness to child *hunger cues*, *receptiveness cues*, and *fullness cues*. Scores range from 1 (highly unresponsive) to 5 (highly responsive). Because home visits were scheduled at typical mealtimes and food preparation began immediately upon filming, child hunger cues were not captured and maternal responsiveness to these cues could not be evaluated. The coding system also captures *infant's affect*, with the following ratings: 1 (negative), 2 (balanced), 3 (positive), and 4 (flat). Inter-rater agreement was high for the 42.9% of videos that were double coded with a 67–100% agreement between two raters on subscale scores.

Maternal feeding style and self-efficacy ratings

Infant Feeding Styles Questionnaire (Beliefs and Behaviors) (IFSQ).[29]—The IFSQ measured parents' beliefs about how to feed their child (39 questions) and perceived acceptable feeding behaviors (44 questions). Items were rated on a 5-point scale (1 = disagree/never; 5 = agree/always). Means were calculated from response items to form 13 sub-constructs previously validated in a confirmatory factor analysis[29] and subsumed within five major feeding styles. These styles, calculated by averaging related sub-construct mean scores (2–4 scores per feeding style), are indulgent (parents do not limit either the quantity or quality of foods their child consumes); responsive (parents both monitor the quality of their child's diet and attend closely to their child's hunger and satiety cues); restrictive (parents place limits on the quantity of food their child consumes and limit their child's intake to healthy foods); pressuring (parents may use foods as comfort for their child and pressure their child to eat more); and laissez-faire (parents do not control intake in quantity or quality and have a hands-off approach to feeding). This measure has good internal reliability for the sub-constructs ranging from 0.75 to 0.95.[29]

Parenting Sense of Competence Scale (PCOS).[30]—Parental self-efficacy was assessed using the Efficacy subscale (PES) of the PCOS, a self-report measure of perceived competence, problem-solving ability, and capability in the parenting role. The PCOS is comprised of 16 questions, each scored on a 6-point scale (1 = strongly agree; 6 = strongly disagree). Mean scores of seven items make up the PES. Higher scores reflect greater efficacy. The measure yields internally consistent scores ($\alpha = 0.89$ for current sample).

Child Interaction Survey *(CIS; also known as the* Parent Attribution Test).[31]—The CIS provides a measure of adults' perceived control or power in influencing caregiving outcomes. Parents respond to 18 items about potential causes of successful and unsuccessful interaction with children. Items are scored on a scale of 1 (not at all important) to 7 (very important). Two categorical composite scales are formed, each based on the median of six items to signify whether parents are "high" (median > 3.5) or "low" (median ≤ 3.5) on *perceived adult control over failure* (ACF; i.e., unsuccessful caregiving outcomes attributed to parental factors such as "parental tactics") and *perceived child control over failure* (CCF; i.e., unsuccessful caregiving outcomes attributed to child factors such as "child stubbornness"). Respondents who score low on the ACF and high on the CCF are described as having a "low perceived balance of power." This measure is a valid predictor of stress reactivity,[32] and has moderate 2-month test-retest reliability.[33]

Maternal Psychopathology

Beck Depression Inventory-II (BDI).[34]—The BDI, a 21-item self-report questionnaire, assessed depression symptom severity (two weeks prior to testing). It yields internally consistent scores in postpartum mothers ($\alpha = 0.94$)[35] and high 1-week test-retest reliability ($r = 0.93$).[34]

Beck Anxiety Inventory (BAI).[36]—The BAI, a 21-item self-report survey, measured anxiety symptom severity. The BAI converges with other measures of anxiety and has good reliability and validity.[36]

Eating Disorders Examination—Questionnaire (EDE-Q).[37]—The EDE-Q, a 38-item self-report measure based on the EDE that yields comparable outcome scores, assessed interim changes in eating disorder symptoms over the course of the study. It has high internal consistency (α = 0.78–0.93) and two-week-test-retest reliability (r = 0.81–0.94).[38]

Statistical Analysis

Descriptive statistics included means and standard deviation for continuous variables and count and percent frequencies for categorical variables. Measures of centrality were used to characterize responses on our measure of acceptability (feedback questionnaire responses).

To test the association between the feeding relationships from T1 to T2 we used a paired *t*-test in which the outcome at T2 was subtracted from the T1 value for each participant. These differences were then analyzed with a *t*-test. Tests were two-tailed and a *p*-value of < 0.05 was considered statistically significant. We also examined graphical summaries consisting of boxplots and histograms by time point to assess centrality and dispersion. Given this was a pilot study with 13 participants, the latter method was employed for secondary outcomes and no statistical testing was conducted. In addition to visual examination of distributions, we calculated mean paired differences between T2 and T1 for the secondary measures. These differences are subject to considerable variation, providing limited information regarding size of any treatment effect. Statistical analyses were done with SAS/STAT software,[39] Version 9.2 of the SAS System for Windows XP. Graphics were handled in the ggplot2 package in R software.[40]

RESULTS

Sample Characteristics

All mothers were White with a mean age of 32.3 years (*SD* = 4.5) and mean BMI of 24.4 (*SD* = 3.2; range = 20.5–31.9) at T1. Most mothers were highly educated (58.3% had a post graduate degree; 25.0% were college graduates; 16.6% had a GED/high school diploma or some college). A little over half (58.3%) of the index children were girls. The average age of the index child at baseline was 16.7 months (*SD* = 10.9; range = 2.7–35.7) and the average birth weight was 6.9 lbs (*SD* = 0.9; range = 6–9). Most mothers (75%) had one child; two mothers had two children and one had five children. About 58% of mothers had a history of AN, 54% had a history of BN, and 9% had a history of AN or BN with an additional period of BED.

Feasibility and Acceptability

We assessed feasibility and acceptability by tracking attendance and dropout and reviewing responses on the T1 feedback questionnaire. All 13 mothers participating completed at least 80% of sessions (defined as “treatment completers”). One of these mothers discontinued early after session 14 due to a self-reported worsening of eating disorder and depressive symptoms; this mother had the highest T1 EDE-Q global score (5.02) of all participants.

Participant responses on the feedback interview were positive (n = 12, missing data for one participant; see Figure 1). Eleven participants (n = 11; 91.7%) considered NURTURE

sessions enjoyable, and all but two participants (*n* = 10; 83.3%) "moderately" to "strongly" agreed that participation in the group was helpful. The majority of participants reported feeling comfortable in the group setting (*n* = 11; 91.7%), comfortable sharing/participating (*n* = 11; 91.7%), comfortable with other members (*n* = 11; 91.7%), and comfortable with group leaders (*n* = 11; 91.7%). Nine participants (75%) thought that the NURTURE topics addressed their concerns, with two participants "neither disagreeing nor agreeing" with this statement and one "disagreeing" with this statement. Eleven participants (*n* = 11; 91.7%) reported that they would "strongly" recommend the intervention to other concerned mothers. Future interventions may consider decreasing the number of sessions, as a little over a quarter of participants (*n* = 4; 33.3%) felt that there were too many sessions.

Preliminary Efficacy

Mother/child feeding relationship (primary outcome)—There was no significant change across time points (T1 to T2) on the *responsiveness to fullness* cues ($t(10) = 2.04$, *M*difference = 0.82, *SD* = 1.33; $p = 0.07$) and *responsiveness to receptiveness* cues ($t(10) = 1.08$, *M*difference = 0.36, *SD* = 1.12; $p = 0.31$) scales (Appendix A). The modal score on the *responsiveness to receptiveness* cues at baseline was a 5 (highest possible score), and this score was maintained at T2. There was no variability in *infant affect* with all values falling at a score of 2, representing "balanced" (positive and negative) infant affect.

Maternal feeding style—There was no clinically significant change across time points on any feeding subscales (Appendix B; T3 data not shown). With the exception of restrictive feeding, all styles showed a mean score change at or less than 0.1.

Maternal self-efficacy and competence with general parenting skills—There was no observed change in maternal efficacy (PES) from T1 to T2 (*M*difference = −0.1, *SD* = 0.9; Appendix B) but there was a slight increase in score by T3 (*M*difference = 0.4, *SD* = 1.4; data not shown). On the CIS, the percentage of mothers who had *low perceived balance of power* (with regard to influencing caregiving outcomes) was 0% at T1, 15.4% (*n* = 2) at T2; and 0% at T3. The percentage of mothers with *high perceived adult control over failure* (ACF) was greater at follow-up (*n* = 13; 100%) than at T1 (*n* = 11; 84.6%; percent difference = 18.2%), and the percentage of mothers who scored high on the *low child control over failure* (CCF) decreased at T3 (*n* = 25%) from T1 (*n* = 38.5%; percent difference = −35.1%), suggestive of improving scores on this outcome over time.

Maternal psychopathology—There were point changes in maternal psychopathology that were not clinically meaningful (Appendix B). For the BDI the mean score increase was 3.1 (*SD* = 7.9) from T1 to T2. However, there was an outlier with a T2 BDI score of 34 (severe depression), an increase from a T1 BDI of 10 (mild depression); this was the same participant who began treatment with relatively high EDE-Q scores and who reported a resurgence of eating disorder cognitions during the study. The mean scores on the BAI both at T1 (*M* = 6.1, *SD* = 4.2) and T2 (*M* = 7.7, *SD* = 7.6) fall in the "minimal anxiety" symptom severity. Little change was observed in eating disorder symptoms (EDE-Q global score; *M*difference = 0.2, *SD* = 1.1) from T1 to T2. No changes were observed from T1 to T3 (data not shown).

DISCUSSION

This small pilot study of a novel group parenting intervention (NURTURE) for mothers with histories of an eating disorder with children age 0 to 3 years demonstrates acceptability and provides guidance for enhancing the feasibility of parenting interventions for this population. We observed suggestions of improvement in self-reported maternal self-efficacy and competence with parenting, but no notable changes in the mother-child feeding relationship or maternal feeding style. Consistent with the expectations of pilot studies and given our small sample size, all outcome results are preliminary and should be interpreted with caution.

An important outcome of this pilot study was related to the feasibility of delivering this type of intervention to mothers with young children. Of the 32 initially screened eligible to participate, only 13 mothers (40.6%) ended up participating in the intervention. During initial recruitment, mothers reported several barriers to *in-person* group attendance, including time constraints, scheduling conflicts, and child care challenges. Bryant-Waugh et al.[11] also struggled with recruitment in their face-to-face group parenting intervention study for mothers with active eating disorders (and children under age 5 years), reporting that only 37% of the mothers eligible to participate elected to do so. Reasons mothers declined participation were not documented, but the authors noted[11] that many of the mother participants reported guilt related to leaving their child under the care of others or for prioritizing their personal needs. Qualitative findings support these observations (e.g., Tierney et al.),[7] and also suggest that a fear of being judged by others may have been a barrier to attendance. In our study, uptake improved rapidly when we altered the format, offering groups in the convenience of the participant's home after children went to bed via online web conferencing. It is possible that the online format provided the convenience that accommodated these mother's schedules and guaranteed a degree of anonymity that allowed mothers to feel more comfortable discussing the sensitive topics of parenting and eating disorders without feeling judged.

Although there are limitations to this delivery mode, once mothers agreed to participate, we had a 100% retention rate and feedback on the intervention from the mothers was mostly positive. All but one mother found the group intervention "extremely helpful," and all (but that same one mother) were generally satisfied with the structure and content of groups. Discussing their concerns in an online group format appeared comforting and the vast majority of mothers reported feeling supported and understood by group facilitators. Mothers were overwhelmingly thankful for the group, and most mothers expressed a strong desire to remain in contact with other group members for continued support in the years to come. Some mothers even asked to participate in the next wave of groups offered at the study site clinical program.

Feedback from the end-of-study survey which showed that a little over a quarter of participants felt there were too many sessions, together with feedback from participants in Bryant-Waugh et al.'s[11] 8-session group in which participants expressed a desire for more sessions, suggests twelve 90-minute group sessions might be an ideal duration for the

intervention. Future interventions should consider decreasing the number of sessions to enhance cost-efficiency.

Because this was a pilot study, we did not expect to observe significant improvement in outcome measures across the intervention. However, it was important to pilot our assessments in much the same way we were piloting the intervention and to monitor for any unfavorable outcomes. With reference to parenting scores (RCFCS, IFSQ), one reason we may not have seen significant shifts is that many mothers already scored high or low on these scales, suggesting possible ceiling and floor effects and that they were already doing fairly well in these areas.

Despite preliminary evidence that the mothers with eating disorder histories are anxious during infant feedings[41] and concerned about feeding interactions,[9] the mothers in our study had scores within normal range[26] on our feeding interaction measure at baseline. They scored highest on the responsive feeding style, demonstrating appropriate responsiveness to their infant's fullness and receptiveness cues and generally good feeding practices prior to receiving any education or guided support. In addition, their infant's affect was "balanced" with both positive and negative affect expressed during the feeding session. Importantly, the mother-child feeding interaction did not deteriorate with the intervention. Other studies comparing mothers with eating disorder histories and controls include additional markers of the mother-child feeding interaction and show differences between these groups in the frequency of maternal positive and negative comments[42] and infant autonomy (i.e., self-feeding behavior or free access to food)[12] during feeding. Including these measures as outcome variables in larger studies should be considered, as they may tap into other important aspects of the mother-child feeding relationship not addressed in this pilot study.

Maternal self-efficacy, competence, and general parenting may be the most important targets of NURTURE given that pre-intervention scores were least favorable in these domains. Positive trends in maternal self-efficacy and competence with parenting were observed by follow-up. This change could be due to maturation as opposed to effects of the intervention. However, by enhancing a mother's competence with parenting, we may help facilitate continued recovery from the eating disorder[43] and prevent anxiety and depression in these mothers, both of which have the potential to impact infant feeding[3] and parenting effectiveness negatively.[44]

The general absence of deterioration in maternal psychopathology, with one exception, suggests that NURTURE does not exacerbate symptoms. One mother with an initially high EDE-Q score did report a resurgence of eating disorder symptoms and worsening depression during the course of the study. Whether the intervention contributed to this escalation in symptoms is unknown. It is important to determine whether specific aspects of the intervention could be triggering to women with active symptomatology. Both symptom modeling and severity of baseline symptomatology should be considered in future iterations of this work. For example, weekly symptom checklists should be completed throughout these interventions to monitor for any notable clinical change.

This pilot study has several strengths. First, NURTURE was developed using information gathered from mothers in focus groups. Second, as a treatment development project with a pilot trial, we were in a position to explore feasibility and make adjustments based on our observations. Perhaps the most important contribution of this study to the literature is understanding the logistical and emotional challenges faced by mothers with children in this age group. Bringing the intervention to them, rather than requiring them to come to the intervention, is essential for uptake and retention. Further, the web-based format may have had the unintended benefit of increasing anonymity and thus willingness to participate in mothers fearful of being evaluated by others—especially visually. We believe that our ability to retain mothers in treatment and follow-up not only reflects the value of the program to mothers, but also that we were able to accommodate their schedules and lifestyles. Third, we employed a multi-method approach (i.e., self-report and video coding measures), capturing a range of outcome parameters.

Limitations also warrant discussion. First, demonstration of an effect was not feasible. As with most pilot studies, our sample size was small, limiting power to detect even medium and large effect sizes and our ability to control for potential confounding variables such as maternal age and parity. Moreover, the small sample size precluded separation of groups by eating disorder subtype (binge eating/purging vs. restricting), a distinction that is of relevance with reference to maternal feeding styles. Notwithstanding, as recommended by Leon, Davis and Kraemer,[45] clinically meaningful outcomes that demonstrate feasibility should be the focus of pilot investigations. As such, our 100% retention rate and ratings by approximately 90% of participants that the intervention was enjoyable, comfortable, and that they would recommend it to others, is notable. Second, all the mothers in our study were White and highly educated, potentially reducing generalizability. Similarly, although we had strong interest from mothers with past BED to participate in the study, the intervention was only developed for mothers with histories of AN or BN spectrum disorders. Thus, adaptation of the intervention to meet the unique needs of these other groups may be necessary. Third, therapist feedback on the intervention was not recorded in a systematic way; however, in line with conclusions from a recent review[46] the study therapists (NZ, FU) found the intervention delivery method to be practical, convenient, and sustainable over time. Fourth, the ecological validity of our measure of the maternal-child feeding interaction could be questioned. Although observational coding provides an objective measurement of the mother-child feeding interaction, it is possible that demand characteristics or social desirability bias may have affected maternal and child feeding behavior during the observation. However, we took several measures to enhance ecological validity including conducting the assessment in a state-of-the-art nutritional lab or in the participant's home and beginning with a "warm-up" period where the mother and child were videotaped for a brief period prior to the feeding sessions and minimizing visibility during the filming by operating behind walls or in corners of the room. Fifth, the feeding assessment, IFSQ, used in this study has not yet been validated with mothers with eating disorders, and it may fail to capture subtle restrictive feeding practices.[25] Sixth, concurrent psychological treatment was allowed but due to survey completion errors could not be reported reliably. Finally, all mothers in our sample had a history of an eating disorder or a current subthreshold status;

applying this intervention to mothers with current threshold eating disorders may produce different results.

An important future question is whether parenting interventions such as NURTURE can help prevent eating disorders in offspring and break the "cycle of risk"[5,10] for eating disorders across generations. Our intervention started with the youngest of children in response to maternal feedback from focus groups. Whether these interventions will have enduring effects on child outcomes remains an open question and one that is untestable with the current design.[45] Anecdotally, many mothers in our study spontaneously commented on their desire for further intervention as their children (especially girls) enter puberty and experience changes in their body shape and weight. Additional developmentally appropriate modules are worth exploring to determine whether they assist mothers in dealing with various developmental stages their children traverse, each of which may pose unique challenges to women with an eating disorder history.

Conclusions

The high uptake (after modification of delivery approach) and retention rate, positive scores on feedback questionnaires, and preliminary outcome results suggests this parenting intervention for mothers with histories of eating disorders and their infants aged 0 to 3 years is feasible, acceptable, and may improve maternal self-efficacy and competence with parenting. Delivering this intervention via an interactive web conferencing forum appears to provide an engaging, non-threatening experience to participants, and has the potential to be a cost-effective way of supporting mothers even in distant locations. A necessary next step is to modify this intervention based on preliminary results and recently published data[11,12] and to test the efficacy of this intervention in a larger randomized-control trial including both child and mother outcome measures while controlling for potential confounding variables. Further, identifying moderating variables is necessary to inform for whom this intervention is best suited. NURTURE is the first step in a programmatic series of developmentally appropriate intervention modules (e.g., infancy/toddlerhood, childhood, puberty, adolescence) that we hope to develop and disseminate for mothers with eating disorder histories. Given the ubiquity with which mothers report concerns about how best to talk with their children about weight and eating issues, NURTURE may also have broader applicability to mothers without such histories as well.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We thank all the mothers and their children who participated in this study.

This research was supported by the NIH/NIMH Grant 1R34-MH080750-01 (PI: Bulik) and NIH Grant F30-MH087998 (PI: Hoffman). Drs. Runfola and Ulman were supported by the NIH Grant T32-MH076694 (PI: Bulik). Dr. Zucker was supported by NIH Grants R01-MH078211 and K23-MH070418. Dr. Zerwas was supported by the CTSA (UL1RR025747) and the NIH Building Interdisciplinary Careers in Women's Health award (K12-HD01441).

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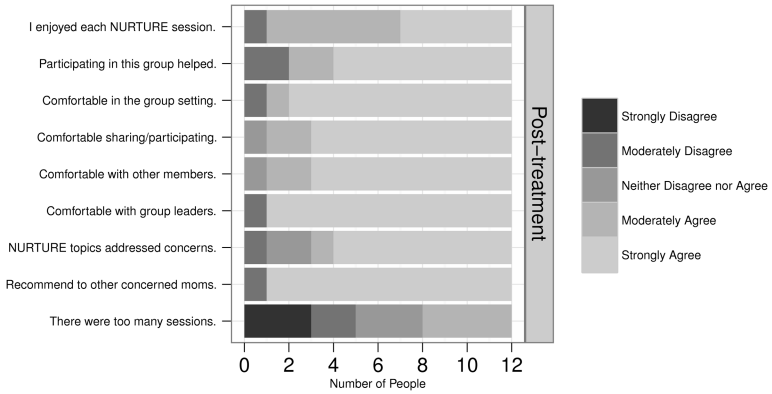

Figure 1.

Participant responses on the post-treatment feedback interview.

Table 1

NURTURE intervention timeline: Modules, topic areas, and aims

Week	Module	Topic Area & Aims
1–3	**Laying the Foundation**	**1. Introduction to group** Aim: To help the mothers gain a broad understanding of the purpose of the treatment and to establish group cohesion. **2. Understanding genetic and environmental influences on disordered eating** Aim: To increase maternal confidence and competence in the degree to which they can positively impact their child's growth irrespective of potential genetic liability to risk of eating disorders.
4–7	**General Parenting Skills**	**3. Empowering mothers to parent effectively** Aims: To describe different parenting styles; to teach or strengthen approaches to increase desired behavior in children; to enhance social support; and to increase confidence in general parenting skills. **4. Improving communication skills** Aim: To empower mothers to be agents of change by refining skills in emotion regulation, communication, and behavior management.
8–10	**Eating and Feeding**	**5. Making progress with behavior change** Aim: To teach mothers how to problem solve effectively and change ineffective or maladaptive behaviors related to eating and mealtimes that pose risk to either themselves or their child. **6. Creating a healthy mealtime environment** Aims: To provide mothers with basic information on child nutrition; to teach mothers how to interpret both their own and their child's hunger and satiety signals more accurately; and to help them promote healthy eating patterns in their children (via family meals and food regulation). **7. Using problem-solving to change child behavior and promote healthy body image** Aim: To have mothers gain experience with successfully changing child eating behavior; to identify ways to enhance their child's body esteem.
11–16	**Breaking the Cycle of Risk**	**10. Developing accurate vigilance of child behavior** Aim: To help mothers develop appropriate and accurate vigilance of eating disorder behavior and weight related concerns in their child. **9. Developing media literacy and resisting sociocultural pressure for thinness** Aim: To teach mothers how to protect their child from social forces and media images that promote unhealthy weight management behaviors. **10. Wrap-Up** Aim: To review skills and heighten mother's awareness of challenges they may face as their children age and ways to generalize skills learned to these situations. **A "flex session" is included for more time or practice on a topic of choice.*