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Randomized, Controlled Trial of Motivational Interviewing to Support Breastfeeding among Appalachian Women

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Abstract

Objective: To determine the effectiveness of a single session of prenatal motivational interviewing (MI) to enhance breastfeeding outcomes.

Design: A randomized, controlled trial with two groups (MI and psychoeducation) with repeated measures: preintervention, postintervention, one month postpartum.

Setting: The intervention was conducted at a university-associated clinic, community locations, and participants' homes. Postpartum follow-up was conducted by telephone.

Participants: A total of 81 women with low-risk pregnancies enrolled at 28 to 39 weeks gestation who lived in Appalachia.

Methods: Participants were randomly assigned to MI or psychoeducation on infant development. Pre and postintervention outcome measures included intention to breastfeed, confidence in and importance of breastfeeding plan, and breastfeeding attitudes. At one month postpartum, participants completed a telephone interview to assess actual breastfeeding initiation, exclusivity, and plans to continue breastfeeding.

Results: At one month postpartum, women in the MI group were more likely to report any current breastfeeding than women in the psychoeducation group, regardless of parity, $\chi^2(1, N=79) = 4.30, p = 0.040, \Phi = .233$. At postintervention, the MI intervention had a significant effect on improving attitudes about breastfeeding among primiparous women only ($p < .05$).

Conclusion: One session of MI was effective to promote breastfeeding at one month postpartum and to enhance positive attitudes towards breastfeeding among primiparous women in Appalachia.

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Disclosure

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Precis

A single session of motivational interviewing promoted breastfeeding at one month postpartum among women of mixed parity and enhanced breastfeeding attitudes among primiparous women in Appalachia.

Keywords

breastfeeding; motivational interviewing; lactation; Appalachia; prenatal

Breastfeeding is recognized as the ideal source of nutrition for infants and is associated with well-documented reduction of risk for various diseases in infants, children, and women who breastfeed (Victoria et al., 2016). Most major organizations that promote health recommend breast milk as the singular source of infant nutrition for the first 6 months of life and complementary provision of breast milk for 1 to 2 years or longer (American Academy of Family Practice Breastfeeding Advisory Committee, 2014; American Academy of Pediatrics, 2012; World Health Organization, 2016). Actual rates of exclusive breastfeeding fall far short of these recommendations. Most women in the United States initiate breastfeeding, but only about one-fourth continue exclusive breastfeeding for 6 months (Centers for Disease Control and Prevention [CDC], 2018).

Breastfeeding behavior is embedded in a complex network of biopsychosocial factors, including culture (Kim, Fiese, & Donovan, 2017), demographics (e.g., older age; Jones, Kogan, Singh, Dee, & Grummer-Strawn, 2011), and psychological variables (e.g., holding positive attitudes towards breastfeeding; Guo, Wang, Liao, & Huang, 2016). Appalachia, a 250,000 square mile geographic and cultural region that spans from southern New York state to northern Mississippi and includes all of West Virginia, has some of the lowest breastfeeding rates in the United States (CDC, 2018; Pollard & Jacobsen, 2017). This low breastfeeding rate is not surprising given the poverty and limited access to prenatal care that affect many parts of the area (Snyder & Thatcher, 2014). Further, Appalachian families are disproportionately affected by adverse perinatal and early childhood health outcomes, such as infant mortality (Singh, Kogan, & Slifkin, 2017), childhood obesity (Berlin, Hamel-Lambert, & DeLamatre, 2013), and dental caries (Neiswanger et al., 2015). Breastfeeding decreases the risk for many of these health concerns (e.g., Reynolds, Hennessy, & Polek, 2014), and thus, interventions to target breastfeeding in this region may have long-lasting, cascading benefits.

Over the past several decades, breastfeeding rates have increased in the United States, likely as result of increased availability of community- and peer-based breastfeeding support groups, changes in state and federal legislation, and targeted public health interventions. This progress, however, has not come without relative cost. The *breast is best* message touted by breastfeeding advocates and ingrained in recent health policies conveys the many benefits associated with breastfeeding but also portrays breastfeeding as a moral issue, which may cause women to feel ashamed for not reaching their breastfeeding goals (Thomson, Ebisch-Burton, & Flacking, 2015).

In addition, health care providers' understandable enthusiasm about breastfeeding may lead them to give inconsistent advice to women regarding feeding practices. Although advice from health care professionals can be effective to increase breastfeeding initiation and duration (Hannula et al., 2008), many new mothers reported advice that was inconsistent or confusing (Schmied, Beake, Sheehan, McCourt, & Dykes, 2011). This type of advice caused frustration and negatively affected breastfeeding outcomes (Eisenberg, Bair-Merritt, Colson, Heeren, Geller, & Corwin, 2015). Clearly, interventions that avoid confusing advice and use a patient-centered, strengths-based approach are needed, and motivational interviewing (MI) is such an intervention. Motivational interviewing is a patient-centered, psychosocial intervention designed to help individuals increase readiness for behavior change by increasing intrinsic motivation and resolving ambivalence (Miller & Rollnick, 2013). Behavior change is promoted through the elicitation of change talk, or arguments for behavior and behavior change verbalized by the patient.

This study was guided by the Theory of Planned Behavior (TPB; Ajzen, 1991), which posits that human behavior can be predicted through behavioral intention that is determined by an individual's attitude towards the behavior, perceived control of the behavior, and the individual's perception of the subjective norms of the behavior (Ajzen, 1991). The TBP has been used as a framework for understanding breastfeeding behavior and for guiding the development of behavioral interventions to improve breastfeeding outcomes in a variety of populations, including rural women (Giles et al., 2014; Wilhelm, Rodehorst, Stepan, Hertzog, & Berens, 2008). Many studies have measured the association between intention to breastfeed and actual breastfeeding behavior, and found that the two are positively correlated (Thomas-Jackson et al., 2016).

Findings from existing studies suggest that MI may be a promising tool with which to change women's breastfeeding behaviors. Specifically during pregnancy and the postpartum period, MI was associated with stronger intention to breastfeed, earlier breastfeeding initiation, fewer breastfeeding problems, higher breastfeeding self-efficacy (Cangöl, & ahin, 2017), and higher rates of exclusive breastfeeding at 4 months postpartum than control group interventions (Elliott-Rudder, Pilotto, McIntyre, & Ramanathan, 2014). Results of other studies suggested that MI might be effective to increase intention to breastfeed, exclusivity, and duration, but researchers noted attrition or small sample sizes as possible issues for lack of significant findings (Tuthill et al., 2017; Wilhlem et al., 2006). Multisession interventions may help bolster therapeutic effects, however, as has been found in the literature on breastfeeding promotion, multi-session trials often suffer from participant attrition. Research suggests that a single session of MI can be efficient and effective to modify behavior, such as smoking (Lindson-Hawley, Thompson, & Begh, 2015) and poor oral hygiene (Rigau-Ray, Claver-Garrido, Benet, Lusilla-Palacios, & Ustrell-Torrent, 2018). Practically speaking, a single session of MI is more conducive to implementation in maternity care settings than a multiple-session intervention. Although breastfeeding may be a priority for many maternity care providers, including nurses, they likely do not have time to provide breastfeeding education and support at multiple visits.

Notably, none of the existing studies on MI included treatment integrity measures, and few targeted women during pregnancy, which is when most women decide how they will feed

their infants (Chantry, Eglash, & Labbok, 2015). More research on prenatal interventions with clear MI-adherent treatment protocols is needed to fully elucidate effectiveness of MI to promote breastfeeding, especially among populations whose breastfeeding initiation and duration rates fall short of established guidelines (AAP, 2012, American Academy of Family Practice Breastfeeding Advisory Committee, 2014; World Health Organization, 2016), such as women in Appalachia (Wiener & Wiener, 2011).

The purpose of our study was to determine the effectiveness of a single session of MI delivered during the third trimester of pregnancy to enhance the following variables: intention to breastfeed; confidence in and importance of breastfeeding plan; breastfeeding attitudes; and actual breastfeeding initiation, exclusivity, and plans to continue breastfeeding at one month postpartum. Targets of the MI intervention were based on the Theory of Planned Behavior (Ajzen, 1991).

Methods

Design

We used a two-group, repeated measures, single-blind, randomized, controlled trial to determine the effects of MI on intention to breastfeed; confidence in and importance of breastfeeding plan; breastfeeding attitudes; and actual breastfeeding initiation, exclusivity, and plans to continue breastfeeding at one month postpartum. Women living in Appalachia were recruited from obstetric and family medicine clinics; Special Supplemental Nutrition Program for Women, Infants, and Children centers, and through online advertising from October 2016 through April 2017. The study consisted of an in person visit during the third trimester of pregnancy and a follow-up phone call at one month postpartum. Data were collected at the in person visit at baseline (preintervention), immediately after the intervention (postintervention), and by telephone at one-month postpartum. The research protocol was approved by the Institutional Review Board at West Virginia University (protocol ID #: 1605123038).

Sample

Pregnant adult women (≥ 18 years of age) were eligible to participate if they were at 28 to 39 weeks gestation, had singleton fetuses, and had access to a telephone. We began the trial with recruitment of only primiparous women for the first 3 months. Because of low recruitment, we opened the trial to all pregnant women, regardless of parity. We adjusted randomization blocking methods accordingly to distribute primiparous women equally between groups. We excluded women from participating if they had medical conditions that affected comprehension of study procedures and/or how to breastfeed (e.g., intellectual disability, infectious disease, and history of mastectomy/lumpectomy; Levison, Weber, & Cohan, 2014), fetuses with known congenital birth defects that would affect breastfeeding, were taking medications contraindicated during breastfeeding (American Academy of Pediatrics, 2001), or had active substance use (Moretti, Lee, & Ito, 2000).

We determined an acceptable sample size by examining previous literature. Previous studies on the utility of MI for breastfeeding had sample sizes that ranged from 53 (Wilhelm,

Aguirre, Koehler, & Rodehorst, 2015) to 330 (Elliott-Rudder et al., 2014); most sample sizes did not exceed 75 participants. Effect sizes in these studies were in the small to medium range ($d = .24 - .30$, $OR = 1.40-1.81$). More generally speaking, effect sizes in randomized, controlled trials on MI vary greatly ($d = .10 - .90$; $OR = 1.10 - 3.20$) depending upon the target behavior to change, the type of provider who delivers the intervention, and the strength of the control group intervention (Lundahl & Burke, 2009). Effect sizes among studies on the effects of lactation training or breastfeeding promotion interventions on breastfeeding outcomes varied similarly (Bonuck et al., 2014; Chung, Raman, Trikalinos, Lau, & Ip, 2008). Effect sizes of MI tend to decrease as the temporal distance increases between the intervention and measurement time point (Lindson-Hawley et al., 2015). Considering previous literature, our strong control condition (psychoeducation on infant development), and the fact that we measured dependent variables only 2 to 4 months following the intervention delivered during pregnancy, we set our desired effect size at .65. According to Cohen's (1988) guidelines, an effect size of $d = .65$ is considered medium to large.

Using the power analysis program GPower 3 (Faul, Erdfelder, Lang, & Buchner, 2007), an a priori calculation indicated that to detect differences between groups with power of .8, effect size of $d = .65$, and $\alpha = .05$, with two-tailed test, the needed sample size was approximately 78 participants ($n = 39$ in MI group; $n = 39$ in psychoeducation group). As such, we planned to recruit approximately 80 participants.

Procedures

Interested women spoke with a researcher in person at the time of recruitment (e.g., during regularly scheduled prenatal visit) or were directed to a study telephone number or email address to determine eligibility and to schedule appointments. The study procedures took place at a university-associated mental health clinic, community locations, and participants' homes. After they provided informed consent, participants were asked, "How certain are you that you will feed your baby only breastmilk for your baby's first six months?" Responses ranged from -10 to $+10$, with anchors $-10 = \textit{Completely certain that I will NOT feed my baby only breastmilk for six months}$, $0 = \textit{Neutral (ambivalent)}$, and $+10 = \textit{Completely certain that I will feed my baby only breastmilk for six months}$. Responses to this item were used in study randomization as later described.

We randomized participants into the MI or psychoeducation group using the covariate adaptive randomization procedures described by Rosenberger and Lachin, (2016): the first 15% of participants ($n = 12$) were randomly assigned to a group using the simple randomization method (Suresh, 2011); numbers were generated by an online randomizer and then entered into a spreadsheet (Urbaniak & Plous, 2013). Thereafter, we used covariate adaptive randomization to match participants in groups based on certainty of exclusive breastfeeding, therapist (A, B), and parity (primiparous, multiparous). Participants were not told which intervention they were to receive. Following randomization, we collected preintervention demographics and data about intention to breastfeed; confidence in and importance of breastfeeding plan, and breastfeeding attitudes. Next, participants completed their randomly assigned interventions, and we collected postintervention data on intention to

breastfeed; confidence in and importance of breastfeeding plan, and breastfeeding attitudes. At the end of the session, all participants received a small gift.

Approximately one month after the participants' self-reported due dates, the researcher attempted to contact them by telephone to collect data on the postpartum variables. The researcher made a maximum of 10 attempts to contact participants over the course of 14 days following the self-reported due date. If the researcher was unable to establish contact after approximately 10 attempts, the participant was considered lost to follow up. Upon study completion, each participant received a \$40 gift card by mail.

Study therapists and supervision activities.—In-person sessions and follow-up phone calls for all participants were distributed across two therapists. Both study therapists had master's degrees in clinical psychology and intermediate and advanced training in MI (20 hours). This duration of MI training is commensurate with and/or exceeds the training possessed by therapists in other studies (Forsberg, Forsberg, Lindqvist, & Helgason, 2010). A PhD licensed psychologist provided clinical supervision throughout the study's duration.

Intervention.—Participants assigned to the MI group received a 45 ($\pm$ 5) minute intervention provided by one of the two therapists. The MI sessions were patient-centered and conversational in style consistent with the spirit of MI (Miller & Rollnick, 2013). We adapted the overall structure of the protocol from Martins (2008) and Wilhelm and colleagues (2006; see Figure 1). As suggested by Steinberg and Miller (2015), we provided a bubble sheet of possible topics related to breastfeeding to participants and encouraged them to lead the conversation by selecting topics from the sheet that interested them (see Figure 2). As appropriate, change rulers were used as a tool to elicit change talk. These rulers provide visual scales of confidence and importance associated with a given behavior change on a scale of 0 (i.e., *not at all important/not at all confident*) to 10 (i.e., *extremely important/extremely confident*). Similar rulers have been employed in a variety of MI interventions to evoke change talk (e.g., Dean, Britt, Bell, Stanley, & Collings, 2016).

The psychoeducation intervention consisted of 45 ($\pm$ 5) minutes of psychoeducation on typical, infant developmental stages and infant feeding. The participants in this group responded to several sham questions about what they learned from the intervention. The purpose of adding sham questions was to blind the purpose of the postintervention items and to ensure treatment integrity as later described.

Treatment integrity.—The MI and psychoeducation sessions were video recorded to ensure treatment integrity. Approximately 20% of all sessions were then independently reviewed by two coders, who used standardized checklists to evaluate the presence of target content areas for the MI and psychoeducation sessions (see supplementary materials). Breastfeeding information made up approximately 10% of the psychoeducation intervention and was included to enhance credibility. One of the sham items asked participants to identify three concepts they learned in the psychoeducation session. We used results of this item to measure the salience of the breastfeeding education portion of the psychoeducation session.

Measures

Demographic, health, psychosocial, and breastfeeding history information.—

At the preintervention time point, we interviewed participants in person about demographic information, employment history and plans, psychosocial and medical histories, and past breastfeeding experience. At the postpartum time point, we interviewed participants by telephone to gather information about the participant's and neonate's health status, birthing experience, and breastfeeding problems. Many of the items in these interviews were adapted from the CDC's Infant Feeding Practices Study II (Fein et al., 2008).

Infant feeding plans.—At the pre and postintervention time points, we asked participants how they intended to feed their newborns in the first few weeks; response options included *breastfeed only*, *formula feed only*, *both breast and formula feed*, and *don't know yet*. We asked participants who indicated that they planned to exclusively or partially breastfeed or they had not yet decided to state their intended breastfeeding duration. At the postpartum time point, participants who were currently breastfeeding were asked to estimate the duration that they intended to continue breastfeeding.

Confidence and importance.—We asked participants to rate their confidence in their ability to adhere to the feeding plan (i.e., method and duration, if breastfeeding) on a scale of 0 to 10, with 0 meaning *not at all confident* and 10 meaning *extremely confident*. Importance of adhering to stated plan was measured on the same 0 to 10 scale with 0 meaning *not at all important* and 10 meaning *extremely important*. The same items were administered at the postpartum time point, as appropriate, to women regarding their plans for continued breastfeeding.

Attitudes towards breastfeeding.—We assessed attitudes towards breastfeeding with the Iowa Infant Feeding Attitudes Scale (IIFAS; Mora, Russell, Dungy, Losch, & Dusdieker, 1999). The IIFAS is a 17-item, self-report measure that is used to assess general attitudes towards infant feeding methods, including breastfeeding, formula feeding, and combinations of the two. Participants answer items on a five-point Likert scale ranging from *strongly disagree* to *strongly agree*. Total scores range from 17 to 84, and higher scores indicate more favorable attitudes towards breastfeeding. The scale has demonstrated good psychometric properties in women, regardless of selected feeding method. Cronbach's alpha estimate of internal consistency reliability was .85-.86 on the original development scale (Mora et al., 1999). The IIFAS also demonstrated good content and predictive validity, and higher scores are associated with an increased likelihood of intending to breastfeed and actual breastfeeding behavior (Dungy, McInnes, Tappin, Wallis, & Oprescu, 2008; Mora et al., 1999) and intent to continue breastfeeding (Wallis et al., 2008). In our study, the Cronbach's alpha estimate of internal consistency reliability was .75-.77.

Breastfeeding behavior at one month postpartum.—We determined breastfeeding initiation by asking participants whether they ever breastfed their infants (*yes* or *no*). Breastfeeding status at one month postpartum was characterized by several items. Participants were asked whether they were currently breastfeeding and if not, when they discontinued. There were also asked to report the total number of breast milk feedings

versus formula feedings per day over the past week. These data were used to categorize participant feeding status using a modified version of the Interagency Group for Action on Breastfeeding's (IGAB) guidelines (Labbok & Krasovec, 1990; Labbok & Starling, 2012). The six categories were as follows: *exclusive* (breast milk plus prescribed vitamins or medications), *almost-exclusive* (breast milk plus water or juice), *high partial* (80% breast milk), *medium partial* (20–79% breast milk), *low partial* (< 20% breast milk), and *token* (infrequent breastfeeding; Labbok & Krasovec, 1990).

Data Analysis

For each research question, we first conducted tests to determine if therapist (A, B) or parity (primiparous, multiparous) affected the findings. If these variables did not affect findings, we did not include these variables in final analyses for the sake of parsimony. Group (MI or psychoeducation) was the between-subjects factor for all repeated measures analyses of variance (RANOVA), and time (preintervention, postintervention) was the within-subjects factor. All tests were two-tailed. Huynh-Feldt corrections were used to account for violations of the sphericity assumption (Huynh & Feldt, 1976). Tukey's Honestly Significant Difference tests were used to examine mean differences (Abdi & Williams, 2010). For all tests, $p < .05$ was used to demonstrate statistical significance.

Results

Sample

Of the 269 women who responded to advertisements and indicated interest, 165 (61.3%) were eligible. Of those, 81 (49.1%) were enrolled in the study and randomized into groups. See Figure 3 for the Consolidated Standards of Reporting Trials (CONSORT) diagram. Follow-up rates were high; nearly all enrolled participants ($n = 79$, 97.5%) completed the follow-up telephone call. Enrollment ended when the predetermined sample size was met. The demographic, health, psychosocial, breastfeeding history, and birth-related characteristics are presented Table 1. The mean age of participants was 27.9 years with a mean gestational age at time of in-person intervention session of 31.8 weeks. The mean gestational age at birth was 38.8 weeks with average newborn birthweight of 7.6 pounds. More than half ($n = 56$, 69.1%) of participants were primiparous. Participants were primarily White ($n = 72$, 88.9%) and married or co-habiting ($n = 70$, 86.4%). There were no preintervention group differences on age, race, ethnicity, relationship status, employment status, years of education, gestational age at time of intervention session, parity, income, past breastfeeding experience, enrollment in WIC, gestational diabetes, smoking status, or hypertension (see Table 1). As shown in Table 2, groups also did not differ at preintervention on the bases of the dependent variables. At one month postpartum, there were no between-group differences on variables of history of taking breastfeeding class during pregnancy, gestational age at birth, type of birth (e.g., vaginal vs cesarean), skin-to-skin time in hospital, rooming in, neonatal birth weight, NICU admission, neonate receiving formula supplementation in hospital, total breastfeeding problems, or maternal postpartum depression (see Table 3). Women in the MI group were more likely to give their newborns Vitamin D supplements.

Treatment Integrity

The two interventions had excellent treatment integrity. In all but one of the reviewed videos, 100% of the target content areas were discussed in the sessions. The content area AAP Breastfeeding Guidelines was not covered in one of Therapist B's psychoeducation sessions. Of the eight, randomly selected, intervention videos, content area coverage was greater than or equal to 96.9%. Only 7.5% of participants in the psychoeducation group mentioned breastfeeding as something they learned, which suggested low saliency of the breastfeeding education while maintaining a strong control condition.

Main Outcomes

Infant feeding plans.—At preintervention, nearly all participants ($n = 73$, 90.1%) intended to exclusively breastfeed. At postintervention, 74 participants (91.4%) intended to exclusively breastfeed. Group was not associated with a change in intended infant feeding method, $\chi^2(1, N = 81) = 0.99$, $p = .500$. Similarly, intended breastfeeding duration did not change from pre ($M = 10.7$, $SE = 0.48$) to postintervention ($M = 10.5$, $SE = 0.48$), and no Time $\times$ Group interaction was observed.

Confidence.—Confidence in ability to breastfeed increased across both groups from pre ($M = 7.4$, $SE = 0.26$) to postintervention ($M = 7.7$, $SE = 0.24$), $F(1, 79) = 4.3$, $p = .042$; partial $\eta^2 = .05$, but there was no Time $\times$ Group interaction. **Importance.** Importance of breastfeeding increased across both groups from pre ($M = 8.2$, $SE = 0.25$) to postintervention ($M = 8.5$, $SE = 0.23$), $F(1, 79) = 10.9$, $p = .001$; partial $\eta^2 = .12$, but there was no Time $\times$ Group interaction.

Attitudes.—Scores on the IIFAS increased across both groups from pre ($M = 63.5$, $SE = 0.91$) to postintervention ($M = 66.1$, $SE = 0.87$), $F(1, 73) = 19.8$, $p < .001$, partial $\eta^2 = .214$. There was a Group $\times$ Time $\times$ Parity interaction observed for IIFAS scores, $F(1, 73) = 11.0$, $p = .001$. Tukey's post-hoc tests revealed that a pre-post enhancement of positive breastfeeding attitudes was significant among primiparous women in the MI group only ($p < .05$). See Figure 4.

Initiation.—Nearly all participants ($n = 77$, 97.5%) initiated breastfeeding, and group assignment was not associated with breastfeeding initiation, $p = 0.241$.

Infant feeding status at one month postpartum.—Participants in the MI group were more likely to endorse any current breastfeeding at one month postpartum (IGAB categories: *exclusive*, *partial*, and *token*), $\chi^2(1, N = 79) = 4.3$, $p = 0.040$, $\Phi = .233$ (small to moderate effect size). Group was not associated with exclusive breastfeeding at one month postpartum. Proportion of daily feedings as breastmilk did not significantly vary by group.

Plans to continue breastfeeding.—At one month postpartum, participants estimated that they would breastfeed their infants for approximately 10.3 months ($SD = 0.66$). We found no significant, between-group differences for duration of planned breastfeeding or confidence and importance of continuing breastfeeding.

Discussion

Our study assessed the effectiveness of a brief, single-session, prenatal MI intervention to promote breastfeeding in a sample of Appalachian women. Women in the MI group were more likely to report any current breastfeeding at one month postpartum, which is a positive finding, although the effect size was small to moderate. We found no between-group differences on changes to intended feeding method, breastfeeding exclusivity, proportion of feedings that were breastmilk, or future breastfeeding plans.

Intervention group had no effect on intended feeding method or intended breastfeeding duration. It is very possible that a ceiling effect explains the lack of association between group and change in breastfeeding plans in the present study. At preintervention, most participants endorsed plans to exclusively breastfeed their infants ($n = 73$, 90.1%), which limited the amount of change that could occur. Similarly, the average intended duration at preintervention was about 11 months, which is nearly consistent with national recommendations of breastfeeding for at least 12 months. Certainly, the fact that nearly all participants endorsed plans to breastfeed for nearly a year is alone a positive finding and likely owed to various public health efforts to promote breastfeeding over recent decades.

Study enrollment initially was open to primiparous women only, but because of slow recruitment, the study was later opened to include mixed parity women. Interestingly, MI was associated with enhanced positive breastfeeding attitudes among primiparous women only. Social psychology research suggests that in general, attitudes tend to become less flexible and more fixed with increased life experience (Tyler & Schuller, 1991). Additionally, breastfeeding duration of one's first infant tends to predict breastfeeding duration of subsequent infants (Bai, Fong, & Tarrant, 2015). This decrease in openness to attitude change, combined with the high likelihood of repeating previous breastfeeding patterns, likely made it more difficult to change the attitudes of multiparous women.

We found no significant between-group differences in confidence or importance. There is some inconsistency in the existing literature regarding the effect of MI on confidence in breastfeeding. Researchers found that MI had no effect on confidence at six weeks postpartum among women with HIV in South Africa (Tuthill et al., 2017) or at six months postpartum among rural White (Wilhelm et al., 2006), or rural Mexican American women (Wilhelm et al., 2015). On the other hand, Cangöl and Şahin (2017) found that women assigned to their Breastfeeding Motivation Program reported higher levels of confidence in breastfeeding at 4 weeks postpartum than women assigned to a control group. Notably, Cangöl and Şahin (2017) were the only researchers who mentioned an intervention that included actual instruction to improve breastfeeding skill. Therefore, it is possible that in Cangöl and Şahin's (2017) study, the effect of MI effect on confidence could be attributed to the more breastfeeding-specific instructional content of the intervention, and an instructional component may be necessary to achieve increased confidence. Regarding the importance of breastfeeding, our result is consistent with findings of Cangöl and Şahin (2017), who observed no effect of MI on postintervention (4–6 six weeks postpartum) measures of perceived importance of breastfeeding.

Limitations

Strengths of this study include random group assignment, a strong control group intervention, minimal attrition at postpartum follow-up, and reasonable generalizability to women with a wide range of incomes and various clinic and in-home intervention delivery settings. Despite these strengths, our study has several limitations that should be considered when interpreting results. Selection bias was likely an issue, as participants were primarily White, well-educated, and married, all factors positively associated with breastfeeding. The mean household income among our participants (\$83,234) exceeded the mean Appalachian income (\$62,254), which may limit the generalizability of our findings to women with lower income (Pollard & Jacobsen, 2017). However, annual income of our participants ranged from \$0 to nearly \$500,000. Selection bias relating to self-selection may also have been an issue. Of the 269 women who responded to advertisements and indicated interest, 165 (61.3%) were eligible. Of those, 81 (49.1%) were enrolled in the study, which likely represents a group with higher initial attitudes towards breastfeeding, which could have affected results. Reliance on self-report was another limitation, as self-reported outcomes are particularly vulnerable to social desirability bias. We followed participants through one month postpartum, so in general we did not capture data after return to work, which is associated with breastfeeding decrease and cessation (Ogbuanu, Glover, Probst, Liu, & Hussey, 2011). Finally, the MI intervention was delivered by two professions who were not nurses or lactation consultants. It is possible that the effect of the intervention may have been even stronger if delivered by professionals with more specialized expertise in this content area.

Implications

The utility of MI to improve breastfeeding outcomes has not yet been fully explored, which creates abundant opportunities for additional research. Future researchers should consider including nurses as MI interventionists. Nurses are instrumental in the delivery of prenatal and maternity care, especially in rural areas (MacKinnon, 2008), and this makes them well-suited to provide a one-session MI intervention. Bunyan et al (2017) highlighted the effectiveness of well-trained registered nurses in delivering MI. Given that skill self-efficacy is essential to any health behavior change regardless of the guiding theoretical model (Ajzen, 1991; Rosenstock, Strecher, & Becker, 1988), future interventions in this area may benefit from the inclusion of practical breastfeeding trainings in combination with MI, similar to the intervention described by Cangöl and ahin (2017). In addition, future studies should target low-income women, as women living in poverty are more vulnerable to suboptimal breastfeeding than wealthier women. Similarly, we recommend that future research in this area targets primiparous women because attitudes in this sub-group improved more in response to our MI intervention than those of their multiparous counterparts. Finally, future studies may also benefit from the inclusion of telehealth as an intervention modality to reach women with barriers that prevent in-person participation or adjunctive text messages that provide encouragement and support.

Conclusion

Our study demonstrated that a single-session, prenatal, MI intervention was effective to increase breastfeeding attitudes among primiparous women in Appalachia and generally effective to increase the likelihood of breastfeeding at one month postpartum. The intervention was resource-efficient and well-received by participants, which makes it suitable for larger scale implementation in office or home settings. Prenatal MI is especially beneficial for changing the attitudes of nulliparous women, which may also lead to positive, cascading effects on future generations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Callouts

1. Breastfeeding decreases risk for many pediatric health problems that affect Appalachian families, and thus interventions to target breastfeeding in this region may have cascading benefits.
2. Motivational interviewing was effective to promote breastfeeding at one month postpartum among women in Appalachia regardless of parity.
3. Maternity care providers should consider using motivational interviewing during prenatal discussions about breastfeeding with women during pregnancy.

Figure 1.
Basic structure of motivational interviewing intervention.

Figure 2.

Motivational interviewing intervention topics bubble sheet. Two bubbles were intentionally left blank to encourage participants to generate their own ideas for conversation topics.

Figure 3.
CONSORT flow diagram.

Figure 4. Mean (± 1 SEM) Iowa Infant Feeding Attitudes Scale (IIFAS) scores at pre and postintervention for Motivational Interviewing and psychoeducation groups by parity status. MI = motivational interviewing; PE = psychoeducation.

Table 1:

Total Number/Mean (and Percentages or Standard Deviations) and Statistical Comparisons for Participants' Baseline Demographic, Health, and Breastfeeding History Characteristics by Group: Motivational Interviewing (MI) or Psychoeducation (PE)

Characteristic	Overall (N = 81)	MI (n = 41)	PE (n = 40)	<i>t</i> / χ^2	<i>p</i>
Age, <i>M</i> (<i>SD</i>)	27.9 (5.2)	27.5 (6.0)	28.2 (4.31)	0.61	.544
Hispanic ethnicity, <i>n</i> (%)	7 (8.6)	6 (14.6)	1 (2.5)	3.78	.109
Race, <i>n</i> (%)					
African American	3 (3.7)	—	3 (7.5)		
Asian	1 (1.2)	—	1 (2.5)		
Hispanic	3 (3.7)	2 (4.9)	1 (2.5)		
Multiracial	1 (1.2)	—	1 (2.5)		
White	72 (88.9)	38 (92.7)	34 (85.0)		
Other	1 (1.2)	1 (2.4)	—		
Married or cohabiting, <i>n</i> (%)	70 (86.4)	34 (82.9)	36 (90.0)	.863	.519
Employed, <i>n</i> (%)	69 (76.5)	36 (78.0)	33 (82.5)	0.17	.753
Years education, <i>M</i> (<i>SD</i>)	16.1 (3.0)	16.1 (3.0)	16.0 (3.1)	−0.11	.914
Gestational age at intervention session, <i>M</i> (<i>SD</i>)	31.8 (4.3)	31.6 (4.4)	32.0 (4.4)	0.45	.651
Previously breastfed, <i>n</i> (%)	21 (25.9)	12 (29.3)	9 (22.5)	0.48	.614
Primipara, <i>n</i> (%)	56 (69.1)	28 (68.3)	28 (70.0)	0.03	1.00
Household annual income, range, <i>n</i> (%)					
Less than \$10,000	4 (4.9)	2 (4.9)	2 (5.0)		
\$10,000-\$14,999	3 (3.7)	1 (2.4)	2 (5.0)		
\$15,000-\$24,999	5 (6.2)	2 (4.9)	3 (7.5)		
\$25,000-\$34,999	8 (9.9)	4 (9.8)	4 (10.0)		
\$35,000-\$49,999	5 (6.2)	2 (4.9)	3 (7.5)		
\$50,000-\$74,999	11 (13.6)	5 (12.2)	6 (15.0)		
\$75,000-\$99,999	17 (21.0)	11 (26.8)	6 (15.0)		
\$100,000	25 (30.9)	13 (31.7)	12 (30.0)		
Enrolled in WIC program, <i>n</i> (%)	16 (19.8)	6 (14.6)	10 (25.0)	1.37	.276
Gestational diabetes, <i>n</i> (%)	10 (12.3)	6 (14.6)	4 (10.0)	0.40	.737
Hypertension, <i>n</i> (%)	3 (3.7)	—	3 (7.5)	3.19	.116
Smokes cigarettes, <i>n</i> (%)	5 (6.2)	1 (2.4)	4 (10.0)	2.00	.201

Note. Statistical tests for categoric income and participant race not calculated because of small cell sizes. *M* = mean; *SD* = standard deviation; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Table 2

Total Number/Mean (and Percentages or Standard Deviations) and Statistical Comparisons Preintervention Dependent Variables by Group: Motivational Interviewing (MI) or Psychoeducation (PE)

	Overall (<i>N</i> = 81)	MI (<i>n</i> = 41)	PE (<i>n</i> = 40)	<i>t/χ²</i>	<i>p</i>
IIFAS, <i>M</i> (<i>SD</i>)	63.8 (7.4)	64.0 (6.3)	63.6 (8.5)	−0.22	.829
Intending to exclusively breastfeed, <i>n</i> (%)	73 (90.1)	38 (92.7)	35 (87.5)	1.11	.555
Duration of intended breastfeeding (months), <i>M</i> (<i>SD</i>)	10.7 (4.3)	10.4 (4.6)	10.9 (4.0)	0.50	.616
Importance of breastfeeding for intended duration, <i>M</i> (<i>SD</i>)	8.2 (2.3)	8.5 (1.9)	7.8 (2.6)	−1.51	.134
Confidence of breastfeeding for intended duration, <i>M</i> (<i>SD</i>)	7.4 (2.4)	7.9 (1.9)	7.0 (2.7)	−1.89	.062

IIFAS, *M*(*SD*)

Note. IIFAS = Iowa Infant Feeding Attitudes Scale.

Table 3

Total Number/Mean (and Percentages or Standard Deviations) and Statistical Comparisons for Type of Birth, Neonate, and Participant Variables at 1 Month Postpartum by Group: Motivational Interviewing (MI) or Psychoeducation (PE)

	Overall (<i>N</i> = 79)	MI (<i>n</i> = 40)	PE (<i>n</i> = 39)	<i>t</i> / χ^2	<i>P</i>
Took breastfeeding class, <i>n</i> (%)	36 (45.6)	17 (42.5)	19 (48.7)	0.31	.654
Gestational age (weeks), <i>M</i> (<i>SD</i>)	38.8 (4.5)	39.4 (1.3)	38.0 (6.2)	−1.40	.164
Gestational age, range, <i>n</i> (%)					
Very preterm	3 (3.7)	1 (2.5)	2 (5.1)		
Preterm	4 (5.1)	2 (5.0)	2 (5.1)		
Term	71 (89.9)	37	34 (87.2)		
Postterm	1 (1.3)	1 (2.5)	0		
Cesarean birth, <i>n</i> (%)	24 (30.4)	12 (30.0)	12 (30.8)	0.01	1.00
Skin-to-skin care, <i>n</i> (%)	67 (84.8)	36 (90.0)	31 (79.5)	1.69	.225
Rooming-in, <i>n</i> (%)	68 (86.1)	36 (90.0)	32 (82.1)	1.04	.348
Birth weight (pounds), <i>M</i> (<i>SD</i>)	7.6 (1.1)	7.8 (1.2)	7.5 (1.0)	−1.23	.224
NICU admission, <i>n</i> (%)	7 (8.9)	1 (2.5)	6 (15.4)	4.06	.057
Received formula in hospital, <i>n</i> (%)	26 (32.9)	10 (25.0)	16 (41.0)	2.08	.230
Total problems, <i>M</i> (<i>SD</i>)	2.4 (1.7)	2.3 (1.4)	2.8 (1.8)	0.81	.422
Vitamin D supplement, <i>n</i> (%)	22 (27.2)	16 (39.0)	6 (15.0)	5.96	.023*
Postpartum depression, <i>n</i> (%)	9 (11.4)	4 (10.0)	5 (12.8)	0.16	.737

Note. Breastfeeding class refers to a class outside of routine prenatal visits that was solely or partially focused on breastfeeding. Total problems refers to breastfeeding problems. Statistical tests for categorical gestational age not calculated due to small cell sizes.

*
p .05

Table 4

Total Number/Mean (and Percentages or Standard Errors of the Mean) and Statistical Comparisons for Type of Birth, Neonate, and Participant Variables at One Month Postpartum for Feeding Characteristics by Group: Motivational Interviewing (MI) or Psychoeducation (PE)

Feeding Characteristic	Overall (N = 79)	MI (n = 40)	PE (n = 39)	<i>t</i> / χ^2	<i>p</i>
Breastfeeding, initiated, <i>n</i> (%)	77 (97.5)	40 (100.0)	37 (94.9)	2.11	.241
Breastfeeding, any current, <i>n</i> (%)	69 (85.2)	38 (92.7)	31 (79.5)	4.30	.048 *
Breastfeeding, exclusive, <i>n</i> (%)	43 (53.1)	23 (56.1)	20 (51.3)	0.31	.654
% feedings/day breast milk, <i>M</i> (<i>SE</i>)	77.1 (4.0)	83.2 (4.5)	70.9 (6.4)	-1.57	.120
IGAB Category, <i>n</i> (%)					
Exclusive	43 (53.1)	23 (56.1)	20 (50.0)		
Almost exclusive	-	-	-		
Partial-High, 80%	13 (16.1)	8 (19.5)	5 (12.5)		
Partial-Medium, 60% - 79%	6 (7.4)	3 (7.3)	3 (7.5)		
Partial-Medium, 40% - 59%	5 (6.2)	3 (7.3)	2 (5.0)		
Partial-Medium, 20% - 39%	1 (12)	-	1 (2.5)		
Partial-Low, 0 % - 19%	-	-	-		
Token	1 (12)	1 (2.4)	-		
Never initiated breastfeeding, <i>n</i> (%)	2 (2.5)	-	2 (5.0)		
Not breastfeeding, initiated, <i>n</i> (%)	8 (9.9)	2 (4.9)	6 (15.0)		
Estimated infant age at breastfeeding cessation, <i>M</i> (<i>SE</i>)	10.3 (0.66)	9.7 (0.89)	10.9 (0.90)	0.93	.354
Confidence, continued breastfeeding, <i>M</i> (<i>SE</i>)	7.7 (0.26)	8.0 (0.36)	7.4 (0.38)	1.25	.251
Importance, continued breastfeeding, <i>M</i> (<i>SE</i>)	8.4 (0.22)	8.2 (0.35)	8.5 (0.28)	-0.58	.564

Note. IGAB = Interagency Group for Action on Breastfeeding. Statistical test not conducted for IGAB categories due to small cell sizes.

*
p .05