JOGNN CLINICAL RESEARCH

Randomized Controlled Trial to Determine Effects of Prenatal Breastfeeding Workshop on Maternal Breastfeeding Self-Efficacy and Breastfeeding Duration

Joy Noel-Weiss, André Rupp, Betty Cragg, Vicki Bassett, and A. Kirsten Woodend

Objective: To determine the effects of a prenatal breastfeeding workshop on maternal breastfeeding self-efficacy and breastfeeding duration.

Design: Randomized controlled trial.

Setting: Large tertiary hospital in Ontario, Canada.

Participants: 110 primiparous women expecting a single child, an uncomplicated birth, and planning to breastfeed.

Intervention: 2.5-hour prenatal breastfeeding workshop based on adult learning principles and self-efficacy theory.

Main Outcome Measure: Maternal breastfeeding self-efficacy and the numbers of days and amount of breastfeeding were measured at four and eight weeks postpartum.

Results/Data Analysis: Over time, maternal breastfeeding self-efficacy scores increased in both groups. Women who attended the workshop had higher self-efficacy scores and a higher proportion were exclusively breastfeeding compared to women who did not attend the workshop. There was little difference in the average number of days of breastfeeding, but the intervention group had less weaning.

Conclusions: The workshop increased maternal breastfeeding self-efficacy and exclusive breastfeeding. *JOGNN, 35*, 616-624; 2006. DOI: 10.1111/J.1552-6909.2006.00077.x

Keywords: Adult learning principles—Antenatal education—Breastfeeding—Confidence—Prenatal education—Self-efficacy

Accepted: March 2006

A prenatal breastfeeding workshop was developed with the goal of increasing maternal breastfeeding self-efficacy (Noel-Weiss, Bassett, & Cragg, 2006). Interventions and implementations, such as this workshop, require research to verify their merit. This article reports a randomized controlled trial (RCT) completed to determine the effects of this prenatal breastfeeding workshop.

Background

Breastfeeding provides many benefits to mothers and their infants. Fewer incidences of osteoporosis, ovarian cancer, and premenopausal breast cancer are reported for women who have breastfed (Bernier, Plu-Bureau, Bossard, Ayzac, & Thalabard, 2000; Labbok, 2001; Lawrence & Lawrence, 1999). The nutrients, growth factors, and immunologic components a healthy term infant requires are provided in breastmilk, and fewer illnesses are reported for breastfed infants (Bachrach, Schwarz, & Bachrach, 2003; Duffy et al., 1997; Oddy et al., 2003; Scariati, Gummer-Strawn, & Fein, 1997; Young et al., 2002).

Responding to this evidence, Canadian women are initiating breastfeeding in larger numbers than in the past three generations, but breastfeeding rates still drop precipitously in the early weeks (Health Canada, 1999; Maclean, 1998; McNally, Hendricks, & Horowitz, 1985; Statistics Canada, 2003). Of the 85% of Canadian women who start breastfeeding, about one third wean by 8 weeks postpartum, and the most common reason they give for early weaning is lack of milk (Millar & Maclean, 2005; Sheehan, Krueger, Watt, Sword, & Bridle, 2001).

Approximately 85% of Canadian women initiate breastfeeding, and about one third stop by the eighth week postpartum.

Multiple factors contribute to breastfeeding duration including maternal age and education level, family income, family support, prenatal intention, timing of the decision to breastfeed, timing of first feeding, and maternal confidence and self-efficacy (Blyth et al., 2002, 2004; Cerandas, Noceda, Barrera, Martinez, & Garsd, 2003; Dunn, Davies, McCleary, Edwards, & Gaboury, 2006; McLeod, Pullon, & Cookson, 2002; O'Campo, Faden, Gielen, & Wang, 1992; Sheehan et al., 2001; Williams, Innis, Vogel, & Stephen, 1999). Of particular interest to this study are maternal confidence and breastfeeding self-efficacy. Maternal breastfeeding self-efficacy is defined as the confidence a woman has in her ability to breastfeed her baby (Dennis, 1999). Although the terms "confidence" and "self-efficacy" are used interchangeably in the nursing literature, self-efficacy is preferred for this study.

The prenatal breastfeeding workshop was based on a pilot study with 16 families; half formed the experimental group and half formed the comparison group (Bassett, Dumas, & Mayrand-Leclerc, 2002). The experimental group attended a prenatal education session. Breastfeeding self-efficacy was measured at 24 hours postbirth and at 4 weeks postpartum using the Breastfeeding Self-Efficacy Scale (Dennis & Faux, 1999). The results suggested the intervention might be effective in influencing certain aspects of breastfeeding self-efficacy.

Hypotheses of This Study

1. A prenatal breastfeeding workshop, based on the theory of self-efficacy and on adult learning principles, increases maternal breastfeeding self-efficacy in the early postpartum period.
2. Increased maternal breastfeeding self-efficacy results in increased breastfeeding duration.

Methods

Research Design

This study was designed as an RCT. Participants registered prenatally and were randomized into either the intervention group or the control group (see Figure 1). Both groups received standard care and were not limited in the types of breastfeeding support they could seek before and after their infant's birth. Standard care, including the choice of physician or midwife, frequency of prenatal visits, and attendance at prenatal classes, was defined by each mother. In addition to their standard care, participants in the intervention group attended a 2.5-hour prenatal breastfeeding workshop (Noel-Weiss et al., 2006). Ethics approval was obtained from both the university and hospital research ethics boards.

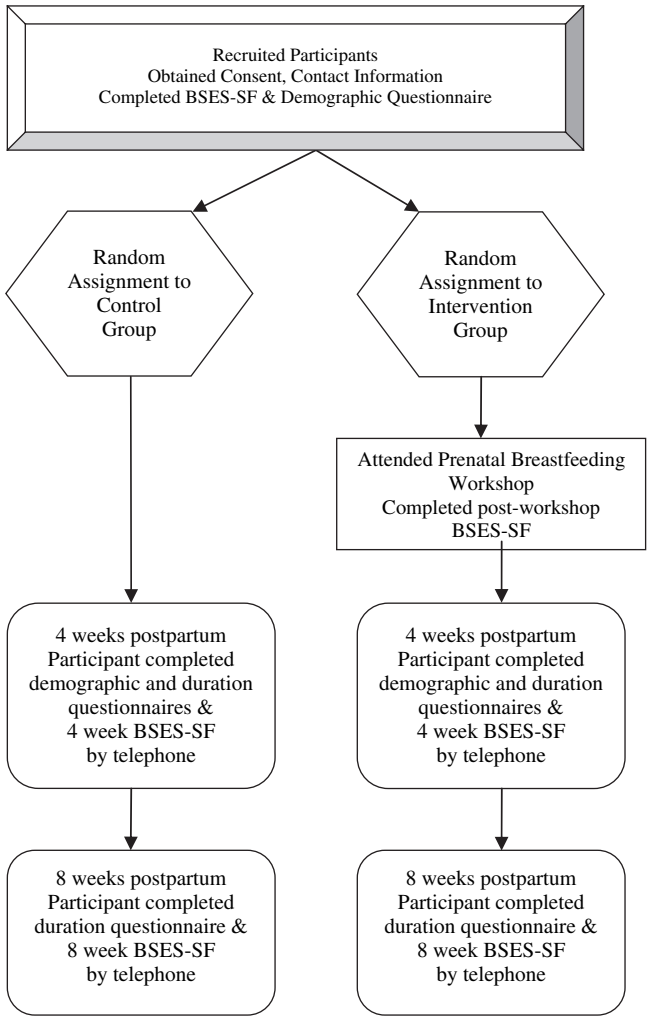

FIGURE 1
Schematic diagram of study design.

Participants

The study was advertised through a poster and pamphlet campaign. Participants were nulliparous women expecting a single child, an uncomplicated birth, and planning to breastfeed. Participants expected a date of confinement between August 2004 and February 2005 and gave birth at a large tertiary hospital that averages 600 to 700 births each month (Perinatal Partnership Program of Eastern and Southeastern Ontario, 2003). The women had to read and write in English and have a telephone to complete the postpartum questionnaires. To remain in the study, a mother and her infant had to be discharged at the same time and be able to breastfeed without restriction.

Overall, 110 women volunteered for this study. Nine participants formed a group to trial a revised version of the original prenatal education session, and 101 were randomized into the control or the intervention group. A total of 10 women, 1 from the trial group and 9 from the randomized group, were lost to the study. Two participants chose to drop out for personal reasons, two did not remain in contact, and six had medical reasons for not remaining in the study. The final analysis was completed with the 92 women randomized into the control and intervention groups.

Intervention

The intervention was a 2.5-hour prenatal breastfeeding workshop designed using Bandura's theory of self-efficacy and adult learning principles (Noel-Weiss et al., 2006). Bandura (1977) proposes that four sources influence self-efficacy: performance accomplishment, vicarious learning, social/verbal persuasion, and emotional/physiological arousal. These four sources were provided by using life-like dolls, videos, and discussions in a comfortable atmosphere (Noel-Weiss et al.). Adult learning principles assume adults are self-directed, self-motivated, and come to learning with past experience; various strategies were used in accordance with these principles (Brookfield, 1991; Knowles, 1980; Noel-Weiss et al.).

Randomization

Randomization occurred after the women had completed a registration package that included a consent form, a contact information sheet, a prenatal demographic questionnaire, and the Breastfeeding Self-Efficacy Scale—Short Form (BSES-SF). Participants returned the registration package in a sealed manila envelope, and randomization was completed by matching the manila envelope with a sealed, sequentially numbered, opaque envelope containing a slip of paper stating either Control or Workshop.

Outcome Variables

Maternal breastfeeding self-efficacy was measured with the BSES-SF at registration to establish a baseline (Dennis, 2003). It was then measured at 4 and 8 weeks postpartum because this appears to be a critical time for early weaning (Kronberg & Vaeth, 2004; Millar & Maclean, 2005; Statistics Canada, 2003).

The BSES-SF is a revision of the Breastfeeding Self-Efficacy Scale, which has 33 items and was used in the original pilot study (Dennis & Faux, 1999). Dennis (2003) revised the original tool and deleted items deemed redundant, which resulted in the BSES-SF, a 14-item tool with high internal consistency (Cronbach's $\alpha = .94$). In this study, the tool was internally consistent when used at registration, after the workshop, at 4 weeks postpartum, and at 8 weeks postpartum (Cronbach's $\alpha = .91, .86, .86$, and .87, respectively).

The 14 items on the BSES-SF are statements about coping with, feeling capable about, and managing breastfeeding. Each of the statements on the BSES-SF begins with "I can always …" and is answered on a 5-point Likert scale from 1 (*not at all confident*) to 5 (*very confident*). These ratings were summed into a total score ranging from 14 to 70, with a higher total score indicating a higher level of maternal breastfeeding self-efficacy (Dennis, 2003; Polit & Beck, 2004). Women who weaned were not asked to complete the BSES-SF since it seemed the questions could not be answered if the participant had stopped breastfeeding.

Breastfeeding duration was measured at 4 weeks and 8 weeks postpartum by first asking whether the mother was breastfeeding and then how much she was breastfeeding. Duration in number of days and amount of breastfeeding were noted. Usually, six categories of infant feeding are used to describe the amount of breastfeeding: exclusive breastfeeding, almost exclusive, high, partial, token, and bottle-feeding (Labbok & Krasovec, 1990). With this classification, exclusive breastfeeding means the only fluid the infant receives is breastmilk—with or without vitamins, whether by breast or by bottle as expressed breastmilk (EBM).

For the purpose of this study, it seemed important to further differentiate actual feeding at the mother's breast from providing EBM by bottle. The authors recognize the effort and dedication required to pump and bottle-feed breastmilk. However, since a woman feeding her baby at breast cannot see and measure the amount of milk received, her breastfeeding self-efficacy and confidence in milk supply are tested in a way that is different from the mother who is pumping and bottle-feeding. Therefore the researchers considered "Exclusive breastfeeding" to be feeding only at breast and they added two additional infant feeding categories: Exclusive by breast with some EBM and Exclusive EBM.

Demographic data such as age, marital status, family income, and prenatal intention were collected prenatally at registration. Data about birthweight, type of birth, birth experience, and any free formula received were gathered postpartum.

Data Collection

Women randomized into the intervention group were called and offered a choice of workshop times after the 34th week of gestation. The researcher called each participant after her expected date of confinement to confirm the baby's date of birth and the participant's eligibility to remain in the study. At 4 weeks, a research assistant, blinded to the mother's group assignment and workshop attendance, telephoned and completed a postpartum demographic questionnaire, the BSES-SF, and a breastfeeding duration questionnaire. At 8 weeks, the same research assistant telephoned each mother and completed a final BSES-SF and breastfeeding duration questionnaire.

Two confounding variables were controlled. Because all participants were nulliparous and had not previously fed a child of their own, prior infant feeding experience was controlled. Workshop facilitation was controlled by having all workshops facilitated by the same person. Other possible confounding variables were expected to be evenly distributed between the two groups with randomization.

Intention to Treat Assumption

Intention to treat (ITT) analysis is a principle that assumes participants received the intervention they were assigned to receive. In this study, this means participants remained in their randomized group regardless of actual attendance in the workshop and were analyzed as such (Polit & Beck, 2004). Unexpectedly, six women randomized to the intervention group did not actually attend the workshop. The researchers reasoned that women who attended the workshop should be compared with women who did not attend, but ITT is the standard analytic approach for an RCT. Therefore, they chose to analyze the data with both the ITT assumption and using the actual workshop attendance and to present the results side-by-side, so differences between the two methods of analysis can be compared.

Data Analysis

The primary researcher and a research assistant coded the data separately and each built an SPSS 12.0.1 database, which allowed for comparisons to ensure accurate data entry. The groups were compared with a t test or a Pearson χ^2 test, depending on whether the variable of interest was continuous or categoric; all t tests were two tailed, and the α level was set at .05 for all analyses. An a priori power analysis determined a total of 128 participants would be required to detect an effect size of a standardized mean difference of 0.5 with a power of 80%.

Data analysis was completed with 92 randomized participants (control, $n = 45$; intervention, $n = 47$). In the end, 41 participants attended the workshop and 51 participants did not attend the workshop. Six women from the intervention group, who were scheduled for a workshop, did not attend it, either due to personal reasons or because their baby was born before the workshop.

Results

Participants ranged in age from 17 to 42 years (mean age = 30.20 years). The majority had completed postsecondary education, had a family income in excess of $70,000, and were in a committed relationship with 99% rating their partner as "very supportive." Prenatal goals for breastfeeding ranged from 3 to 18 months, and 87% of the participants had made the decision to breastfeed before getting pregnant. Sixty-eight percent had attended prenatal classes, 59% stated their own mothers had breastfed, and 95% knew a friend or family member who had breastfed. None had attended La Leche League meetings.

Maternal breastfeeding self-efficacy scores increased in both groups.

Gestational ages ranged from 36 to 42 weeks (mean gestation = 39.77 weeks), and birthweights ranged from 2183 to 5046 g (mean weight = 3437.62 g). Thirty-six percent of the participants had a cesarean birth and 7% had previously had breast surgery. Sixty-eight percent received free formula, many from multiple sources including through the mail and at the hospital.

There were no statistically significant distributional differences between the two groups with respect to any background variables collected at registration and the 4-week postpartum birth characteristics (i.e., $p \geq .05$ for all variables). This suggests randomization was effective and the groups did not differ, on average, on any potentially confounding variables that could have affected the intervention outcomes.

Maternal Breastfeeding Self-Efficacy

The BSES-SF score was treated as continuous, even though it is, technically, an ordinal variable. The scores at registration, and at 4 and 8 weeks postpartum were compared using t tests (Table 1). At registration, average baseline scores were not statistically different between the two groups under either the ITT assumption, $t(84) = -.345$, .371, or actual workshop attendance, $t(84) = -.075$, .941. At week 4, however, under either the ITT assumption or the actual workshop attendance analysis, the mean BSES-SF scores were significantly lower in the control group than in the intervention group, $t(78) = -2.320$, $p = .023$ and $t(78) = -3.002$, $p = .004$, respectively. By week 8, 17 women had weaned their babies and one had not completed her BSES-SF leaving only 74 scores to analyze (Table 1). Importantly, a lack of statistical significance can be partially attributed to the small sample size, but the effect sizes at weeks 4 and 8 clearly show the mean BSES-SF scores were about half a standard deviation lower in the control group when the data were analyzed either under the ITT assumption ($d = .523$ at 4 weeks and $d = .412$ at 8 weeks) or with actual workshop attendance ($d = .677$ at 4 weeks and $d = .432$ at 8 weeks) showing a practically important effect of the intervention over time that is strongest 4 weeks after birth but still statistically detectable after 2 months. It appears the workshop was effective in increasing the average self-efficacy scores for mothers who attended it.

TABLE 1
Breastfeeding Self-Efficacy Scores by ITT and Actual Workshop Attendance Analyses

Timing of Score	Range	ITT Analyses						Actual Workshop Attendance Analyses					
		Control	Intervention	Test Statistic	p	Effect Size[a]	95% CI	Nonattend	Attend	Test Statistic	p	Effect Size	95% CI
Registration (6 missing)	14-60	42.02 (9.7),[b] n = 42	42.73 (9.2), n = 44	t = −0.345	.731	.076	(−4.76, 3.35)	42.31 (9.5), n = 45	42.46 (9.5), n = 41	t = −0.075	.941	.016	(−4.21, 3.91)
4 weeks (12 missing)	30-69	53.38 (9.1), n = 39	57.98 (8.6), n = 41	t = −2.32	.023	.523	(−8.53, −0.65)	52.90 (9.2), n = 41	58.72 (8.0), n = 39	t = −3.002	.004	.677	(−9.67, −1.96)
8 weeks (18 missing)	40-70	58.91 (9.1), n = 34	61.70 (5.8), n = 40	t = −1.60	.115	.412	(−6.28, 0.70)	58.71 (9.1) n = 35	61.95 (5.6), n = 39	t = −1.864	.066	.432	(−6.69, 0.23)

Note. ITT = intention to treat.
[a]The effect sizes are Cohen's d (see Howell, 2002, p. 205).
[b]Standard deviation is in parentheses beside mean.

At week 8, the intervention group was more often exclusively breastfeeding than the control group.

Breastfeeding Duration and Infant Feeding Practices

Under the ITT assumption, the mean difference in number of days of breastfeeding computed at 8 weeks was not statistically significant, $t(90) = -.066$, $p = .948$, while a significant difference could be detected when actual workshop attendance was analyzed, $t(90) = -2.360$, $p = .020$. This effect is also reflected in the effect size measure showing a practically negligible effect under the ITT assumption ($d = .034$) but a practically important effect when actual workshop attendance was analyzed ($d = .496$) (Table 2).

Results on the distributional differences of the amount of breastfeeding are statistically unstable because the sample size was small and there were fewer than five participants in several of the categories (Table 2). However categories were not collapsed as the differences in breastfeeding categories provided important descriptive information.

Results of analyses for week 8 based on an ITT assumption showed the two groups varied in the amount of breastfeeding. The intervention group had a higher rate of exclusive breastfeeding than the control group (70% compared to 58%) and a lower rate of weaning (15% compared to 22%). The difference is even more striking when the groups are compared based on actual class attendance. In the nonattender group, only 53% of the women were exclusively breastfeeding by breast, while 18% engaged in other categories of breastfeeding and 29% had weaned. In the attender group, 78% were still exclusively breastfeeding by breast, while 17% engaged in other types of breastfeeding and only 5% had weaned.

Finally, an odds ratio (OR) was computed to compare the odds of exclusively breastfeeding at week 8. Results were inconclusive under the ITT assumption, OR = 1.7, 95% confidence interval (CI) = [.728, 4.07], but when the actual workshop attendance was analyzed, the attender group was significantly more likely to be exclusively breastfeeding than the nonattender group, OR = 3.2, 95% CI = [1.26, 7.94].

Breastfeeding self-efficacy was not measured if the woman had stopped breastfeeding. Because of this, the relationship between self-efficacy and duration rates cannot be determined and conclusions about the second hypothesis cannot be made.

TABLE 2
Infant Feeding Practices by ITT and Actual Workshop Attendance Analyses

		ITT Analyses						Actual Workshop Attendance Analyses					
Characteristic	*Range*	*Control, n = 45*	*Intervention, n = 47*	*Test Statistic*	*p*	*Effect Size*[a]	*95% CI*	*Nonattend, n = 51*	*Attend, n = 41*	*Test Statistic*	*p*	*Effect Size*	*95% CI*
Timing of first feeding (hr) [0][b]	1-48	5.44 (8.54)	2.81 (6.89)	$t = 1.63$	.106	.342	(−.572, 5.84)	5.02 (8.1)	2.95 (7.37)	$t = 1.27$	.209	.266	(−1.18, 5.31)
Formula given in hospital (number of bottles) [0]	0-40	4.07 (5.72)	2.68 (6.53)	$t = 1.08$	.283	.226	(−1.16, 3.93)	4.75 (7.51)	1.63 (3.18)	$t = 2.48$	.015	.520	(.616, 5.61)
Number of days of breastfeeding at 8 weeks postpartum [0]	2-56	49.9 (14.5)	50.4 (14.2)	$t = -.158$	.875	.034	(−6.42, 5.47)	47.1 (16.7)	54.0 (9.3)	$t = -2.36$	.020	.496	(−12.7, −1.09)
Infant feeding category[c] (8 weeks) [0]				$\chi^2 = 8.41$	.135	.302	n/a			$\chi^2 = 16.6$	.005	.425	n/a
Exclusive breastfeeding by breast		26 (58)[d]	33 (70)					27 (53)	32 (78)				
Exclusive by breast/ some EBM		0 (0)	1 (2)					0 (0)	1 (2)				
Exclusive EBM		3 (7)	0 (0)					3 (6)	0 (0)				
Almost exclusive		0 (0)	0 (0)					0 (0)	0 (0)				
High		5 (11)	2 (4)					5 (10)	2 (5)				
Partial		1 (2)	4 (9)					1 (2)	4 (10)				
Token		0 (0)	0 (0)					0 (0)	0 (0)				
Bottle-feeding (weaned)		10 (22)	7 (15)					15 (29)	2 (5)				

Note. ITT = intention to treat; n/a = not applicable; EBM = expressed breastmilk.

[a]The effect sizes are Cohen's *d* (see Howell, 2002, p. 205).

[b]The number in brackets indicates the number of cases missing.

[c]The infant feeding categories used are as follows: exclusive breastfeeding by breast (breastmilk by breast with no other liquids or solids except possibly vitamins), exclusive by breast with some EBM (breastmilk by breast with no other liquids or solids except some bottles of EBM and possibly vitamins), exclusive EBM (all feeds are by bottle with EBM), almost exclusive (breastmilk by breast or as EBM plus water, juice, or ritualistic teas), high (one or less bottle of artificial breastmilk [formula] daily), partial (more than one bottle of artificial breastmilk [formula] daily), token breastfeeding (breastfeeding for comfort and not for nutritive reasons), bottle-feeding (no breastfeeding) (adapted from Labbok & Krasovec, 1990; Statistics Canada, 2003).

[d]Percentage of this group in parenthesis.

Additional Workshop Effects

The study provided a few unexpected results about perception of milk supply, missed workshops, timing of the first feeding, and the amount of formula used in the hospital.

The groups were compared with respect to each of the 14 statements on the BSES-SF to see whether there were trends that could differentiate the women in the two groups. The statement "I can always determine that my baby is getting enough milk" showed statistically significant differences under the ITT assumption and when actual workshop attendance was analyzed both at week 4, $t(79) = -2.85$, $p = .005$ and $t(79) = -3.80$, $p \leq .001$, respectively, and week 8, $t(73) = -3.09$, $p = .003$ and $t(73) = -3.19$, $p = .002$, respectively. When asked the reason for weaning, one third of the women in this study cited lack of milk as either the sole reason or one of the reasons. Therefore, the workshop seemed to have had a positive impact on women and helped them to be more confident in detecting their babies are getting enough milk.

Timing of the first feeding and the amount of formula used in the hospital are inversely related to duration of breastfeeding (Hörnell, Hofvander, & Kylberg, 2001; Lawson & Tulloch, 1995). Specifically, the longer the first feeding is delayed, and the more frequently formula supplements are used, the less likely a woman will continue breastfeeding. Data about the timing of the first feeding and the amount of formula used were collected at week 4 with the same intent as collecting other potentially confounding variables: to ensure the two groups were equal.

It appears that it took much longer for the first feeding to occur and much more formula was used with the control group when compared to the intervention group (see Table 2). Both groups were expected to be the same, as they had been with other potentially modifying variables such as age and type of birth. The researchers had not considered the timing of the intervention and that the workshop preceded and could influence these variables. This lead to the conclusion that these two variables are actually mediating variables, affected by the workshop, and not simply modifying variables affecting breastfeeding duration.

It was also interesting that all participants who missed more than one scheduled workshop had weaned by the end of the study. Of course, factors that might cause a woman to miss a workshop, including a lack of interest in breastfeeding or a chaotic home life, could also contribute to early weaning.

Strengths and Limitations

The study benefited from a number of factors. The original pilot study formed a strong base for designing this study. The nurse who completed the original study was available to share her experience. A validated tool was used for measuring maternal breastfeeding self-efficacy and established definitions for infant feeding categories. Also, literature published since the original pilot study has continued to support the importance of maternal breastfeeding self-efficacy as a predictor of breastfeeding duration.

Participation bias limits the study results because the participants were self-selecting. Overall, both the control and intervention groups had higher breastfeeding rates at 8 weeks postpartum when compared with national statistics. This indicates all participants may have started out more committed to, or more confident about, breastfeeding than the general population. Although this does not affect internal validity, it does limit generalizability to other populations.

Randomization appears to have been effective with an even distribution of possibly confounding variables. Maternal infant feeding experience and variations in facilitator styles were accounted for by all participants being nulliparas and all workshops having the same facilitator. Participants could not be blinded to the intervention, but the research assistant was blinded to their group assignment.

The timing of the breastfeeding prenatal workshop may not have been optimal because many of the participants were anxious about and preparing for their first birth experience. With the baby not actually present, much of the content was discussed hypothetically and this may not have been as effective as answering questions when women are actually dealing with a breastfeeding baby.

There were minor variations in the prenatal breastfeeding workshops. These variations can be attributed to the differing needs of each group and the workshop size, which varied from two to eight women plus their partners. It is uncertain whether the variations were an advantage or disadvantage in meeting the needs of the group and raising maternal breastfeeding self-efficacy.

While the sample size was too small for some of the statistical analyses to have enough power to detect small effects, the effect sizes nevertheless indicated practically important differences in several instances. Finally, the breastfeeding duration and infant feeding categories were only measured at four and eight weeks. By week 8, many of the women who had not attended the workshop had weaned but both groups still had large numbers in the exclusive breastfeeding category. Continuing to measure duration and infant feeding categories over a longer period of time would have provided a clearer picture.

Nursing Implications

The authors recommend that nurses and lactation consultants use a prenatal breastfeeding workshop based on self-efficacy theory and adult learning principles to help prepare and support women who want to breastfeed. This workshop is a valuable tool for increasing maternal breastfeeding self-efficacy and exclusive breastfeeding rates.

Further research to determine optimal workshop size and key elements affecting maternal breastfeeding self-efficacy is recommended. As well, establishing the ideal timing and length of the workshop would be useful. For example, workshops may be more effective if they were held in the first or second trimester, repeated during the prenatal period, or were longer than 2.5 hours.

Perhaps the best program would integrate the prenatal breastfeeding workshop into a comprehensive perinatal breastfeeding support program including postpartum professional care and peer support. Both the professional care and peer support could be built on a framework of self-efficacy theory and adult learning principles.

Acknowledgment

We thank G. Courant, RN, IBCLC, MSc, for comments and support with early drafts of this article.

REFERENCES

Bachrach, V. G., Schwarz, E., & Bachrach, L. R. (2003). Breastfeeding and the risk of hospitalization for respiratory disease in infancy: A meta-analysis. *Archives of Pediatrics & Adolescent Medicine*, *157*, 237-243.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.

Bassett, V., Dumas, L., & Mayrand-Leclerc, M. (2002, November). *Influencing breastfeeding confidence: A prenatal intervention*. Report of a pilot study presented at AWHONN Canada Conference, Halifax, Canada.

Bernier, M. O., Plu-Bureau, G., Bossard, N., Ayzac, L., & Thalabard, J. C. (2000). Breastfeeding and risk of breast cancer: A meta-analysis of published studies. *Human Reproduction Update*, *6*, 374-386.

Blyth, R., Creedy, D. K., Dennis, C.-L., Moyle, W., Pratt, J., & De Vries, S. M. (2002). Effect of maternal confidence on breastfeeding duration: An application of breastfeeding self-efficacy theory. *Birth*, *29*, 278-284.

Blyth, R. J., Creedy, D. K., Dennis, C.-L., Moyle, W., Pratt, J., De Vries, S. M., et al. (2004). Breastfeeding duration in an Australian population: The influence of modifiable antenatal factors. *Journal of Human Lactation*, *20*, 30-38.

Brookfield, S. D. (1991). *Understanding and facilitating adult learning*. San Francisco: Jossey-Bass.

Cerandas, J. M., Noceda, G., Barrera, L., Martinez, A. M., & Garsd, A. (2003). Maternal and perinatal factors influencing the duration of exclusive breastfeeding during the first 6 months of life. *Journal of Human Lactation*, *19*, 136-144.

Dennis, C.-L. (1999). Theoretical underpinnings of breastfeeding confidence: A self-efficacy framework. *Journal of Human Lactation*, *15*, 195-201.

Dennis, C.-L. (2003). The breastfeeding self-efficacy scale: Psychometric assessment of the short form. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, *32*, 734-744.

Dennis, C.-L., & Faux, S. (1999). Development and psychometric testing of the breastfeeding self-efficacy scale. *Research in Nursing and Health*, *22*, 399-409.

Duffy, L. C., Faden, H., Wasielewski, R., Wolf, J., Krystofik, D., & Tonawanda/Williamsville Pediatrics. (1997). Exclusive breastfeeding protects against bacterial colonization and day care exposure to otitis media. *Pediatrics*, *100*, E1-E8.

Dunn, S., Davies, B., McCleary, L., Edwards, N., & Gaboury, I. (2006). The relationship between vulnerability factors and breastfeeding outcome. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, *35*, 87-97.

Health Canada. (1999). *Breastfeeding in Canada: A review and update*. Ottawa, ON: Author.

Hörnell, A., Hofvander, Y., & Kylberg, E. (2001). Solids and formula: Association with pattern and duration of breastfeeding. *Pediatrics*, *107*, 38-44.

Howell, D. C. (2002). *Statistical methods for psychology* (5th ed.). Pacific Grove, CA: Duxbury.

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy* (Rev. ed.). Chicago: Association Press.

Kronberg, H., & Vaeth, M. (2004). The influence of psychosocial factors on the duration of breastfeeding. *Scandinavian Journal of Public Health*, *32*, 210-216.

Labbok, M. H. (2001). Effects of breastfeeding on the mother [Review]. *Pediatric Clinics of North America*, *48*, 143-158.

Labbok, M. H., & Krasovec, K. (1990). Toward a consistency in breastfeeding definition. *Studies in Family Planning*, *21*, 226-230.

Lawrence, R. A., & Lawrence, R. M. (1999). *Breastfeeding: A guide for the medical professional* (5th ed.). St. Louis, MO: Mosby.

Lawson, K., & Tulloch, M. I. (1995). Breastfeeding duration: Prenatal intentions and postnatal practices. *Journal of Advanced Nursing*, *22*, 841-849.

Maclean, H. M. (1998). Breastfeeding in Canada: A demographic and experiential perspective. *Journal of The Canadian Dietetic Association*, *59*, 15-23.

McLeod, D., Pullon, S., & Cookson, T. (2002). Factors influencing continuation of breastfeeding in a cohort of women. *Journal of Human Lactation*, *18*, 335-343.

McNally, E., Hendricks, S., & Horowitz, I. (1985). A look at breast-feeding trends in Canada (1963-1982). *Canadian Journal of Public Health*, *76*, 101-107.

Millar, W. J., & Maclean, H. (2005, March). Breastfeeding practices. In B. Riggs (Ed.), *Health Reports* (Vol. 16), Catalogue no. 82-003-XIE, pp. 23-31. Ottawa, Ontario: Statistics Canada.

Noel-Weiss, J. A., Bassett, V., & Cragg, B. (2006). Developing a prenatal breastfeeding workshop to support maternal breastfeeding self-efficacy. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, *35*, 349-357.

O'Campo, P., Faden, R. R., Gielen, A. C., & Wang, M. C. (1992). Prenatal factors associated with breastfeeding duration: Recommendations for prenatal interventions. *Birth*, *19*, 195-201.

Oddy, W. H., Sly, P. D., de Klerk, N. H., Landau, L. I., Kendall, G. E., Holt, P. G., et al. (2003). Breast feeding and respiratory morbidity in infancy: A birth cohort study. *Archives of Disease in Childhood*, *88*, 224-228.

Perinatal Partnership Program of Eastern and Southeastern Ontario. (2003). *Annual perinatal statistical report 2003*. Retrieved February 5, 2005, from http://www.pppeso.on.ca/english/statisticalreport_2003.pdf

Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and methods* (7th ed.). Philadelphia: Lippincott Williams & Wilkins.

Scariati, P. D., Gummer-Strawn, L. M., & Fein, S. B. (1997). A longitudinal analysis of infant morbidity and the extent of breastfeeding in the United States. *Pediatrics*, *99*, 1-5. Retrieved May 24, 2005, from http://www.pediatrics.org

Sheehan, D., Krueger, P., Watt, S., Sword, W., & Bridle, B. (2001). The Ontario mother and infant survey: Breastfeeding outcomes. *Journal of Human Lactation*, *17*, 211-219.

Statistics Canada. (2003). Breastfeeding practices. Retrieved February 5, 2005, from http://www.statcan.ca/english/freepub/82-221-XIE/2004002/tables/html/2178_03.htm

Williams, P. L., Innis, S. M., Vogel, A. M. P., & Stephen, L. J. (1999). Factors influencing infant feeding practices of mothers in Vancouver. *Canadian Journal of Public Health*, *90*, 114-119.

Young, T. K., Martens, P. J., Tabak, S. P., Sellers, E. A., Dean, H. J., Cheang, M., et al. (2002). Type 2 diabetes mellitus in children: Prenatal and early infancy risk factors among native Canadians. *Archives of Pediatric & Adolescent Medicine*, *156*, 651-655.

Joy Noel-Weiss, RN, IBCLC, MScN, is a part-time professor at the School of Nursing, University of Ottawa, Ontario, Canada.

André Rupp, MA, MS, PhD, is a visiting professor (associate level) at Institut zur Qualitätsentwicklung im Bildungswesen, Humboldt-Universität zu Berlin, Berlin, Germany.

Betty Cragg, RN, EdD, is a professor at the School of Nursing, University of Ottawa, Ontario, Canada.

Vicki Bassett, RN, PNC(C), BNSc, MEd, IBCLC, is a nurse educator Obs/Gyne at The Ottawa Hospital, Ontario, Canada.

A. Kirsten Woodend, RN, MSc, PhD, is an assistant professor at the School of Nursing, University of Ottawa, Ontario, Canada.

Address for correspondence: Joy Noel-Weiss, RN, IBCLC, MScN, 22 Pinetrail Crescent, Nepean, Canada ON K2G 5A1. E-mail: noelweiss@rogers.com.