Predicting Breastfeeding Duration Related to Maternal Attitudes in a Taiwanese Sample

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ABSTRACT

The purpose of this study was to examine maternal attitudes and sociodemographic variables associated with Taiwanese mothers' continuation of breastfeeding at 6 weeks postpartum. A sample of 140 in-hospital breastfeeding mothers was recruited in Taiwan. Participants completed the Iowa Infant Feeding Attitude Scale (IIFAS) in the hospital prior to discharge. Postdischarge participants were contacted by telephone at 3 and 6 weeks postpartum to obtain information regarding their feeding method and duration. Findings revealed that in-hospital maternal breastfeeding attitudes are predictive of breastfeeding duration. Insufficient milk supply was the reason most often given for discontinuing breastfeeding. Women's husband/partner was found to be the main source of breastfeeding support. We recommend health-care professionals add the IIFAS to their assessment to identify mothers at high risk for discontinuing breastfeeding and to develop and better evaluate breastfeeding promotion programs.

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Breastfeeding is well recognized as the optimal method to nourish newborns and is beneficial to both the developing child and the mother. Since 1978, the World Health Organization has made the promotion of breastfeeding a primary goal through the development of international standards and policies (Dennis, 2002). Despite the widely recognized benefits of breastfeeding, the level of breastfeeding performance is considered poor in Taiwan. From the 1960s to the 1980s, the prevalence of breastfeeding in Taiwan declined significantly, with breastfeeding initiation rates dropping from 94.5% in 1960 to exclusive and partial rates of 5.8% and 25%, respectively, in 1980 (Chen, Ho, Chen, & Chen, 1989). Given these findings, the Taiwanese Department of Health set a 2010 goal to increase the rate of continued breastfeeding at 1 month postpartum to 64%. In addition, the Taiwanese Department of Health encouraged women to perform exclusive breastfeeding until 6 months postpartum and to continue breastfeeding (to any degree) until 2 years (Bureau of Health Promotion, Department of Health, Taiwan, 2007). Recent statistics in

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Taiwan show that the rates of exclusive breastfeeding are 54.3% at 1 month postpartum, 25.8% at 4 months postpartum, and 15.9% at 6 months postpartum (Bureau of Health Promotion, Department of Health, Taiwan, 2010). Despite governmental support and existing educational programs, it remains challenging for health-care providers to increase Taiwan's rates of exclusive breastfeeding and prolonged duration of breastfeeding after hospital discharge.

To date, researchers have focused on identifying factors that may affect the continuation of breastfeeding. Successful breastfeeding depends on multiple factors associated with the mother, the infant, and the supportive environment. Support from husbands or partners, family, and friends has been identified as an important predictor of women's choices and continued duration of breastfeeding (Giugliani, Caiaffa, Vogelhut, Witter, & Perman, 1994; Khoury, Mitra, Hinton, Carothers, & Sheil, 2002; Raj & Plichta, 1998). Identified barriers include the negative attitudes of women, husbands or partners, and health-care professionals toward breastfeeding (Dungy, McInnes, Tappin, Wallis, & Oprescu, 2008; Freed, Fraley, & Schanler, 1993; Kuan et al., 1999). Dungy, Losch, and Russell (1994) found that maternal breastfeeding attitudes are better predictors of infant-feeding method during the postpartum period than are sociodemographic factors. Shaker, Scott, and Reid (2004) used the Iowa Infant Feeding Attitude Scale (IIFAS) to compare the infant-feeding attitudes of parents of breastfed infants with the attitudes of parents of formula-fed infants at hospital discharge. They found a strong correlation between maternal intentions and actual infant-feeding behaviors ($p < .001$). Breastfeeding mothers had a significantly higher total attitude score related to breastfeeding preference than mothers who chose to formula feed ($p < .001$). Furthermore, the fathers of breastfed infants had a significantly higher total attitude score toward breastfeeding preference when compared with the fathers of formula-fed infants ($p < .001$).

Although breastfeeding is a common practice in Taiwan, the country's rate of exclusive breastfeeding is very low. Maternal positive attitudes toward breastfeeding have been found to be associated with continued breastfeeding at the first month postpartum (Chen & Chi, 2003). Several reasons have been linked to the low percentage rate of breastfeeding, including insufficient family support and few consulting resources for breastfeeding mothers in the community and health-care facilities, as well as policies in medical institutions and workplaces that are unsupportive of breastfeeding (Ko, 2002).

However, although some women choose to breastfeed for a limited amount of time, many women are not successful in breastfeeding for a longer period. For example, 87% of women who discontinued breastfeeding within the first 6 weeks postpartum reported they would have liked to breastfeed for a longer period (Hamlyn, Brooker, Oleinikova, & Wands, 2002). For women who breastfed for at least 6 weeks, 37% would have preferred to continue for a longer period but had other demands that took priority.

The possible modifiable variables related to breastfeeding outcomes include breastfeeding attitudes, experiences, satisfaction, and breastfeeding confidence. Many self-report assessment tools have been developed to increase the ability of health-care professionals to determine the modifiable variables associated with breastfeeding behavior (Ho & McGrath, 2010). To date, Taiwanese mothers' attitudes toward breastfeeding have not been sufficiently examined with a validated breastfeeding attitudes instrument. Therefore, a better understanding of Taiwanese mothers' breastfeeding attitudes is clearly needed for developing effective interventions and measuring outcomes in terms of changes in maternal attitudes and behavior in Taiwan. The objectives of our study were twofold. Our first objective was to explore Taiwanese maternal breastfeeding attitudes by using a validated instrument, the IIFAS, and sociodemographic variables associated with the continuation of breastfeeding through the first 6 weeks postpartum. Our second objective was to examine the reasons why Taiwanese mothers choose to discontinue breastfeeding and their perceived social support systems related to breastfeeding. The psychometric properties of the newly translated Chinese IIFAS are addressed in a separate publication (see Ho & McGrath, 2011).

METHODS

Sample

A convenience sample consisting of 140 new breastfeeding mothers was recruited between October 2009 and January 2010 from a public hospital in Taichung City, Taiwan. The computer-assisted power analysis software nQuery Advisor 7.0 was used to determine the sample size for the log-rank test of survival analysis. Follow-up procedures were conducted with participants through 6 weeks postpartum, and the planned attrition rate was calculated at 20%.

We based our calculations on a meta-analysis of 85 other longitudinal studies of breastfeeding mothers in which the average attrition rate for follow-up was 18.6% at 3 months and 32.5% at 3 years (Hansen, Tobler, & Graham, 1990). For our study, 140 participants were recruited based on power analysis and general consideration for having an adequate sample size.

Eligible participants were mothers who were hospitalized for childbirth. All participants met the following inclusion criteria: (a) age between 18 and 45 years old; (b) gave birth to a healthy, singleton, term infant (≥37 weeks and ≥2,500 g) during hospitalization; (c) able to read and write in Chinese and to understand the survey directions and questions; and (d) had initiated breastfeeding their infant during the hospital stay. Although these criteria allowed us to best examine factors affecting the duration of breastfeeding, they limited our ability to examine attitudes related to the initiation of breastfeeding. Exclusion criteria were women who suffered from postnatal complications or had previous mental illness and infants who had chronic, acute, or congenital illness.

Definitions of Variables

For clarity, infant feeding was operationally divided to three categories: exclusive breastfeeding, partial breastfeeding, and bottle feeding. *Exclusive breastfeeding* was defined as the infant's receiving only human milk, with no formula provided. *Partial breastfeeding* was defined as the infant's receiving human milk and formula by bottle feeding. *Bottle feeding* was defined as the infant's receiving formula from a bottle. *Breastfeeding duration* was defined as the total number of days from the beginning to the end of breastfeeding. Because the study examined maternal breastfeeding attitudes from birth to 6 weeks postpartum, the maximum number of days was 42. Data related to the duration of breastfeeding were obtained by phone conversations with the women at 3 weeks and 6 weeks postpartum. The women were asked how they were feeding their baby at home, and their method of feeding was classified as exclusive breastfeeding, partial breastfeeding, or bottle feeding. *Weaning* was defined as the woman discontinuing breastfeeding and not intending to breastfeed again. The "breastfeeding attitude" variable was defined as the degree of positive or negative value placed on breastfeeding (Ajzen, 1988). Maternal breastfeeding attitudes were measured using the IIFAS (De La Mora, Russell, Dungy, Losch, & Dusdieker, 1999).

Sociodemographic characteristics collected included age, maternal education level, marital status, family annual income, employment status, parity, gender of baby, previous breastfeeding experience, the condition of previous breastfeeding experiences, and method of birth. Data for all the demographic variables were collected upon admission to the study, as reported by the mothers. Maternal age was collected as a continuous variable. Maternal education level was categorized as senior high school or lower, college, university, or graduate or higher. Maternal marital status was categorized as married, divorced or separated, or single. Infant gender was categorized as female or male. Family annual income referred to the total parental income per year and was divided to four categories in New Taiwan dollars (NT$): less than 400,000; 400,000 to 600,000; 600,001 to 1,000,000; or more than 1,000,000. Maternal employment status was categorized as returning to work after maternity leave or being unemployed. Maternal parity was categorized as first birth, second birth, or third birth or more. Maternal previous breastfeeding experience was categorized as "yes" or "no." The condition of previous breastfeeding experience was categorized as "good" or "not good." The method of birth was categorized as "cesarean surgery" or "vaginal birth."

Procedure

Our study was approved by the research ethics committee of the participating hospital and by the institutional review board of our university, Virginia Commonwealth University in Richmond, Virginia. Before the study participants were discharged from the hospital, we conducted a face-to-face interview with each mother to administer the IIFAS and collect sociodemographic data. At 3 weeks and 6 weeks postpartum, we conducted telephone interviews with each mother to collect data regarding breastfeeding duration and to record each woman's current status of breastfeeding and infant-feeding method. In the final follow-up at either 6 weeks or when it was determined that breastfeeding was discontinued, mothers were asked during phone interviews to provide reasons for breastfeeding cessation and their perceived social support. We asked the question, "What are the reasons why you chose to stop breastfeeding?" We also asked two open-ended questions about the support the women received: "As you look back over the time you have breastfed, who has been supportive to you since your baby's birth?" and "What type of support did you receive?"

Iowa Infant Feeding Attitude Scale

The IIFAS was developed by De La Mora et al. (1999) and consists of 17 items with a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Nine of the items are worded in a manner favorable to breastfeeding, and the remaining items are favorable to formula feeding. Items favoring formula feeding are reverse scored (i.e., 1 = 5, 2 = 4, 4 = 2, and 5 = 1), and a total attitude score is computed (see Table 1 for example items from the IIFAS). Total attitude scores range from 17 (indicating more positive formula-feeding attitudes) to as high as 85 (reflecting more positive attitudes toward breastfeeding). The IIFAS can be used to predict the choice of infant-feeding method, as reflected by measures of behavioral intentions, and the actual feeding behavior, as reflected by the duration of breastfeeding. De La Mora et al. found that the predictive validity of the IIFAS is independent of sociodemographic variables.

Researchers have used the IIFAS for studies on breastfeeding in various international locations: in the United States (De La Mora et al., 1999; Marrone, Vogeltanz-Holm, & Holm, 2008; Simmie, 2006), in Australia (Giglia, Binns, Alfonso, & Zhao, 2007; Scott, Binns, Oddy, & Graham, 2006), in Northern Ireland (Sittlington, Stewart-Knox, Wright, Bradbury, & Scott, 2007), in Romania (Wallis et al., 2008), and in Scotland (Dungy et al., 2008; Scott, Shaker, & Reid, 2004; Tappin, Britten, Broadfoot, & McInnes, 2006). They reported adequate predictive validity and internal consistency of the IIFAS, with Cronbach's alpha ranging from .79 in Northern Ireland (Sittlington et al., 2007) to .86 in the United States (De La Mora et al., 1999) and .89 in Scotland (Dungy et al., 2008). In a separate study, we translated the English version of the IIFAS to a Chinese version and found that the Cronbach's alpha coefficient for the Chinese version was .74 (Ho & McGrath, 2011).

TABLE 1
Example Items From the Iowa Infant Feeding Attitude Scale

Item
1. The nutritional benefits of breastmilk last only until the baby is weaned from breastmilk.
2. Formula feeding is more convenient than breastfeeding.
3. Breastfeeding increases mother–infant bonding.
4. Breastmilk is lacking in iron.
5. Formula-fed babies are more likely to be overfed than are breastfed babies.
6. Formula feeding is the better choice if a mother plans to work outside the home.
7. Mothers who formula feed miss one of the great joys of motherhood.
8. Women should not breastfeed in public places such as restaurants.
9. Babies fed breastmilk are healthier than babies who are fed formula.
10. Breastfed babies are more likely to be overfed than formula-fed babies.
11. Fathers feel left out if a mother breastfeeds.
12. Breastmilk is the ideal food for babies.
13. Breastmilk is more easily digested than formula.
14. Formula is as healthy for an infant as breastmilk.
15. Breastfeeding is more convenient than formula feeding.
16. Breastmilk is less expensive than formula.
17. A mother who drinks alcohol once a week should not breastfeed her baby.

Data Analysis

Data analysis included both quantitative and qualitative processes. For quantitative data analysis, we used SPSS version 17 for Windows statistical software program. All data were reviewed and examined for coding errors or missing data. Missing data were handled by using the "exclude cases pairwise" option in SPSS. We tested the relationship between IIFAS scores and sociodemographic variables by using correlation, *t* tests, or a one-way analysis of variance. The significance level for all statistical analysis was set at .05.

Determinants of breastfeeding duration were investigated in the regression analysis using the Cox proportional hazards model. The model allows joint estimation of the effects of predictor variables on the "hazard," the risk of breastfeeding cessation, rather than the duration itself, and it can be used to analyze data containing censored observations (Cox & Oakes, 1984). The censored data in our study represented data from mothers who continued to breastfeed beyond the end of the study period or beyond the time at which mothers dropped out from the study.

The qualitative data were obtained from the open-ended questions related to the mothers' reasons for changing their infant-feeding method from breastfeeding to bottle feeding and their perceived social support. Content analysis was used to identify prominent themes and categories. The categories were then coded and ranked in order of frequency to determine the most common reasons for maternal cessation of breastfeeding and the most commonly perceived sources of social support.

RESULTS

Description of Sample

A total of 140 breastfeeding mothers met all the study criteria and were enrolled in the study. The mean age of the sample was 30.04 years old ($SD = 4.29$), ranging from 19 to 41 years old. The characteristics of the study population are shown in Table 2. Most participants had university education (34.3%), and 35% of the participants had a family annual income of 400,000 to 600,000 in NT$. In all, 93.6% of the women were married, and 64.3% of the women indicated that they would return to work after maternity leave. Of the 140 mothers who enrolled in the study and completed the initial IIFAS, 120 mothers completed telephone interviews at 3 weeks postpartum (14% attrition rate). Attrition resulted from the loss of contact with 20 mothers. No significant differences were found between participants who completed the study and women who were lost to follow-up with respect to IIFAS scores, age, education, employment status, parity, previous breastfeeding experience, condition of previous breastfeeding experience, and method of birth (Table 3). Although the study sample was large enough to detect the significance of breastfeeding attitudes in relationship to the outcomes of breastfeeding duration and factors related to breastfeeding duration, not enough participants were available to statistically compare marital status and family annual income between participants who completed the study and women who were lost to follow-up.

TABLE 2
Characteristics of the Study Population ($N = 140$)

Variables	Number	%
Maternal education level		
Senior high school or lower	45	32.1
College	40	28.6
University	48	34.3
Graduate or higher	7	5.0
Marital status		
Married	131	93.6
Divorced or separated	2	1.4
Single	7	5.0
Family annual income (in New Taiwan dollars)[a]		
Less than 400,000	48	34.3
400,000–600,000	49	35.0
600,001–1,000,000	34	24.3
More than 1,000,000	9	6.4
Employment status		
Return to work after maternity leave	90	64.3
Unemployed	50	35.7
Parity		
First birth	67	47.9
Second birth	60	42.9
Third birth or more	13	9.3
Gender of baby		
Female	72	51.4
Male	68	45.7
Previous breastfeeding experience		
Yes	64	45.7
No	76	54.3
Condition of previous breastfeeding experience		
Good	45	70.3
Not good	19	29.7
Method of birth		
Cesarean surgery	44	31.4
Vaginal birth	96	68.6

[a]In 2010, $1 in U.S. currency equaled $32 in New Taiwan dollars.

At 3 weeks postpartum, 72.9% ($n = 102$) of the mothers were breastfeeding their infants. Among these breastfeeding mothers at 3 weeks postpartum, 37 mothers (26.4%) were exclusively breastfeeding and 65 mothers (46.4%) were partially breastfeeding. All 102 breastfeeding mothers were successfully contacted again at 6 weeks postpartum (0% attrition rate), and 62.1% ($n = 87$) were still breastfeeding their infants. Among these mothers who were still breastfeeding at 6 weeks postpartum, 34 mothers (24.3%) were exclusively breastfeeding and 53 mothers (37.9%) were partially breastfeeding.

Iowa Infant Feeding Attitude Scale Scores and Demographic Factors

The relationship between the demographic factors of the initial 140 in-hospital women and their IIFAS scores was examined. Maternal age ($r = .20$, $p < .05$) was positively correlated with IIFAS scores, indicating older mothers with higher IIFAS scores favored positive attitudes about breastfeeding. Relationships were also found between IIFAS scores and family annual income. Post hoc analysis indicated that maternal infant-feeding attitudes became more favorable toward breastfeeding as household annual income increased (<400,000 and 400,000–600,000 in NT$: M difference $= -2.73$, $p < .05$; <400,000 and 600,001–1,000,000 in NT$: M difference $= -3.82$, $p < .05$; and <400,000 and >1,000,000 in NT$: M difference $= 6.17$, $p < .05$). Table 4 shows the differences in demographic factors and IIFAS scores.

Factors Predictive of Breastfeeding Duration

To determine factors contributing to breastfeeding duration at 6 weeks postpartum, a Cox regression analysis was performed. Factors affecting the

TABLE 3
Comparison of Characteristics Between Participants Who Completed the Study and Participants Who Were Lost to Follow-Up

Variables	Completed the Study ($n = 120$)—Number and Percentage	Lost to Follow-Up ($n = 20$)—Number and Percentage	p Value
t-test			
Iowa Infant Feeding Attitude Scale scores	120 (Mean: 64.7)	20 (Mean: 63.5)	.47
Maternal age (in years)	120 (Mean: 30.1)	20 (Mean: 29.7)	0.71
Chi-square test			
Maternal education level			
Senior high school or lower	37 (30.8)	8 (40.0)	.51
College	35 (29.2)	5 (25.0)	
University	43 (35.8)	5 (25.0)	
Graduate or higher	5 (4.2)	2 (10.0)	
Employment status			
Return to work after maternity leave	78 (65.0)	12 (60.0)	.67
Unemployed	42 (35.0)	8 (40.0)	
Parity			
First birth	54 (45)	13 (65.0)	.14
Second birth	53 (44.2)	7 (35.0)	
Third birth or more	13 (10.8)	0	
Gender of baby			
Female	63 (52.5)	5 (25.0)	.02
Male	57 (47.5)	15 (75.0)	
Previous breastfeeding experience			
Yes	57 (47.5)	7 (35.0)	.30
No	63 (52.5)	13 (65.0)	
Condition of previous breastfeeding experience			
Good	39 (68.4)	6 (85.7)	.32
Not good	18 (31.6)	1 (14.3)	
Method of birth			
Cesarean surgery	35 (29.2)	9 (45.0)	.16
Vaginal birth	85 (70.8)	11 (55.0)	

continuation of breastfeeding among the study's sample are shown in Table 5. The only factor independently related to the duration of breastfeeding was maternal IIFAS scores. Risk for cessation of breastfeeding at 6 weeks postpartum was negatively related to the mothers' IIFAS scores; that is, mothers with higher IIFAS scores, which indicated a favorable attitude toward breastfeeding, were less likely to discontinue breastfeeding than mothers with lower IIFAS scores ($B = -.06, SE = .03$, Hazard Ratio = .938, $p = .03$).

Reasons for Weaning From Breastmilk

Women who had decided to bottle feed their infant by the time of the 3-week or 6-week postpartum follow-up telephone call were asked why they had stopped breastfeeding. Eighteen women (12.9%) discontinued breastfeeding within 3 weeks postpartum. The most common reason cited by these women was insufficient milk supply (89.5%). The second most common reason was painful nipples (10.5%). Fifteen more women (10.7%) weaned their infant and were exclusively bottle feeding sometime between the third and sixth weeks postpartum (for a total of 33 women, or 45.5%, who discontinued breastfeeding). Their reasons for weaning were insufficient milk supply (52.9%), return to work (35.3%), not knowing if their baby had received enough to eat (5.9%), and painful nipples (5.9%). The reasons for discontinuing breastfeeding are shown in Table 6.

Women's Perceived Social Support

When the women were asked who had been supportive to them after their babies were born and what type of support they had received, they provided several answers. The most commonly reported source of support was the women's husbands or

TABLE 4
Differences in Demographic Factors and Scores on the Iowa Infant Feeding Attitude Scale (IIFAS)

Demographic Factors Value	$N = 140$	IIFAS Mean Score (*SD*)	*p* Value
Correlation test			
Age (in years)	30.04	64.55 (6.90)	.02
The one-way analysis of variance			
Maternal education level			
Senior high school or lower	$n = 45$	63.33 (6.12)	.46
College	$n = 40$	65.08 (5.87)	
University	$n = 48$	64.90 (7.99)	
Graduate or higher	$n = 7$	67.00 (9.18)	
Marital status			
Married	$n = 131$	64.75 (6.93)	.40
Divorced or separated	$n = 2$	63.50 (10.61)	
Single	$n = 7$	61.14 (5.40)	
Family annual income (in New Taiwan dollars)[a]			
Less than $400,000	$n = 48$	62.27 (5.75)	.02
$400,000–$600,000	$n = 49$	65.00 (6.28)	
$600,001–$1,000,000	$n = 34$	66.09 (7.66)	
More than $1,000,000	$n = 9$	68.44 (9.83)	
Parity			
First birth	$n = 67$	64.51 (6.67)	.88
Second birth	$n = 60$	64.40 (7.46)	
Third birth or more	$n = 13$	65.46 (5.72)	
***t*-test**			
Employment status			
Return to work after maternity leave	$n = 90$	64.62 (7.05)	1.22
Unemployed	$n = 50$	64.42 (6.70)	
Gender of Baby			
Female	$n = 68$	64.74 (6.03)	.76
Male	$n = 72$	64.38 (7.67)	
Previous breastfeeding experience			
Yes	$n = 64$	64.62 (7.35)	.91
No	$n = 76$	64.49 (6.55)	
Condition of previous breastfeeding experience			
Good	$n = 45$	65.58 (7.52)	.11
Not good	$n = 19$	62.37 (6.58)	
Method of birth			
Cesarean surgery	$n = 44$	64.84 (6.44)	.74
Vaginal birth	$n = 96$	64.42 (7.13)	

[a]In 2010, $1 in U.S. currency equaled $32 in New Taiwan dollars.

partners ($n = 120$, 47.4%), who were also the most supportive among all the women's reported sources of support. Other support that women received came from both maternal and paternal parents ($n = 94$, 37.2%), friends ($n = 20$, 7.9%), and sisters ($n = 19$, 7.5%). The women also reported additional sources and types of support: family members who encouraged them to breastfeed ($n = 120$, 44.1%), family members who helped with household chores ($n = 75$, 27.6%), the women's mothers or mothers-in-law who provided some of the meals for the family to allow the women more time with their infant and to increase breastmilk production ($n = 45$, 16.5%), and family members who helped take care of the women's other children ($n = 32$, 11.8%).

DISCUSSION

Since 1992, the Department of Health, Executive Yuan, in Taiwan has launched several national programs to promote breastfeeding, including regulating the marketing of breastmilk substitutes by

TABLE 5
Factors Associated With the Continuation of Breastfeeding in Multiple Cox Regression Models

Major Factors	*B*	*SE*	Hazard Ratio (95% Confidence Interval)	*p* Value
Iowa Infant Feeding Attitude Scale	−.06	.03	0.94 (0.88–0.99)	.03
Age	−.03	.05	0.98 (0.88–1.09)	.65
Family annual income (in New Taiwan dollars)[a]				
Less than $400,000[b]			1.00 (reference)	.23
$400,000–$600,000	−.91	.75	0.40 (0.09–1.76)	.26
$600,001–$1,000,000	−.78	.69	0.46 (0.12-1.76)	.18
More than $1,000,000	−1.00	.74	0.37 (0.09-1.57)	
Employment status				
Unemployed	.22	.43	1.25 (0.54–2.90)	.60
Parity				
First birth[b]			1.00 (reference)	.16
Second birth	−1.14	.63	0.32 (0.09–1.11)	.07
Third birth or more	−.84	.56	0.43 (0.14–1.29)	.13
Gender of Baby				
Male	−.26	.37	0.77 (0.37–1.61)	.49
Previous breastfeeding experience				
No	−0.77	0.58	0.43 (0.15–1.43)	.18
Method of birth				
Vaginal birth	.24	.40	1.27 (0.58–2.77)	.55

[a]In 2010, $1 in U.S. currency equaled $32 in New Taiwan dollars.
[b]Reference category.

companies that make baby formula, developing facilities for breastfeeding in public, providing supplemental breastfeeding counseling and training courses for health-care workers, introducing mass media programs, and adopting the Ten Steps to Successful Breastfeeding program to certify Baby-Friendly hospitals (Chien, Chu, Tai, & Lin, 2005). After years' worth of breastfeeding promotion, breastfeeding initiation is more common in Taiwan; however, breastfeeding duration rates remain low. Among the Taiwanese mothers in our study, the prevalence of exclusive and partial breastfeeding was 26.4% and 46.4%, respectively, at 3 weeks postpartum, and 24.3% and 37.9%, respectively, at 6 weeks postpartum. In this study, the breastfeeding rates (to any degree) after hospital discharge approached the Taiwanese breastfeeding policy goals but continued to show decreased rates of exclusive breastfeeding.

TABLE 6
Percentage of Participants Who Cited Given Reasons for Discontinuing Breastfeeding

Reason	3 Weeks Postpartum ($n = 18$)	6 Weeks Postpartum ($n = 15$)
Insufficient milk supply	89.5%	52.9%
Painful nipples	10.5%	5.9%
Return to work		35.3%
Not knowing if the baby had enough to eat		5.9%

High IIFAS scores are associated with maternal intention to continue breastfeeding, whereas low scores indicate the likelihood that the mother might discontinue breastfeeding and use formula feeding to nourish her infant. In our study, we found that the participants' IIFAS scores were somewhat related to demographic variables. Mothers with higher IIFAS scores indicated a preference for breastfeeding and tended to be older and to have a higher family annual income. These findings are consistent with results from previous studies (De La Mora et al., 1999; Sittlington et al., 2007). Because few studies have investigated the influence of demographic factors on maternal breastfeeding attitudes in Asian countries, our finding that demographic variables may influence breastfeeding duration in this culture is important.

We also examined the factors associated with the duration of breastfeeding. Our findings suggest that positive maternal attitudes toward breastfeeding are the only predictive factor of the duration of breastfeeding among Taiwanese mothers. In their

Positive maternal breastfeeding attitudes may motivate women to continue to breastfeed for at least the first 6 weeks postpartum and, most likely, longer.

Taiwanese study, Chen and Chi (2003) also found that positive breastfeeding attitudes are the most important determinant to predict greater breastfeeding duration within the first month postpartum. Similarly, Dungy et al. (1994) indicated that maternal attitudes are stronger independent predictors of breastfeeding duration than are sociodemographic factors during the postpartum period. Our findings are consistent with these previous studies. Thus, highly positive maternal breastfeeding attitudes may motivate women to continue to breastfeed for at least the first 6 weeks postpartum and, most likely, longer. This finding is important for health-care professionals to consider when designing breastfeeding promotional strategies that prolong breastfeeding duration specifically among women who display a low level of breastfeeding attitudes in the newborn period. Health-care providers may often believe that if mothers initiate breastfeeding, the mothers' attitude about breastfeeding must be good enough to sustain breastfeeding; however, these findings demonstrate that although mothers may initiate breastfeeding, their breastfeeding attitudes are variable and can be predictive of breastfeeding duration.

In our study, insufficient milk supply was the most common reason cited by mothers for weaning their infant from breastfeeding prior to 6 weeks. This finding is similar to results from other studies (Chen & Chi, 2003; Lewallen et al., 2006; Otsuka, Dennis, Tatsuoka, & Jimba, 2008). Not knowing if their baby had enough to eat was the third most common reason the women in our study reported for discontinuing breastfeeding between 3 and 6 weeks postpartum. Insufficient milk supply and not knowing if the baby has had enough to eat are related factors associated with breastfeeding discontinuation. According to Giugliani (2004), most women can produce enough breastmilk to meet their baby's demand, and having an insufficient milk supply may not reflect the true reason for mothers' decision for early weaning. Several factors may cause a woman's perceived insufficient milk, such as the woman's uncertainty about her capacity to feed her baby properly, lack of knowledge about the normal behavior of a baby, and negative opinions about breastfeeding from her significant persons (Giugliani, 2004). Moreover, some women may cite having an insufficient milk supply as the reason why they decided to discontinue breastfeeding because it is a socially acceptable reason to cease breastfeeding when women decide that they no longer wish to breastfeed (Hitchcock & Coy, 1988).

Insufficient milk supply was the most common reason cited by mothers for weaning their infant from breastfeeding prior to 6 weeks.

Additional research is needed to reliably identify women who are at high risk for problems with insufficient milk supply so that the appropriate strategies to increase milk supply may be instituted. In addition, health-care professionals can be encouraged to teach mothers how to know if their baby has a low intake of breastmilk by checking several of their baby's wet diapers per day (less than six to eight) and monitoring the frequency and amount of their baby's bowel movements (Powers, 2001). Moreover, health-care professionals can provide suggestions to women on how to increase milk production, such as improving latch-on, increasing the frequency of feeding, offering both breasts during each breastfeeding session, and drinking enough fluids (Giugliani, 2004). Perceived insufficient milk supply is considered a modifiable factor in breastfeeding duration. Therefore, based on our study's findings, implementing strategies that prevent the development of maternal perceptions of insufficient milk supply seems appropriate in order to encourage increased breastfeeding duration.

Returning to work is another common reason women provide for weaning their baby (Chen & Chi, 2003; Lewallen et al., 2006). In Taiwan, most employed women are allowed 8 weeks' worth of maternity leave. Thus, in our study, having to return to work was an additional primary reason the mothers cited for ceasing breastfeeding around 6 weeks postpartum. To prevent the discontinuation of breastfeeding among working mothers, we recommend that community health nurses conduct home visits with postpartum women to provide information about how to pump breastmilk, maintain lactation, and store breastmilk while the women are at work. When the women return to work, occupational health nurses can provide support and strategies to help employed women to continue breastfeeding. Additional strategies include ensuring supportive measures from the women's employers and workplace, such as providing breastmilk pumps and a pumping room,

regular breaks to express milk, and support groups that encourage breastfeeding duration.

In previous studies, breastfeeding mothers have reported that experiencing painful nipples is a reason for early weaning (Kirkland & Fein, 2003; Lewallen et al., 2006; Schwartz et al., 2002). Similarly, women in our study also cited painful nipples as a reason to discontinue breastfeeding their infant. Nipple pain is a common symptom observed in mothers of infants with *ankyloglossia*, which is a condition that restricts the infant's range of tongue movement. For example, Geddes et al. (2008) reported that infants with ankyloglossia can experience persistent breastfeeding difficulties, including poor attachment to the breast and suboptimal weight gain, and that mothers of infants with ankyloglossia often experience nipple pain. Based on Geddes et al.'s findings and on the mothers' reports of nipple pain in our study, we recommend nurses assess maternal nipple pain and, in addition, consider treating ankyloglossia as a potential factor related to early breastfeeding discontinuation.

Results from our study suggest that Taiwanese breastfeeding mothers' main source of support is their husbands or partners. Other studies have also found that the baby's father has a significant influence on a woman's choice of feeding method (Littman, Medendorp, & Goldfarb, 1994; Matthews, Webber, McKim, Banoub-Baddour, & Laryea, 1998). The women in our study also reported that family members, in general, were a source of support for their infant-feeding decisions. Our finding is consistent with results from other studies that emphasize the importance of support from family members in a mother's decision to initiate and continue breastfeeding (Evans, Dick, Lewallen, & Jeffrey, 2004; Lewallen et al., 2006; Meyerink & Marquis, 2002).

The Taiwanese postpartum women in our study felt that family members were very supportive in various ways and provided valuable assistance to help them through the early postpartum period after childbirth. Their description of the family support they received indicates that the birth of a new infant is an important family event in Taiwan. For example, the women reported that family members helped with sharing household chores, cooking, and taking care of the women's other children. The women also reported that family members, in general, provided emotional and instructional support, and all of the women in our study said that family members specifically encouraged them to breastfeed their infant. Based on our study's findings, we recommend that health-care providers confirm whether or not a mother has a positive support system and whether the people in her support system are only supportive while the woman is breastfeeding. If possible, it may be helpful to involve the woman's consistently supportive people in a breastfeeding promotion program to increase the woman's breastfeeding duration. Moreover, practitioners or community health-care nurses can serve as one of the woman's supportive sources by providing at-home visits or telephone consultation services that offer information about successful breastfeeding techniques.

STUDY LIMITATIONS

Our study included several limitations. First, the study population was mostly well educated, married, and with a middle-class income. Women from lower socioeconomic groups are known to be at a higher risk to discontinue breastfeeding (Dennis, 2003; Riordan & Gill-Hopple, 2001). Further research with a more diverse population is needed to determine if the results from our study can be generalized to socioeconomically disadvantaged women. Second, our study used a convenience sample, and all the women came from one geographical area in Taichung, Taiwan. Thus, the results may not be generalizable to all childbearing women in Taiwan. Third, our study investigated the relationships between maternal attitudes and sociodemographic factors on the continuation of breastfeeding. Women from different regions may have different factors associated with the duration of breastfeeding. Future studies could extend various factors in relationship to infant-feeding decision and initiation. Finally, additional research is needed to consider more information about how the type of birth (e.g., prepared/ nonmedicated, epidural, inductions, emergency cesarean surgery, or planned cesarean surgery) might affect breastfeeding initiation and duration. The type of birth often plays an important role in the early initiation of breastfeeding because a difficult birth can change how an infant responds to early breastfeeding.

IMPLICATIONS FOR PRACTICE

Understanding maternal attitudes related to infant feeding in Taiwan will support the development of more effective health promotion programs aimed at increasing breastfeeding rates in Taiwan. One of our goals was to explore factors that influence the duration of breastfeeding in postpartum women to better understand how to improve the effectiveness of

See the JPE 20(1) issue for two other articles that address factors related to breastfeeding duration: "Factors Associated With Exclusive Breastfeeding" by DiFrisco et al. and "Factors Related to Breastfeeding Discontinuation" by Brand, Kothari, and Stark. Both articles are available at JPE's site on IngentaConnect (http://www.ingentaconnect.com/content/springer/jpe).

breastfeeding promotion. The findings from our study indicate that maternal breastfeeding attitudes are related to breastfeeding duration at 6 weeks postpartum. The sociodemographic factors associated with the method of infant feeding may be difficult to change. However, maternal infant-feeding attitudes are more likely to change in response to the information provided by breastfeeding promotion programs. Using this information, practitioners can design interventions that specifically target relevant issues or areas where mothers' infant-feeding attitudes are poor.

Among the participants in our study, insufficient milk supply was the most common reason for women to stop breastfeeding within 6 weeks postpartum. Insufficient milk supply is also a modifiable factor. Efforts to enhance breastfeeding education to reduce the incidence of insufficient milk supply may be an important element for improving breastfeeding rates.

The women in our study also viewed family members as their major source of support at home. Strategies for changing breastfeeding attitudes might include not only mothers but also husbands or partners, mothers, mothers-in-law, and friends. Family members especially need more information about how they might be supportive of breastfeeding mothers, which may improve rates of successful breastfeeding. Additionally, the role of health-care professionals in home breastfeeding support cannot be overlooked. Health-care professionals must be better trained in the area of breastfeeding so they can offer better assistance to breastfeeding women on how they may increase breastfeeding duration and continue breastfeeding.

Our study needs to be replicated in different regions of Taiwan with larger, more diverse populations to verify our results. We also recommend further research to explore the association of women and their social network attitudes with the duration of breastfeeding.

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