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Breastfeeding Self-efficacy: A Critical Review of Available Instruments

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Abstract

Increasing breastfeeding rates in the United States is a national priority. Yet, initiation and duration of breastfeeding remains below national targets. Breastfeeding self-efficacy has been shown to be a strong predictor of both breastfeeding initiation and duration and is therefore an important characteristic to be able to measure. However, there is currently a myriad of instruments for measuring breastfeeding self-efficacy, which makes selection of an appropriate instrument difficult. Thus, our aim was to identify, compare, and critically review available breastfeeding self-efficacy instruments. In a systematic review, 6 breastfeeding self-efficacy instruments were identified. The instruments' purposes, theoretical framework, final scale development, and application in 5 most recent settings were analyzed. The 6 breastfeeding self-efficacy instruments apply a number of theoretical and conceptual frameworks in their development, with Bandura's social cognitive theory being most common. Content, construct, and predictive validity were strong for most scales. Some, but not all, have been successfully adapted to novel settings. In sum, there are several measurements of breastfeeding self-efficacy that can and should be employed to better understand reasons for suboptimal breastfeeding rates and the effects of interventions on breastfeeding self-efficacy. Instrument selection should be based on domains of primary interest, time available, peripartum timing, and assessment of previous adaptations. Failure to apply appropriate measures in research may garner results that are inconclusive, inaccurate, or nonrepresentative of true study effects.

Keywords

affective instruments; breastfeeding; human milk; instruments; measurement; psychometric testing; review; self-efficacy; survey

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Background

Human milk provides optimal infant nutrition and has short-and long-term health benefits for both infants and mothers.¹ As such, the World Health Organization and American Academy of Pediatrics recommend exclusive breastfeeding (EBF) (ie, feeding only human milk, including expressed milk and medicines and no other fluids or foods) for the first 6 months of the infant's life, with continued breastfeeding for at least 1² or 2^{1,3} years.

Breastfeeding practices in the United States (US) are suboptimal. The US surgeon general issued a call to action in 2011 with initiatives reflected in Healthy People 2020, which aimed to increase US breastfeeding rates for having ever breastfed and EBF to 6 months to 81.9% and 25.5%, respectively.⁴ In 2013, the prevalence of breastfeeding at 6 months was 49%, up slightly from 41.5% in 2007.³ Similarly, EBF rates in the US increased to 16.4% in 2007 from 11.3%.⁴ However, if the breastfeeding goals set out by the US surgeon general are to be met, a better understanding of the numerous barriers to breastfeeding is needed.

Indeed, there are many determinants of breastfeeding behaviors from the level of the society, to the community, the household, and the individual.⁵ At the level of the individual, affective characteristics, or the "qualities which represent people's typical ways of feeling," have been shown to be particularly important determinants of breastfeeding practices.⁶

Self-efficacy, or "one's belief in one's ability to succeed in a specific situation,"⁷ is 1 such affective characteristic and is 1 of the strongest predictors of a range of behaviors, including breastfeeding.⁵ As such, the ability to appropriately measure self-efficacy is useful for predicting both breastfeeding initiation and breastfeeding behavior over time. This review aims to make the measurement of breast-feeding self-efficacy more readily achievable by providing a brief description, evaluating validity and adaptation, and then offering critical assessments of each instrument.

Methods

We searched electronic databases, including PubMed, CINAHL, PsychINFO, Web of Science, Health and Psychosocial Instruments, and Cochrane, through March 2013. Unpublished reports, theses, dissertations, and studies not in English were not included in the analysis. Key search terms and their synonyms, including PubMed MeSH terms, were *breastfeeding*, *infant feeding*, *pregnant and postpartum women*, *self-efficacy*, *lactation*, *breast milk*, *affective measures*, *scales*, *human milk*, *instrument*, and *tools*. Any original empirical study measuring some aspect, either implicitly or overtly, of self-efficacy toward breastfeeding among pregnant and postpartum women was analyzed. There were no limitations placed on how instrument creators defined self-efficacy.

Seventy-two articles were initially identified. After abstract review, 64 were excluded because they described instruments pertaining to other affective constructs, such as knowledge, attitudes, and social support. Two more were excluded after full review for not measuring breastfeeding self-efficacy, leaving a total of 6 instruments.

In the Results, we first provide a brief overview of each instrument. Then, 3 types of validation are assessed. Because the purpose of validity is to ensure that data derived from the instrument provide meaningful and reliable results, it is arguably the most important consideration to instrument development.⁶ *Content validity*, or the extent to which the items reflect the intended universe of content, was established by both literature review and expert judges.⁶ Some developers chose to use a content validity index score to enhance their confidence in the content validity results. Content validity index scores have been used to provide some objective measure to the subjective assessment made by content experts.⁸ *Construct validity* measures how well items capture their intended domain or construct by applying a factor analysis, which yields the number of derived factors (derived from the original domains) and a Cronbach alpha score indicating whether participants understood the items as the creator intended (ie, if the data are reliable).⁶ A third type of validity is *predictive validity*, or the adequacy of an instrument in projecting a future behavior/outcome (ie, whether results from the breastfeeding self-efficacy instrument accurately forecast behavior on a future criterion, initiation, or duration).⁶ Predictive validity is often reported descriptively, however, some studies may report results using correlations. This type of validity is useful in identifying women at risk for not breastfeeding as well as providing the researcher, practitioner, or program managers with an indication of what to expect in order to tailor programs accordingly. In the third portion of the Results, we describe the adaptation of each tool in novel settings, using the 5 most recently published studies at the time of writing this manuscript.

Results

Overview of Breastfeeding Assessment Tools (Table 1)

Breastfeeding Self-Efficacy Scale (BSES)—The BSES was published by Dennis and Faux⁹ to measure postpartum mothers' breastfeeding self-efficacy, defined as "a mother's perceived ability to carry out breastfeeding." Bandura's Social Cognitive Theory guided the development of the BSES.⁷ Dennis and Faux were interested in capturing 2 components to self-efficacy in postpartum women, including (1) one's belief that a behavior will produce a particular outcome and (2) one's conviction in one's ability to perform a specific behavior that results in the desired outcome.⁹ The instrument has 33 items with a 5-point Likert-type scale, with responses from *not at all confident* (1) to *always confident* (5). As such, scores can range from 33 to 165.

Breastfeeding Self-Efficacy Scale—Short Form—In 2003, Dennis¹⁰ revised the BSES from 33 to 14 items and renamed it the BSES-Short Form (BSES-SF). The theoretical framework is the same as the BSES and uses the same 5-point Likert-type scale with scores ranging from 14 to 70.

H & H Lactation Scale—Pamela Hill and Sharron Humenick published the H & H Lactation Scale in 1996 to use among postpartum women to measure indicators of perceived milk insufficiency. Applying their own conceptual framework of Insufficient Milk Supply¹¹ to capture determinants to breast-feeding, they developed a questionnaire that included 3 specific constructs, including infant satisfaction, maternal satisfaction, and maternal

confidence (ie, self-efficacy toward breastfeeding). The scale consists of 30 items with a 7-point Likert-type scale, ranging from *strongly disagree* (1) to *strongly agree* (7), with scores ranging from 30 to 210.

Breastfeeding Personal Efficacy Beliefs Inventory (BPEBI)—The Breastfeeding Personal Efficacy Beliefs Inventory was published by Cleveland and McCrone¹² in 2005 with the aim of assessing breastfeeding confidence to predict initiation and duration of breastfeeding to 12 months among pregnant women. This instrument was intended to fill a gap in breast-feeding self-efficacy instruments by identifying pregnant women at risk of not initiating breastfeeding, rather than measuring breastfeeding confidence after delivery.

Like the BSES and BSES-SF, this tool uses Bandura's⁷ self-efficacy model as its theoretical framework. Unlike the other 5 instruments, the BPEBI uses a visual analog scale with "cannot do" on 1 end and "certain can do" on the other and a score range of 0% to 100%, generated by calculating the mean of the participant's score for each item.

Prenatal Breast-feeding Self-efficacy Scale—The Prenatal Breast-feeding Self-efficacy Scale (PBSES) was published by Wells et al in 2006.¹³ Similar to the BPEBI, the PBSES was created to assess women's perceived breastfeeding self-efficacy during pregnancy.¹³ The BSES instrument is acknowledged by the authors as a strong tool, but they felt it lacked breadth in its ability to measure breastfeeding self-efficacy antenatally. Thus, using Bandura's Social Cognitive Theory,⁷ they created the PBSES for use with pregnant women. The scale comprises 20 items with ranges on a 5-point Likert-type scale from *not at all sure* (1) to *completely sure* (5), with a range from 20 to 100.

Infant Feeding Intentions scale—The Infant Feeding Intentions (IFI) scale, published by Nommsen-Rivers and Dewey in 2009, was created to measure infant feeding intentions of pregnant women, specifically, intentions to exclusively breastfeed.¹⁴ Like the PBSES and BPEBI, the IFI scale was intended for use during the prenatal period. The major difference between the PBSES and IFI scale is the underlying theories. Rather than applying Social Cognitive Theory, the IFI scale is grounded in the Theory of Planned Behavior and Theory of Reasoned Action, which posit that behavioral intentions are highly correlated with actual behavior.¹⁵ The authors also applied tenets of the Stages of Change model, which comprises 5 phases from precontemplation to action to assess mothers' readiness to carry out her intentions.¹⁷ These phases were likened to the 4-point Likert-type scale with *very much disagree* (1) (ie, precontemplation) to *very much agree* (4) (ie, action), with scores ranging from 0 to 16. A score of 0 represents strong intention to not breastfeed, whereas a score of 16 represents a strong intention to exclusively breastfeed up to 6 months.

Validation of Breastfeeding Self-efficacy Instruments (Table 2)

Breastfeeding Self-Efficacy Scale—To establish content validity, Dennis and Faux calculated a content validity index score. To calculate this score, 3 measurement experts and 4 content experts reviewed the instrument. They rated each item on its relevance (ie, its fit and understandability for the target population) and clarity (ie, item readability) using a 4-point Likert-type scale. The overall content validity index score was .86, suggesting strong

content validity. Construct validity was measured by administering the 40-item instrument to 23 mothers in-hospital who were breastfeeding. This yielded 3 derived factors and a Cronbach alpha of .95, indicating both strong reliability and that some items could be omitted while still preserving internal reliability.⁹ The final 33-item instrument was then retested among 130 recently delivered, inhospital breastfeeding mothers with a Cronbach alpha of .96. Predictive validity was not measured.

Breastfeeding Self-Efficacy Scale—Short Form—Content validity was not repeated for the BSES-SF version. The BSES-SF showed strong construct validity with a total Cronbach alpha of .94.¹⁰ Predictive validity was tested by administering the instrument at 1 week postpartum and assessing exclusive breastfeeding at 4 and 8 weeks postpartum, yielding strong results indicating that behavior at 1 week is predictive of behavior at 4 and 8 weeks.

H & H Lactation Scale—The content validity of the H & H Lactation Scale was not assessed. Construct validity was tested extensively via home visits with 120 term mothers at weeks 1, 2, 3, 4, and 6 postpartum as well as via telephone at weeks 5, 8, 12, 16, and 20. The final scale resulted in 20 items with 3 derived factors and a Cronbach alpha score of .96. Findings supported predictive validity between each of the factors and reported breastfeeding practices. Satiety and satisfaction had the highest predictive validity scores. Thus, mothers with greater confidence in their infant's satiety and satisfaction were better equipped to overcome personal beliefs about milk insufficiency and therefore continue breastfeeding.

Breastfeeding Personal Efficacy Beliefs Inventory—Content validity was assessed by expert review. Three nurses with expertise in maternity care reviewed each item prior to pilot testing. Construct validity was completed by pilot testing among a convenience sample of 42 lactating women who also provided qualitative feedback on item relevance. Revisions were then made based on content expert feedback and pilot testing. The final 27-item scale was retested among 479 female students. Factor analysis of the instrument uncovered 5 factors: thought, affect (emotion), motivation, action, and environment.¹⁵ The final version included 24 items with a Cronbach alpha of .89. Predictive validity was not specifically measured. Although results indicate that higher scores were correlated with EBF in the early weeks postpartum, actual breastfeeding behavior was not assessed. Therefore, despite strong results indicating high levels of confidence to initiate breastfeeding, the actual link between confidence to initiate and that individual's behavior postpartum was not addressed.

Prenatal Breast-feeding Self-efficacy Scale—Content validity was established by 2 experts rating each of the 20 items' relevance on a 4-point Likert-type scale. An overall content validity index score of .90 was reported. Construct validity was then tested among 279 pregnant women recruited from antenatal clinics in Atlanta, Georgia, which revealed 4 derived factors and a Cronbach alpha of .89. Predictive validity was not tested.

Infant Feeding Intentions scale—Content validity was established by eliciting feedback on the instrument's content and clarity from a sample of 88 women, and not by expert review. The high proportion of women who spoke Spanish only necessitated

translation. Construct validity was then tested among English- and Spanish-speaking pregnant women in Sacramento, California. One hundred seventy participants completed the survey at delivery and at 4 days, 6 weeks, and 6 months postpartum to assess actual behavior, with a Cronbach alpha reported at .90 (derived factors from a factor analysis were not discussed). Predictive validity was explored by assessing whether higher scores of the IFI scale were associated with greater likelihood of breastfeeding postpartum.

Application of Breastfeeding Self-efficacy Instruments in Other Studies (Table 3)

Breastfeeding Self-Efficacy Scale—The BSES has been adapted and translated for use in Western Iran,¹⁸ Australia,^{19,20} China,²¹ and Turkey,²² with study results from the 5 most recent publications showing strong Cronbach alpha scores ranging from .83 to .93. The BSES has been used to evaluate programs and test intervention effects on self-efficacy¹⁸ and to predict duration of breastfeeding.^{18,19}

Breastfeeding Self-Efficacy Scale-Short Form—The BSES-SF has been used more often than any of the other breastfeeding self-efficacy instruments; more than 40 articles have been published using this instrument. In the 5 most recent publications, the Cronbach alpha scores ranged from .86 to .93. Similar to the BSES, the BSES-SF has been used worldwide²³ and translated to other languages, including Chinese,²⁴ Croatian,²⁵ Japanese,²⁶ and isiZulu.²⁷ The BSES-SF has also been used to investigate the relationships between breast-feeding determinants, such as self-efficacy and insufficient milk perceptions,²⁶ or mothers who are ill²³ and pattern and duration of breastfeeding.²⁸

H & H Lactation Scale—We identified only 2 subsequent studies in which the H & H scale has been used, and in 1 study, only the items pertaining to maternal confidence were included.²⁰ Both studies, conducted in the United States, compared results from the H & H Lactation Scale with the results from the BSES or BSES-SF. Findings showed high correlations between perceived milk insufficiency (ie, H & H lactation results) and breastfeeding confidence (ie, BSES/BSES-SF) among antenatal and postpartum participants (eg, $r = -.84$, $P < .001$, where higher scores on the H & H indicate greater perceived milk supply²³).

Breastfeeding Personal Efficacy Beliefs Inventory—We found only 1 study that used the BPEBI. Results were reported in Japanese and the study was therefore excluded.²⁹

Prenatal Breast-feeding Self-efficacy Scale—This scale has subsequently been used in Spain³⁰ and the United States.³¹ Content, construct, and predictive validity were tested, yielding strong results with women antenatally.³⁰ Assessing breast-feeding behavior by mothers at discharge confirmed predictive validity, with higher scores on the PBSES correlating with exclusive breastfeeding.³⁰ The translated version yielded a strong Cronbach alpha of .91.³⁰ Robinson and VandeVusse³¹ conducted a sequential mixed methods study using the PBSES to better understand decision making about using formula or breastfeeding among an African American population in the Midwestern United States.

Infant Feeding Intentions scale—The IFI scale was used in 2 subsequent studies, both of which were conducted by its developers.^{32,33} Their findings demonstrated its usefulness within a multiethnic setting (ie, Sacramento, California), where both English and Spanish are spoken, in showing a relationship between higher intentions and exclusive breast-feeding at 6 months. Subsequent studies were both conducted in the United States.

Discussion

These results suggest that there are several key considerations when selecting an existing instrument. These include the theoretical framework, number of items, timing of administration, validity, and adaptability in new settings. Furthermore, careful consideration of each item to confirm its relevance in another setting is critical to both appropriate adaptation and ultimately meaningful conclusions from applying an existing instrument in other research applications.

Considerations When Selecting an Existing Instrument

Theoretical framework—Although the aim of each instrument was to measure breastfeeding self-efficacy, their theoretical underpinnings differed (Table 1). However, the majority of instruments (ie, BSES, BSES-SF, PBSES, BPEBI) were directly or indirectly based on Bandura's social cognitive theory.

The applied theory and its clarity of explanation by instrument developers are important for understanding the foundation behind item development. The BSES, BSES-SF, and BPEBI went into great detail explaining their theoretical frameworks as they applied to their item development, whereas the PBSES item development was theoretically guided by Dennis and Faux and not fully discussed. The H & H Lactation Scale applied the insufficient milk supply conceptual framework and described this well, but failed to explain what theoretical framework guided development of their self-efficacy domain. Similarly, the IFI scale did not operationalize breastfeeding self-efficacy well; therefore, we cannot assume that one's strength of intention is a reflection of one's self-efficacy. Ultimately, understanding the theoretical framework underpinning item development can ensure that a match is made between measurement intentions and actuality.

Validity—Content and construct validity were well assessed for each of the 6 instruments (Table 2). Many of the instruments measured predictive validity. However, given that this validity is only described by instrument developers qualitatively, results cannot be compared across instruments to judge the value-added benefits that predictive validity can yield to research conclusions, future research, or programs. Conceptually, predictive validity is useful to identify an instrument's adequacy in illustrating the relationship between an intention or behavior and a future outcome. However, lack of standardized reporting makes predictive validity results challenging to judge and therefore less useful when comparing results across instruments or when evaluating instrument fit for use in a subsequent study.

Participant burden—Time needed to complete the instrument is an important consideration given the realities of participant fatigue. Although instrument developers did not specifically address the number of minutes needed to administer their instrument, the

number of items provides an estimate (Table 1). The BSES-SF (14 items) and IFI scale (5 items) each have fewer than 20 items, whereas the other 4 instruments each have greater than 20 items. With only 5 items, the IFI scale is likely the shortest option for screening pregnant women during prenatal visits.

Pre/postnatal administration—The BPEPI, PBSES, and IFI scale were developed to measure breastfeeding self-efficacy prenatally, whereas the BSES, BSES-SF, and H & H Lactation Scale measure breastfeeding self-efficacy post-partum. The IFI scale has successfully shown higher breast-feeding intentions, resulting in greater levels of exclusive breastfeeding at 6 months, which speaks to its predictive validity and may be useful for researchers assessing behavior. However, because none of the instruments can be used to measure prenatal and postnatal self-efficacy over time, especially between anticipated self-efficacy and experience self-efficacy, this is 1 area in which scale development could benefit. Specifically, capturing both constructs in 1 measure may be useful in determining the effectiveness of interventions and programs on levels of self-efficacy longitudinally.

Cross-cultural adaptation—Each of the 6 instruments was developed and first tested in the US or Canada (Table 1). Subsequent use of the instruments spans a range of cultures and ethnicities (Table 3). However, such adaptation mostly involved translation. A detailed cross-cultural adaptation process was not always reported. Cross-cultural adaptation is an in-depth process³⁴ that ensures that item meaning is maintained from the original to the target language and culture version. This may require item revision to accurately convey the connotative meaning intended behind each item. Additional testing may be warranted to effectively achieve cross-cultural adaptation, such as formative work with the target population that expounds upon content validity based on expert review to fully capture item understanding by the target population. However, it may be that when adapting instruments for use in settings far different from the original instrument development, even when rigorous cross-cultural adaptation occurs, meaningful results fall short.

The following are next steps for using existing instruments to measure determinants of breastfeeding self-efficacy.

Considerations When Using Existing Instruments in Research

When considering using existing instruments in research, a critical review of each item included in the instrument is important to ensure its relevance for the target population. Certain word choices or circumstances may be *inappropriate* for use in settings different from the original participant population. For example, an item in the BSES stating, “I can use a breast pump to obtain milk,” may not be relevant among a population of women without access to breast pumps.

The *clarity* of items is also important to be confident in the meaning of responses by participants. The BSES-SF asks about the statement, “I can always be satisfied with my breastfeeding experience.” This item could have many different interpretations and may be confusing to answer. If an item is vague, it is questionable that meaningful conclusions can be made from it or that its response would accurately contribute to an overall self-efficacy score. Conversely, the IFI scale has 5 items and is very clear in capturing intentions and

essentially perceived self-efficacy through their chronological items: “When my baby is 1-month old, I will be breastfeeding without using any formula or milk.” However, this scale is limited in its scope as it is designed to assess intentions only.

The H & H uses reverse *scoring*, which is intended to promote critical thinking of each item; however, it may inadvertently result in participant misunderstanding. For example, “Even though I can breastfeed, I would rather not breastfeed.” If a mother has high levels of maternal self-efficacy toward breastfeeding, she would answer “strongly disagree.” However, this item takes more thought to work through and may create confusion for participants. In this way, reverse scoring can be problematic as it requires more time and higher level thinking to ensure accurate responses.

In addition, some items of the H & H targeting levels of maternal satisfaction and self-efficacy toward breastfeeding are potentially judgmental of the mother. For example, “I feel I had to give formula after breastfeeding to satisfy my baby.” Depending on the woman’s health or other circumstances, this may be true regardless of her level of self-efficacy. The item reads more like a judgment of her actions rather than a test of maternal self-efficacy.

The PBSES includes several items regarding comfort of breastfeeding around people (eg, “I can breast-feed my baby when my family or friends are with me”). This is a *relevant topic* for many women and may affect her level of breast-feeding self-efficacy. The PBSES thoroughly covered these kinds of situations in their scale—more so than the other instruments measuring perceived or actual self-efficacy toward breastfeeding.

A further consideration is that instrument creators (Table 1) must be available to respond to requests to use their instrument. and whether the application would fit the instrument’s intended use. Because instruments are typically not available publicly, permission from the authors must be obtained. Therefore, identifying in the instrument development manuscript how to secure permission would be helpful for researchers seeking to use an existing instrument. Furthermore, adapting instruments for use in other settings is essential to ensure meaningful results in a different cultural context and any modifications should be published in their adapted version.

Conclusion

Breastfeeding self-efficacy affects breastfeeding initiation and duration and is therefore an important construct to measure. Breastfeeding self-efficacy should be measured in a transparent, consistent, and replicable way to continue advancing our collective knowledge of this construct and its effect on breastfeeding rates.

A real opportunity exists for researchers studying breast-feeding to use established tools and modify them for their particular need and population. Therefore, the strengths and weaknesses of each instrument need to be recognized to ensure effective and targeted adaptation prior to use in settings different from the original population for which it was created. As breastfeeding self-efficacy continues to be measured, articulating exactly how and why instruments are modified is imperative.

As national and international organizations increase efforts to improve breastfeeding practices worldwide, evaluation of such programs through measuring determinants of breastfeeding, including self-efficacy, will continue to be needed. Furthermore, adding to the body of knowledge by researchers continuing to refine and improve rather than redefine what may already, in part, exist is beneficial to all.

Future Implications

A collaborative effort to increase breastfeeding self-efficacy knowledge through resource sharing and advancing previous work may result in fewer, but stronger, instruments that increase understanding of the etiology of breastfeeding decisions and how breastfeeding can be best supported.

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Overview of Breastfeeding Self-Efficacy Assessment Tools.

Tool and Reference	Site	Stated Purpose	No. of Items and Scoring	Meaning of Score Interpretation (Score Range)	Factor Derived	Theoretical Framework	Instrument Availability/Permission
Breastfeeding Self-Efficacy Scale (BSES; Dennis & Faux, 1999) ⁹	Canada	To assess levels of self-efficacy in postpartum women	32 items; 5-point Likert-type scale (<i>not at all</i> to <i>confident to always confident</i>)	Higher scores indicate greater levels of breastfeeding self-efficacy (33-164)	1 Technique 2 Intrapersonal thoughts 3 Support	Bandura's (1977) ⁷ social cognitive theory	Dr Dennis: cindylee.dennis@utoronto.ca
Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF; Dennis, 2003) ¹⁰	Canada	To assess levels of self-efficacy in postpartum women; To identify women at risk of early breastfeeding cessation through predictive measures	14 items; 5-point Likert-type scale (<i>not at all</i> to <i>confident to always confident</i>)	Higher scores indicate greater levels of breastfeeding self-efficacy (14-70)	1 Technique 2 Intrapersonal thoughts 3 Support	Bandura's (1977) ⁷ social cognitive theory, informed by the BSES	Dr Dennis: cindylee.dennis@utoronto.ca
H & H Lactation Scale (Hill & Humenick, 1996) ¹¹	USA	To understand mother's perception of insufficient milk by measuring infant satisfaction, maternal satisfaction, and maternal confidence in postpartum women	30 items; 7-point Likert-type scale (<i>strongly disagree</i> to <i>strongly agree</i>)	Higher scores indicate that the mother feels more positive (more confident) about her breastfeeding experience (30-120)	1 Maternal confidence/commitment to breastfeeding 2 Perceived infant satiety 3 Maternal-infant breastfeeding satisfaction	Insufficient milk supply conceptual framework (Hill & Humenick, 1996) ¹¹	Dr Hill: phill@uic.edu
Breastfeeding Personal Beliefs Inventory (BPEPI; Cleveland &	USA	To assess levels of confidence prenatally in breastfeeding initiation and duration up to 1 year	24 items; visual analog scale (<i>cannot do to certain can do</i>)	Higher scores indicate greater levels of self-efficacy (0%-100%)	Confidence to manage: 1 Duration 2 Technique 3 Motivation 4 Different environments	Bandura's (1977) ⁷ social cognitive theory	Dr McCrone: smccrone@hsc.wvu.edu

Tool and Reference	Site	Stated Purpose	No. of Items and Scoring	Meaning of Score Interpretation (Score Range)	Factor Derived		Theoretical Framework	Instrument Availability/Permission
					5	Possible challenges		
McCrone, 2005) ¹²								
Prenatal Breast-feeding Self-efficacy Scale (PBSES; Wells et al. 2006) ¹³	USA	To assess prenatal self-efficacy	20 items; 5-point Likert-type scale (<i>not at all</i> to <i>completely sure</i>)	Higher scores indicate greater levels of self-efficacy (20-100)	1 Skills and demands 2 Information 3 Breastfeeding in public 4 Social pressure		Bandura's (1977) ⁷ "definition of self-efficacy" was used to inform development of items	Dr Wells: kwells@cas.usf.edu
Infant Feeding Intentions scale (IFI scale; Nonnmsen-Rivers & Dewey, 2009) ¹⁴	USA	To assess strength and duration of intention to exclusively breastfeed prenatally	5 items; 4-point Likert-type scale (<i>very much agree</i> to <i>very much disagree</i>)	Items are multidirectional and scoring is an average of items with total range being 0 (<i>no intention</i>) to 16 (<i>very strong intention</i>). Higher intention is indicative of greater levels of self-efficacy (0-16).	Not discussed		Theory of planned behavior (Ajzen, 1991) ¹⁵ and Stages of Change for Breastfeeding model (Humphreys et al, 1998) ¹⁶	Dr Nonnmsen-Rivers: laurie.nonnmsen-rivers@echmc.org

Table 2

Validation Studies of Breastfeeding Self-Efficacy Assessment Tools.

Tool	Place of Validation	Population for Validation	Content Validity	Construct Validity	Predictive Validity	Reliability
Breastfeeding Self-Efficacy Scale (BSES; Dennis & Faux, 1999) ⁹	Mid-sized Canadian city	130 in-hospital breastfeeding mothers	3 measurement experts and 4 content experts consulted; overall BSES content validity index score .86; 23 breastfeeding moms	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Tested at 6 weeks postpartum. The higher the BSES score, the more likely the mother was exclusively breastfeeding at 6 weeks postpartum.	Cronbach alpha = .96
Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF; Dennis, 2003) ¹⁰	Near Vancouver, British Columbia, Canada	491 postpartum mothers at 1 week; same mothers again at 4 weeks (n = 459) and 8 weeks (n = 389)	Not retested from BSES	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Tested at 1 week, with higher scores at 4 and 8 weeks indicating the mother is more likely to be exclusively breastfeeding	Cronbach alpha = .97
H & H Lactation Scale (Hill & Humenick, 1996) ¹¹	Western Illinois and Southeastern Wyoming, USA	Two convenience samples; 110 mothers of low birth weight and 120 mothers of healthy term infants	Not tested	Exploratory factor analysis with principal components analysis	Higher scores predict increased rates of breastfeeding, satisfaction, and infant satiety	Cronbach alpha = .96
Breastfeeding Personal Efficacy Beliefs Inventory (BPEBI; Cleveland & McCrone, 2005) ¹²	West Virginia, USA	479 female students	2 maternity nursing faculty members, 1 advanced practice maternity nurse	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Women who breastfed exclusively, were older, had more education, and had a sister who had breastfed had higher BPEBI scores in a multiple regression analysis.	Cronbach alpha = .89
Prenatal Breast feeding Self-efficacy Scale (PBSES; Wells et al, 2006) ¹³	Atlanta, Georgia, USA	279 pregnant women	Experts in the field of breastfeeding and self-efficacy; 2 raters rated each item on a 4-point Likert-type scale (<i>not at all relevant to very relevant</i>)	A factor analysis was performed; maximum likelihood analysis with eigenvalue > 1	Not assessed	Cronbach alpha = .89
Infant Feeding Intentions scale (IFI scale; Nommensen-Rivers & Dewey, 2009) ¹⁴	Sacramento, California, USA	177 women delivering at a regional hospital	Pilot study with 88 women attending the University of CA-Davis prenatal clinics; specific content validity testing not discussed	Analysis of variance comparing IFI scores among 3 groups; Cox model; Kaplan-Meier survival curves for duration of exclusive breastfeeding; factor analysis not discussed	Infant feeding intention based on high scores from the IFI scale correlated with duration of exclusive breastfeeding	Cronbach alpha = .90

Table 3

Application of Breastfeeding Self-efficacy Tools in Novel Settings.^a

Study Reference	Purpose of Study	Setting	Method of Adaptation, Translation, Cross-Cultural Equivalency, or Pretesting	Reliability Results
Breastfeeding Self-Efficacy Scale				
Kamran et al (2012) ¹⁸	To assess the effectiveness of an educational program on breastfeeding self-efficacy; BSES used as a pre-post test	Lorestan Province, Western Iran	2 Persian linguistics experts and 2 professional translators translated; followed by back-translation by 2 "other persons"	Cronbach = .85
Baghurst et al (2007) ¹⁹	To assess the BSES at 1 week postpartum to predict duration of breastfeeding; the authors also tested the BSES-SF	South Australia	No adaptation mentioned	Not mentioned; results in hazard ratios
Dai and Dennis (2003) ²¹	To translate the BSES into Mandarin to ensure content and semantic equivalence; breastfeeding women were assessed at 4 and 8 weeks postpartum	Tianjin City, China	1 translator forward translated followed by 2 blinded lay bilinguals who then back-translated; 8 breastfeeding experts assessed cross-cultural equivalency; pretesting with 21 postpartum breastfeeding mothers	Cronbach = .93
Creedy et al (2003) ²⁰	To test the BSES with antenatal women and then at 1 week and 4 months postpartum to determine predictive validity	Brisbane, Australia	Instruments were not modified	Cronbach = .97
Ekstoglu and Ceber (2009) ²²	To translate the BSES into Turkish and assess its psychometric properties	Altindag district, Izmir, Turkey	Back-translation followed by content validity testing among 10 professionals who knew both languages	Cronbach = .92
Breastfeeding Self-Efficacy Scale—Short Form				
Wheeler and Dennis (2013) ²³	To assess the BSES-SF among mothers of ill or preterm infants; assessed at 1 and 6 weeks post-infant discharge	Central Canada	The BSES-SF was modified for use with mothers of ill or preterm infants and assessed by 12 health care provider experts; pretesting with 10 mothers of ill or preterm infants	Cronbach = .88
Pavlicic Bosnjak et al (2012) ²⁴	To translate and psychometrically assess the BSES-SF among women in Croatia; pretesting took place at discharge, 1 and 6 months	Croatia	2 bilingual experts translated the BSES-SF and back-translation was completed by 2 blinded lay bilingual experts; content experts consulted; several modifications made to instrument; pretested by 20 postpartum mothers	Cronbach = .86
Ip et al (2012) ²⁵	To translate and test the BSES-SF among mothers in Hong Kong, China	Hong Kong	First author translated and second author verified accuracy of translation; content validity index score obtained ¹¹	Cronbach = .95
Tuthill et al (2014) ²⁶	To cross-culturally adapt the BSES-SF for use in an intervention study among HIV+ women	South Africa	Multistep approach—content validity index score and content expert feedback followed by translation and back-translation and the committee approach to refine adaptation after translation	Not tested
Otsuka et al (2008) ²⁷	To investigate the relationship between maternal perceptions of milk insufficiency and breastfeeding confidence	Tokyo and Kusatus, Japan	Translation by mother and author and back-translation by 2 blinded bilingual lay persons	Cronbach = .95
McCarter-Spaulding and Gore (2009) ²⁸	To determine whether breastfeeding self-efficacy predicts duration and pattern of breastfeeding	New England, USA	No adaptations/modifications made; breastfeeding self-efficacy scores were highly predictive of breastfeeding behavior at 1 month postpartum (hazard ratio .97)	Not mentioned

H & H Lactation Scale

Study Reference	Purpose of Study	Setting	Method of Adaptation, Translation, Cross-Cultural Equivalency, or Pretesting	Reliability Results
Creedy et al (2003) ²⁰	To test the BSES with antenatal women and then at 1 week and 4 months postpartum to determine predictive validity and correlate results to the maternal confidence items on the H & H Lactation Scale	Brisbane, Australia	No adaptations/modifications made	Not mentioned
Wheeler and Dennis (2013) ²³	To provide evidence for construct validity when correlated with the BSES-SF at 8 weeks postpartum	Central Canada	No adaptations/modifications made	Cronbach = .87
Breastfeeding Personal Efficacy Beliefs Inventory				
Nakada (2008) ²⁹	To explore the factors related to breastfeeding continuation and to examine the relationship between self-efficacy and breastfeeding continuation (article in Japanese)	Japan	Translation	Not mentioned in abstract
Prenatal Breast-feeding Self-efficacy Scale				
Pineiro-Albero et al (2013) ³⁰	To translate and assess psychometric properties of the PBSES in Spanish	Spain	Translation by 2 bilingual translators; modifications made to the translated version in Spanish; 2 bilingual translators then back-translated; 5 pregnant women where then given the instrument to assess comprehensibility	Cronbach = .91
Robinson and VandeVusse (2011) ³¹	Mixed method study: investigating prenatal breastfeeding self-efficacy and infant feeding decisions among African American women	Midwest, USA	No adaptations/modifications made	t test, regression, and odds ratio reported
Infant Feeding Intentions scale				
Nommisen-Rivers et al (2010) ³²	To examine the intra-ethnic validity of the IFI scale in a multiethnic group of English-Spanish speaking primiparae	California, USA	Originally developed in English and Spanish; no modifications made	Cronbach = .70-.85 depending on ethnic group (tested among 5 different groups)
Chantray et al (2011) ³³	To describe weight loss in a multiethnic population of first-born, breastfed infants	California, USA	No modifications/adaptations mentioned	Statistical tests run to determine relationship between weight loss and other moderators

Abbreviations: BSES, Breastfeeding Self-Efficacy Scale; BSES-SF, Breastfeeding Self-Efficacy Scale-Short Form; IFI, Infant Feeding Intentions; PBSES, Prenatal Breast-feeding Self-efficacy Scale.

^aSeveral of the instruments have not been adapted for use in 5 subsequent studies and are reflected as such in the table.