



PREDICTING FACTORS OF EXCLUSIVE BREASTFEEDING AMONG
MOTHERS IN CHINA: STRUCTURAL EQUATION MODELING

QIAN WU

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR DOCTOR DEGREE OF PHILOSOPHY
(INTERNATIONAL PROGRAM)

IN NURSING SCIENCE
FACULTY OF NURSING
BURAPHA UNIVERSITY

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ในประเทศจีน: โมเดลสมการโครงสร้าง



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ลิขสิทธิ์เป็นของมหาวิทยาลัยบูรพา

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QIAN WU : PREDICTING FACTORS OF EXCLUSIVE BREASTFEEDING AMONG MOTHERS IN CHINA: STRUCTURAL EQUATION MODELING. ADVISORY COMMITTEE: CHINTANA WACHARASIN, Ph.D. PORNPAT HENGUDOMSUB, Ph.D. 2024.

Exclusive breastfeeding (EBF) provides unparalleled health benefits for both mothers and infants. While the World Health Organization (WHO) recommends EBF for up to 6 months, the current situation is less than ideal. A prospective study was conducted to explore EBF duration and test the model of EBF among mothers in Jiangsu province, China. A sample of 374 mothers was recruited in Jiangsu province with multi-stage random sampling method. Research instruments included: 1) Breastfeeding (BF) knowledge questionnaire, 2) BF Attrition Prediction Tool, 3) Perception of Insufficient Milk (PIM) Questionnaire, 4) Infant Feeding Intention Scale. The Cronbach's alpha reliabilities of these instruments ranged from .74 to .88. SEM with AMOS software application was used to analysis causal effects among variables.

Results showed that the average EBF duration was 69.29 days (SD=72.06). Maternity leave, BF intention and perceived control had positively direct effects on EBF ($\beta=.07$, .29 and .29 respectively, $p<.05$). Subjective norm, perceived control and PIM had positively indirect effects on EBF through BF intention ($\beta=.10$, .61 and .20 respectively, $p <.05$). Breastfeeding knowledge had indirect effects on EBF through BF attitude, subjective norm, perceived control and PIM in positive directions ($\beta=.94$, .43, .78 and .18 respectively, $p <.05$). Breastfeeding attitude had a positively indirect effect on EBF through subjective norm ($\beta=.05$, $p<.05$). The modified model explained 30.0% of variances.

The study suggests that healthcare professionals, particularly nurses, can utilize the identified determinants to identify mothers at risk of terminating EBF early. This knowledge can inform the development of evidence-based interventions aimed at

supporting and encouraging mothers to exclusively breastfeed their infants for the recommended 6 months.



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Time has swiftly passed, and my educational journey at Burapha University is drawing to a close. Reflecting on my four years of personal growth, I am acutely aware that this achievement would not have been possible without the invaluable help and support of numerous individuals and institutions. As I approach the milestone of graduation, I feel compelled to extend my sincere gratitude to all those who have played pivotal roles in my academic success.

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Qian Wu

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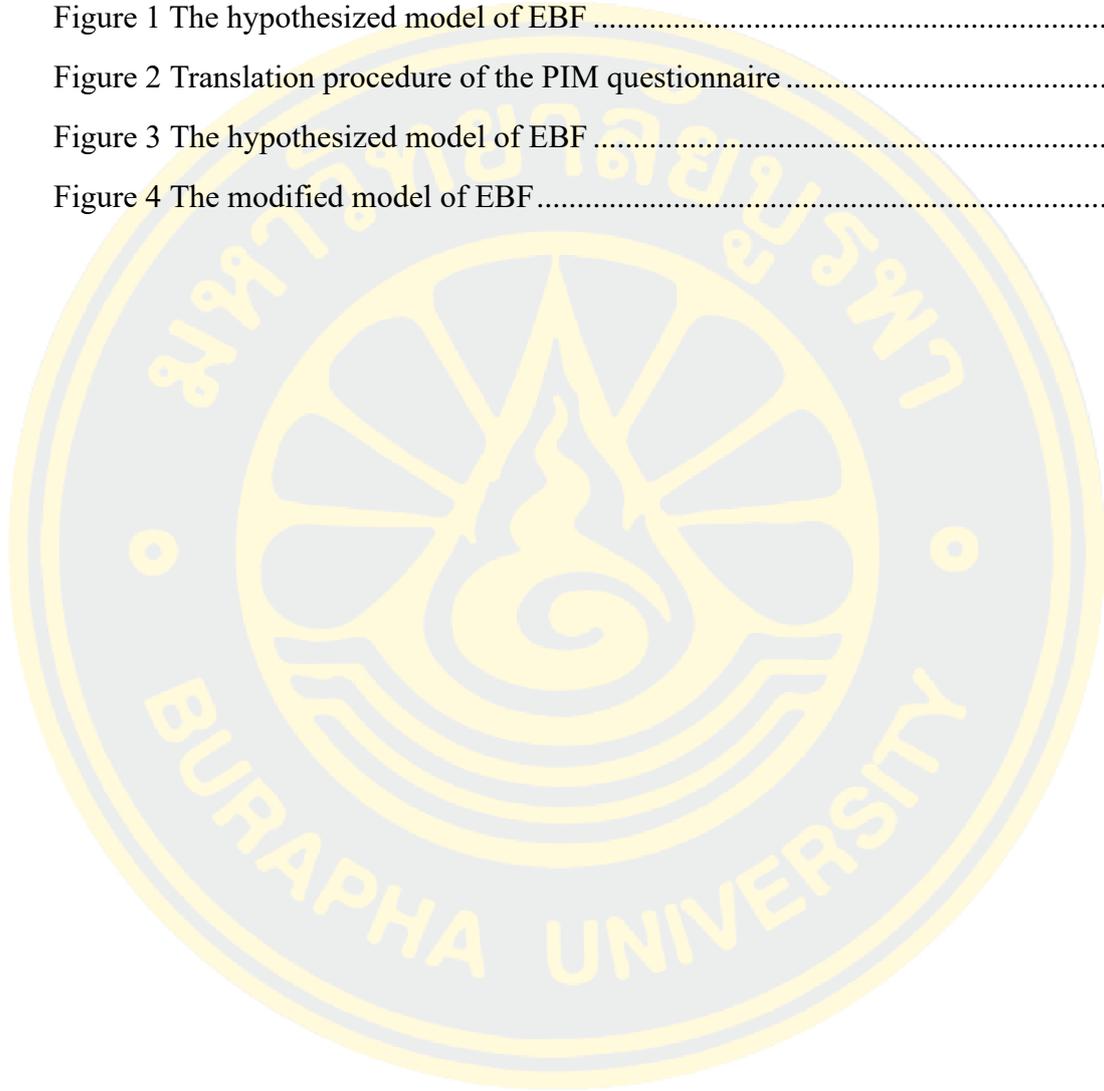
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CHAPTER 1

INTRODUCTION

Statements and significance of the problems

Breastfeeding (BF) plays a key role in promoting infants' health and reducing diseases in their mothers. Breast milk is ideal nourishment for infants. It can provide all the energy and nutrients, which is needed for the growth of infants during the first 6 months in their life (de Jager et al., 2013). Breast milk also contains antibodies, helping infants have passive immunity. Globally, 74% of sudden infant death syndrome and 13% of infant mortality can be prevented by BF (Brahm & Valdés, 2017). Breastfed infants are reported to be a protective factor of childhood obesity, infectious and atopic diseases, as well as celiac disease (Brahm & Valdés, 2017; Yan et al., 2014). Not only babies, but also their mothers can reap the health benefits through BF. Studies have demonstrated that BF mothers have a lower rate of breast and ovarian cancer as well as diabetes (Chowdhury et al., 2015). Excess fat accumulated during pregnancy can be utilized through the process of BF. Mothers who breastfeed their infants are more likely to regain their prenatal weight (Del Ciampo & Del Ciampo, 2018). Breastfeeding also has a certain effect on the mental health of both mothers and children. Breast milk has an association with a child's emotional and cognitive development and an effect on maternal mood, affect, stress, and maternal care as well (Krol & Grossmann, 2018; Safadi et al., 2016).

Breastfeeding can be categorized as exclusive breastfeeding (EBF), predominant BF, and partial BF. According to the definition of WHO, EBF means that all the infants should only receive breast milk, without any other liquids or solids with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines (WHO, 2019a). Predominant BF means that except for breast milk, the infant may also receive water, water-based drinks, fruit juice, ritual fluids, and oral rehydration solution, drops or syrups (vitamins, minerals, and medicines). Partial BF refers to the infant is given some breast milk and some artificial feeds, either milk (including animal milk and formula milk) or cereal, or other food or water. Since 2001, WHO has recommended that all infants should be exclusively breastfed in the first 6 months of life (WHO, 2019a).

There is a dose-response effect between BF and health benefits. Health outcomes can be enhanced through a longer duration and a higher intensity of BF (Chantry et al., 2006). Compared with those who are not breastfed, infants receiving EBF have lower rate of mortality. The Lancet BF Series Group found that the relative risk of death among the exclusively breastfed infants was only 1%, while it was 14% in the non-breastfed infants (Victora et al., 2016). The children exclusively breastfed are 14 times less likely to die (Richardson & Walters, 2014). Data from WHO indicated that EBF for 6 months can even prevent 800,000 infant deaths annually (Tshering et al., 2018). Not only are infant mortality rates down, but also are other health problems of infants. It was reported that supported that 27.37% of diarrhea, 13.24% of fever and 8.94% of acute respiratory infection among babies younger than 6 months could have been prevented through EBF (Khan & Islam, 2017). Compared with EBF for 3 or 4 months, the infants received EBF for longer duration appear to have a lower rate of gastrointestinal infection (Kramer & Kakuma, 2012). EBF can not only reduce disease burden, but also promote child's growth, development and prevent childhood malnutrition (WHO, 2014). WHO works with Member States and partners towards the goal of ending all forms of malnutrition by 2030 as part of the Sustainable Development Goals. Promoting EBF is important to achieve this goal.

Exclusive breastfeeding can also protect mothers from many health problems. Through prevent ovulation, EBF until 6 months postpartum can prolong the duration of locational amenorrhea which can help mothers delay another pregnancy (Kramer & Kakuma, 2012; Scott, 2017). It is also one of the best ways to minimize mothers' chances to get cancer. Studies finding that the risk reduction of breast cancer is associated with longer EBF duration (Ma et al., 2006; Unar-Munguía et al., 2017). Another study also supported that EBF can decrease the risk of reproductive stresses including premenopausal cancer and ovarian cancer (Scott, 2017). Mothers can experience higher rate of breast health problems if they do not exclusively breastfeed their infants. 50% of breast health problems like mastitis, engorgement, and cracked nipples can be decreased by EBF (Doherty et al., 2012). In addition, insulin resistance persists during pregnancy, while insulin-sensitivity can be improved through the process of lactation. The risk of developing type 2 diabetes can be reduced by at least 50% among mothers who exclusively breastfeed their infants for 1-3 months

postpartum, compared to those who never exclusively breastfed(Schwarz et al., 2010). It was also reported that women of different BMI could be more easily to lose weight with higher intensity or exclusivity of BF(Dieterich et al., 2013). All the evidence suggested that mothers can benefit from EBF.

Except for the advantages on mother- infant dyad, EBF can also avoid the disadvantages of artificial feeding. Both the amount and composition of human breast milk can be regulated naturally as time goes on to meet the unique needs for a child growth and development. While formula, unlike breast milk, lacks individualization from children to children. The incorrect ratio of formula and water, over-dilution or under-dilution, easily occurs during the process of preparing for formula can put infants in danger of dehydration or nutritional deficiencies(Ellison et al., 2017). This can be also another issue comes with artificial feeding. It is economical for mothers to exclusively breastfeed their infants since mothers don't need to purchase expensive formulas, supplements, and related equipment. With EBF, mother-infant dyad can have health benefits which are independent of health infrastructure. This is significant to promote health equity(Scott, 2017). The lack of immunoactivity substances is also an important reason that formula cannot compete with breast milk. Therefore, the use of formula should be avoided and EBF should be promoted.

However, the current status of EBF is not satisfactory and this situation is consistent around the world. A study from the USA showed that only 34% and 9% of infants received EBF for 3 months and 6 months respectively(Nnebe-Agumadu et al., 2016). The prevalence of EBF during the first 6 month postpartum in Somaliland is only 20.47%(Jama et al., 2020). The EBF rate in China is even lower than the global average level and also other Asian countries(Wang & Zhou, 2019). A national representative survey conducted in China showed that the EBF rate in the first 6 months of infants' life was only 18.6%(Duan et al., 2018).The average EBF duration in Xinjiang province in China is only 1.8 months(Xu et al., 2007). The rate of 6-month EBF in Nanjing City, capital of Jiangsu Province in China, is only 29.4% (Chen et al., 2020). Another Chinese studies showed that the prevalence of EBF in the neonatal period was 31.3%, and it fell gradually to 12.4% at the sixth month(Wang, 2017). EBF rate dropped dramatically from the initiation to 6 months postpartum.

Understanding the factors influencing mothers to maintain EBF is essential to guide nursing practice. Through integrative literature review, it was found that mothers' BF knowledge (El Shafei & Labib, 2014; Wilson, 2018; Zhu et al., 2019), attitude (Cox et al., 2015; Nnebe-Agumadu et al., 2016; Wilson, 2018), subjective norm (Andrew & Harvey, 2011; Bai et al., 2010; Jama et al., 2020; Wu et al., 2017), perceived control (De Jager et al., 2014; De Roza et al., 2019; Wilson, 2018), intention (De Jager et al., 2014; De Roza et al., 2019; Sasaki et al., 2010), maternity leave (Alzaheb, 2017; Langellier et al., 2012; Sasaki et al., 2010), and perception of insufficient milk (PIM) (De Roza et al., 2019; Hegazi et al., 2019) have positively direct effects on EBF, while cesarean section in delivery mode (Alzaheb, 2017; Dunderly & Laar, 2016) has a negatively direct effect on EBF with moderate to strong evidence support. In terms of indirect effects, BF knowledge have positively indirect effects on EBF through BF attitude (Al-Barwani, 2017; Al Ketbi et al., 2018b; Amin et al., 2014; Hamade et al., 2014; Hamid & Yahya, 2018; Khresheh, 2020; Wilson, 2018) and perceived control respectively (Al-Barwani, 2017; Liu, 2014; Liu, 2015; Sun, 2016; Titaley et al., 2021; Wilson, 2018). Maternity leave has positively indirect effects on EBF through BF attitude (Al-Barwani, 2017; Hanafi et al., 2014; Li et al., 2003), subjective norm (C. Horwood et al., 2020; Okonya et al., 2017) and perceived control respectively (Rashid et al., 2018; Wallenborn et al., 2019). Cesarean section in delivery mode has a negatively indirect effect on EBF through PIM (Babazade et al., 2020; Baxter, 2006; Raghavan et al., 2014; Zhang et al., 2019). BF attitude (Babazade et al., 2020; Baxter, 2006; Raghavan et al., 2014; Zhang et al., 2019), subjective norm (Al-Barwani, 2017; Mitra et al., 2004; Raheel & Tharkar, 2018) and perceived control (Al-Barwani, 2017; Mitra et al., 2004; Raheel & Tharkar, 2018) have positively indirect effects on EBF through BF intention.

Studies specialized in EBF sustainability for 6 months postpartum are rare in China. The EBF outcome of most studies was measured at different time points, always far less than 6 months, through 24-hour or 7-day recall in these studies, which can lead to overestimation of EBF. In addition, studies from China focused on psychological factors on EBF are limited. As an important factor predicting EBF, mothers' PIM gets little attention and no special instrument can be used to investigate its situation in China. Similarly, BF intention has only been studied in Taiwan Province

of China, but little attention has been paid to it in other parts of China. The cultural background in previous studies is also different from that in China. Due to the lack of BF knowledge, the traditional practice (e.g., supplementary feeding and giving hot water, sugar or herbal tea) during sitting the month in Chinese culture is a barrier of EBF (Shah et al., 2021). With incorrect BF knowledge, it is also common for Chinese mothers with babies aged 4-6 months to introduce complementary foods, since it was recommended by the feeding guidelines published in 2000-2010 in China (Shi et al., 2021). Meanwhile, different from other countries, China has extremely high cesarean section rate which maybe an important barrier for Chinese women to maintain EBF. How to breastfeed the infant is not just focused by the nuclear family but also extended generations in most of families in China (Ke et al., 2018). EBF can be easily affected by false belief of significant others (e.g., formula is more nutritious than breast milk). Community nursing plays an important role in promoting EBF. However, community nursing system in China is problematic since lack of systematic education training and community nurses' shortage due to poor allocation of human and material. Limited home visits provided by public health nurses in community are not enough to meet mothers' BF needs (Zhou, 2017). When mothers transit from hospital to home, they may meet many BF problems without professional support from community, leading to early termination of EBF (Jama et al., 2020). Furthermore, mothers in the UK can enjoy 52 weeks maternity leave, while China's statutory maternity leave is 98 days for mothers who have a natural birth and 113 days for mother who have cesarean section, which may make working mothers give up EBF early (Vilas, 2018). Therefore, the results of previous studies from other countries on the predicting factors of EBF may not apply equally to China. The understanding of the contribution of various factors to EBF in China is still unclear. The factors that influence the large number of Chinese mothers to meet WHO recommendation about EBF are still worth exploring. The purpose of this study is to examine the causal relationship between multiple variables and the sustainability of exclusive breastfeeding (EBF) in China, following up to 6 months postpartum. The study is grounded in the Theory of Planned Behavior (TPB) and is informed by a systematic review. The results of this study provide a fresh perspective on the influencing factors of EBF practices in the first 6 months postpartum, thereby contributing to the enhancement of EBF practices in China.

Research objectives

1. To explore EBF duration in Jiangsu Province, China.
2. To examine the causal relationship among BF knowledge, delivery mode, maternity leave, BF attitude, subjective norm, perceived control, PIM, BF intention and EBF in Jiangsu Province, China.

Research hypotheses

1. BF knowledge, maternity leave, BF attitude, subjective norm, perceived control, PIM, and BF intention have positively direct effects on EBF.
2. Delivery mode has a negatively direct effect on EBF.
3. BF knowledge has positively indirect effects on EBF through BF attitude and perceived control respectively.
4. Maternity leave has positively indirect effects on EBF through BF attitude, subjective norm, and perceived control respectively.
5. Delivery mode has a negatively indirect effect on EBF through PIM.
6. BF attitude, subjective norm and perceived control have positively indirect effects on EBF through BF intention.

Conceptual framework

The conceptual framework of this study was constructed based on the Theory of Planned Behavior (TPB) and a systematic review (Wu et al., 2022) that explained the determinants of exclusive breastfeeding (EBF) for the first 6 months postpartum. The hypothesized model focuses on 8 factors influencing EBF, namely BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, and BF intention.

Theory of planned behavior was chosen as the most suitable model for understanding EBF practice due to its robust predictive capacity. The TPB was developed on the basis of the theory of reasoned action (Ajzen, 1991). According to the theory of reasoned action, if a person thinks the targeted behavior as positive (behavioral attitude), and has a perception that the important people around him or her approve the behavior (subjective norm), he or she can have more behavioral intention

to perform this behavior, and this person will be more likely to perform this behavior (Fishbein & Ajzen, 1977). However, the theory of reasoned action has limited ability to deal with behaviors over which people have incomplete control. To improve its predictive power, the TPB elaborated by Icek Ajzen adds behavioral control, which is grow out of self-efficacy theory proposed by Bandura in 1977(Bandura, 1977), to the model. The TPB supported that behavioral achievement can be predicted by behavioral intention together with behavioral control. Therefore, the TPB contains 3 components: belief variables (behavioral attitude, subjective norm, and perceived control), intention and behavior. Compared to other theories commonly used in previous studies, TPB was found to have the highest predictive power (Şimşekoğlu & Lajunen, 2008; Taylor et al., 2006).

Likewise, TPB provides a conceptual framework to comprehend the connection between exclusive breastfeeding (EBF) and various psychological factors that influence it. This fills the gaps present in existing research in China. The TPB explicates the relationships among attitude, subjective norm, perceived control, intention, and behavior. According to this theory, the achievement of a particular behavior depends on an individual's behavioral intention. Belief variables (attitude toward the behavior, subjective norm, and perceived control) play a crucial role in shaping behavioral intention, which is the most immediate determinant of human social behavior. In the context of EBF, the practice results from breastfeeding (BF) intention, reflecting mothers' readiness to exclusively breastfeed their infants. With a stronger BF intention, mothers are more motivated to overcome challenges and persevere in EBF (Ajzen, 2020). Breastfeeding intention, in turn, is influenced by maternal BF attitude, subjective norm, and perceived control. Breastfeeding attitude encompasses mothers' overall feelings and beliefs regarding BF. Subjective norm emphasizes mothers' perceptions of whether they are expected by significant others (friends, family, healthcare providers) to engage in BF. Perceived control reflects mothers' beliefs about their ability to practice EBF. When a mother holds a favorable attitude toward BF, aligns her attitude with important others, and perceives a high level of control over BF, a strong intention to practice EBF is anticipated. By examining these psychological factors, TPB helps researchers and practitioners gain insights into the psychological determinants of EBF behavior and develop

interventions to promote it.

Additionally, the study should be based on TPB since it can be used to predict human behavioral intention and subsequent behavior (Worthington, 2021). This aligns with the research objective of the current study, which aims to predict EBF behavior for the first 6 months postpartum through assessing BF intention, combined with BF attitude, subjective norm, and perceived control before mothers are discharged. This study also examined how BF knowledge, maternity leave, delivery mode, and PIM predict EBF. Through a systematic review, it was found that BF knowledge had a positively direct effect on EBF and positively indirect effects on EBF through BF attitude and perceived control respectively. Maternity leave could positively affect EBF directly or mediating by BF attitude, subjective norm and perceived control respectively. Delivery mode had a negatively direct effect on EBF and an indirect effect through PIM. Perception of sufficient milk had a positively direct effect on EBF. In addition, maternal attitude, subjective norm, and perceived control had positively direct effects on EBF.

On the basis of TPB and the systematic review, we hypothesized the causal relationship between BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, BF intention and EBF, which can be seen in Figure 1.

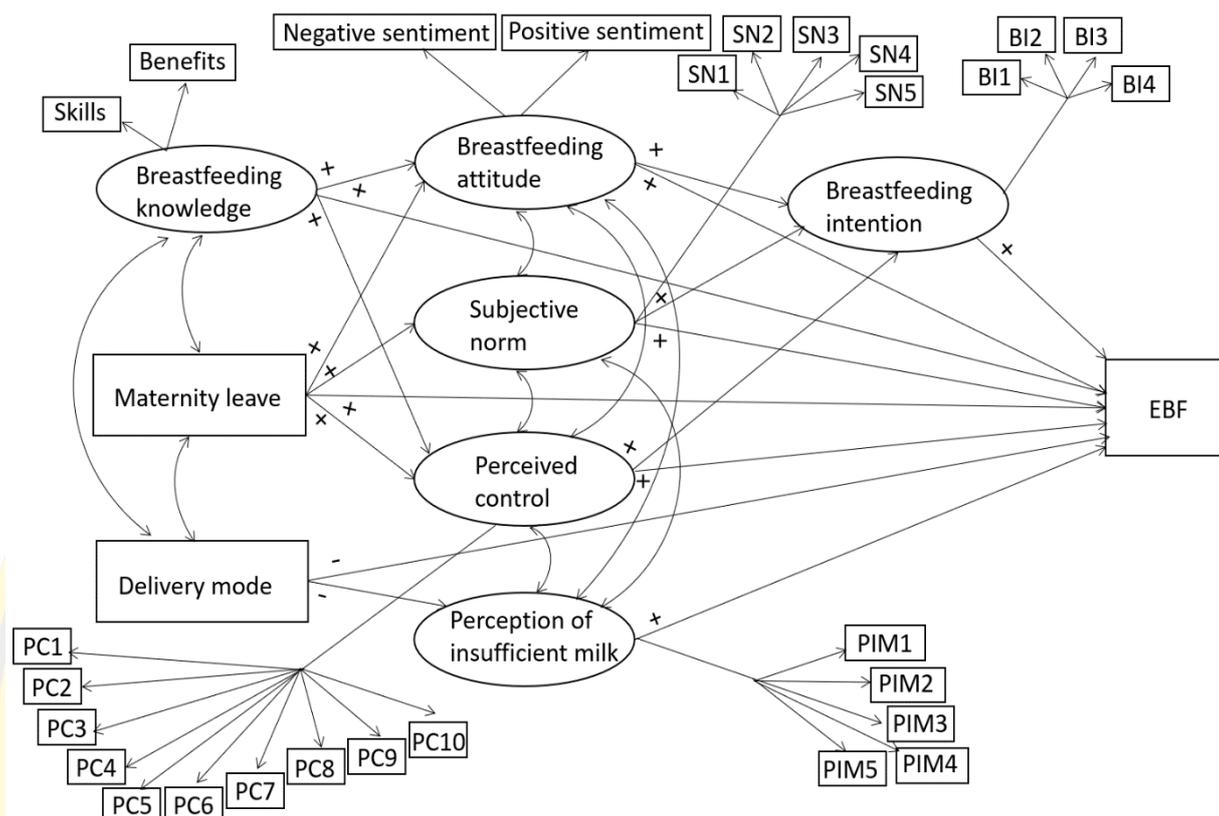


Figure 1 The hypothesized model of EBF

Scope of the study

An empirical of a structural model was conducted to investigate the influence of 8 predictors on EBF. The participants were adult mothers with healthy and full-term singletons, receiving permission to participate in this study and enrolled to study in Jiangsu Province, China. The period of collecting data was from August, 2022 to March, 2023.

Definitions of terms

Breastfeeding knowledge refers to a comprehensive understanding and awareness that mothers have regarding various aspects of BF. It includes factual information about the nutritional benefits of BF, proper BF skills, understanding the importance of EBF for the first 6 months postpartum, and awareness of the overall health implications for both the mother and the infant associated with BF. It was

measured by BF knowledge questionnaire (Zhao, 2008).

Breastfeeding attitude refers to a mother's established mindset or emotional disposition concerning BF, encompassing her perceptions of the positive and negative associated with BF. It was measured by attitudinal scale, which is the subscale of BF Attrition Prediction Tool (BAPT) in Chinese version (Zhu et al., 2017).

Subjective norm refers to a woman's belief regarding the approval and support for BF from significant individuals in her life, such as parents, husband, friends, and healthcare providers. It was measured by subjective norm scale which is the subscale of BF Attrition Prediction Tool (BAPT) in Chinese version (Zhu et al., 2017).

Perceived control refers to a mother's judgment about her capacity to influence BF behaviors. It was measured by perceived control scale, which is the subscale of BF Attrition Prediction Tool (BAPT) in Chinese version (Zhu et al., 2017).

Perception of insufficient milk refers to a mother's belief that her breast milk is either inadequate in quality or quantity to satisfy the needs of her infant. It was measured by PIM Questionnaire (McCarter - Spaulding & Kearney, 2001).

Breastfeeding intention refers to the likelihood of mothers following through with optimal BF behavior. It was measured by Infant Feeding Intention scale (IFIS) in Chinese version (Wu et al., 2018).

Maternity leave refers to the duration of time that mothers take away from their workplace following the birth of a child. It represents the period during which mothers are granted leave from work to focus on postpartum recovery, infant care, and the establishment of BF routines. It was asked in the demographic record form.

Delivery mode refers to the method mothers choose to give birth to a baby (by vaginal or cesarean section delivery). It was asked in the demographic record form.

Exclusive breastfeeding is defined as the practice of feeding an infant solely with breast milk (including expressed breast milk), without other liquids or solids except for drops or syrups consisting of vitamins, supplements, minerals, or medicines. It was estimated by the total number of days for EBF through 3 estimations (2, 4 and 6 months postpartum) with a daily record form.

CHAPTER 2

LITERATURE REVIEWS

The first part of this chapter was a presentation about the situation of EBF all over the world including it in China. In the second part, the theories related to EBF were presented. The third part discussed about factors influencing EBF.

Situation of EBF in China

In collaboration with the Global Breastfeeding Collective, the UNICEF and the World Health Organization reported that no country in the world can fully meet the BF recommendation (WHO, 2017). A study indicated that the rates of BF initiation and rates of BF at six months have increased modestly in various European countries since 2002 (Cattaneo & Garofolo, 2016). However, due to the lack of national data and the inconsistent definition and research methodology of BF, the authenticity of BF related data was affected. In 2018, the Centers for Disease Control and Prevention of America released the Breastfeeding Report Card. It was reported that around 83.2% mothers started out BF, while the data dropped to 46.9 at 3 months and only 25% for 6 months duration (Prevention, 2018). A study coming from Austria reported that the national EBF rate in the first week postpartum was 55.5% and decreased to 1.9% 6 months later (Bürger et al., 2021). About half of babies started receiving formula within the first three days after birth. EBF rate in the first 6 months in Thailand rose from 12.3% in 2012 to 23.1% in 2015, but it dropped to 14% in 2019 (Topothai & Tangcharoensathien, 2021). It can be seen that the global EBF rate is still low and too distant from the global target that set by World Health Organization (WHO), United Nation Children's Fund (UNICEF), which mentioned that 70% of children should be exclusively breastfed during the first 6 months by 2030 (WHO, 2019b).

A survey conducted by China Development Research Foundation during August 2017 and January 2018 pointed out that only 29.2% infants were exclusively breastfed in the first 6 months of life in China (Wang & Li, 2019). One in third of the participants were fed with mixed feeding and 31% were fed with breast milk, juice and water. The remaining infants were artificial feeding (6.3%). The data coming from the World Bank shows that the prevalence of EBF in China decreased from 1998 to

2013. Although it increased slightly by 2018 with the multiple efforts, it was still lower than other Asian countries and also the global average level (Wang & Zhou, 2019). A national representative survey (Chinese National Nutrition and Health Survey) of children younger than 6 years showed that the crude EBF rate was 20.7% (908/4381) and the weighted EBF rate was only 18.6% (Duan et al., 2018). Another study reported that the prevalence of EBF in the neonatal period was 31.3% and fell gradually to 12.4% at the sixth month (Wang, 2017). EBF rate dropped dramatically from the initiation to 6 months postpartum.

Breastfeeding policy in China

Law of the People's Republic of China on Maternal and Infant Health Care

“Law of the People's Republic of China on Maternal and Infant Health Care”, adopted by the National People's Congress Committee in 1994, stipulated that medical and health institutions shall provide health care services for the growth and development, BF and nursing care of newborns (Song, 1999). This law was revised in 2017. It re-emphasizes the need for health care institutions to provide maternal guidance on scientific child-rearing, proper nutrition, and BF (Commission, 2019).

Measures for Implementation of the Law of the People's Republic of China on Maternal and Infant Health Care

The Article 28 of “Measures for Implementation of the Law of the People's Republic of China on Maternal and Infant Health Care” states that medical and health institutions shall provide technical guidance for the implementation of BF. Institution of health care cannot publicize or recommend breast milk substitutes to maternal and infant families. Article 29 emphasizes that the packaging labels for products of breast-milk substitutes shall indicate the advantages of BF in prominent places. Producers or sellers of breast-milk substitutes are not allowed to give samples of their products to medical and health institutions. Article 30 points out that women shall enjoy maternity leave as stipulated by the State. Where a woman has a baby under the age of 1, the work unit shall arrange a certain time for her BF during the working time (Li, 2001).

Maternal and infant health literacy-basic knowledge and skills

“Maternal and infant health literacy-basic knowledge and skills” recommends EBF for about 6 months, and then continuing BF while introducing complementary foods until the child is 24 months old or older. Female workers who have babies under the age of 1 can enjoy feeding time for 30 minutes twice per shift (Lv et al., 2012).

Regulations Concerning the Labor Protection of Female Staff

“Regulations Concerning the Labor Protection of Female Staff” states that lactation time must be counted as labor time. Female worker who are at the stage of lactation shall not engage in high-intensity physical labor and those work which are not suitable for BF women. Their working hours shall not be extended, and they shall not be arranged for night shift work. The work units shall gradually establish facilities such as resting rooms for pregnant women, BF rooms, nurseries and kindergartens, thus properly solving the difficulties of female workers in physical hygiene, BF and baby care(Luo, 2012).

Code of marketing of breast-milk substitutes

“Code of marketing of breast-milk substitutes” emphasized that all the maternity and child health care organization, gynecology and obstetrics and pediatrics in general hospitals are forbidden to accept gifts and sponsorship from manufacturers of breast milk substitutes. Also, advertising, and promotional activity of various kinds of breast milk substitutes are strictly prohibited, and advertisements and product samples of breast milk substitutes are prohibited in all kinds of maternal and child health publications. At the same time, it is necessary to strengthen the training of the medical staff in order to renew their ideas, thus performing better to promote BF (Tuo, 2007).

Problems with policy implementation in China

For lack of comprehensive polices and policy supervision, there is no comprehensive polices and strict policy supervision. From the current situation in China, it is obvious that the policy system of BF cannot keep up with the development requirements of the situation. The current policies only cover different aspects of BF promotion in a scattered way, and there is no comprehensive law and regulation on BF promotion. In addition, the current BF related policies also reflect the problems of

multi-department management, inadequate communication between departments, inadequate management, poor implementation, lack of supervision and so on.

For inadequate support for community, many community health centers now even do nothing about BF promotion. A survey showed that 47.52% of respondents were unclear about the provision of BF guidance services in the community, and 35.54% indicated that their community health service centers did not provide BF related service (Zhang, 2016). A research also showed that professional support related to BF can have a positive effect on a mother's BF attitudes and behavior (Hannula et al., 2008). The community lacks professional BF mentors, so there is much to be improved in both the theoretical and practical aspects of BF guidance in community.

For poor management of baby friendly hospital, the report of the re-evaluation of baby friendly hospitals shows that some medical institutions pay little attention to the management of baby friendly hospitals (Zhang, 2016). The division of responsibilities in different departments is unclear with inadequate management measures. Some medical institutions have not integrated BF indicators into their hospital quality management system, or have not been linked to reward and punishment appraisal system (Zhang, 2016). Professional training and pre-job training of medical staff is not enough, leading to the outmoded knowledge of BF for medical staff. Nursing staff in some institutions lack BF related knowledge and their technology guidance related to BF is not standardized. All of these have negative effects on BF promotion.

Cultural beliefs and practice related to breastfeeding in China

Sitting the month

Sitting the month (“zuo yuezi” or “doing the month”) is the traditional postpartum practice which has been deeply embedded in Chinese culture. It has a long history and even been mentioned in the Book of Changes dating back 2,000 years (C. Yang et al., 2021). Based on various beliefs and practices in Chinese tradition, sitting the month contains a set of precautions of women's behavior, food intake, daily hygiene, and infant feeding during the first 30 days of childbirth. A traditional belief support that the quality of breast milk can be easily changed with an individual's diet despite of it is a myth. During sitting the month, consuming more hot or warm foods

(food with rich protein like pork, beef, and chicken) but avoid cold food (like fruits and vegetables), spicy food, seafood and coffee is good to the quality of breast milk. It is also believed that hot food can increase breast milk production compared to cold food (Lee, 2013). However, some rules of sitting the month are found to be based on experience rather than science. The benefits of dietary restrictions during sitting the month is not set in stone according to some mothers' experience (Raven et al., 2007). On the contrary, an unbalanced diet can prevent mothers from exclusively BF their infants. It is also common for mothers to wean BF since they don't want to constantly restrict what they eat and worry about how their diet affects breast milk.

Except for the dietary restrictions, mothers have to stay inside home with limiting visitors and restrict bathing and dental hygiene. Therefore, it can be a grueling month for mothers who experience sitting the month. It was reported that sitting the month can lead to negative physical and emotional outcomes and lactation delay as well (Lee & Brann, 2015). Some mothers found that negative emotions like sadness and depression can decrease breast milk production, while they think their emotional outcomes will be better if they can go outside the home (Lee, 2013). In addition, supplementary feeding and giving hot water, sugar or herbal tea (e.g., honeysuckle herb) to the infant is also recommended during sitting the month in Chinese culture (Shah et al., 2021). It can be seen that the traditional postpartum practice, sitting the month, has a certain impact on infant feeding. Based on the traditional belief, how to guide mothers to scientific confinement with more BF knowledge is important.

Grandchild rearing

In western societies, many grandparents do not assume an important role in raising grandchildren unless their children are going through something difficult, like divorce, unemployment or drug use (Xiao, 2016). Different from western countries, children raised by grandparents in China has deeply rooted in Chinese traditional culture. The grandparents here can be women's mother/ father in-law or biological mother/father. In China, mothers only enjoy 98 days of maternity leave. And with the development of China's society and economy, more mothers need to be engaged in work. Therefore, grandparents often highly involved in grandchildren's upbringings, regardless of whether the grandparents live with the nuclear family or not. One study

found that 45% of Chinese elderly participated in taking care of their grandchildren younger than 6 years old (Xiao, 2016). Another study also showed that 34% of grandparents were the main force of child-rearing (Sun, 2017). Millions of Chinese children are raised by their grandparents. Grandparents occupy a powerful and influential position in these extended families.

Grandparents especially grandmothers play important roles in infant feeding practices. Since they are the important sources of advice related to infant feeding. Grandmothers like to give their advice and experiences to the next generation to help them feed their infants. In addition, mothers are supposed to obey the grandparents due to filial piety, which is a special social value of in China. However, the grandparents in China are often found to be unsupportive of BF. Today's grandmothers grew up in a culture when formula was a preferred or modern method to feed infants, they lack the knowledge and experience related to breastfeed themselves (Lee, 2019). Some of the old generation believes that formula is needed to achieve satiety in infants and "a fat baby is a healthy baby" (Hockenberry et al., 2021; Zhang et al., 2015). Therefore, some grandmothers often persuade mothers to provide early food supplementation or formula to infants, giving up exclusively breastfeed their infants early (Bai et al., 2016; Takahashi et al., 2017; Xiao et al., 2020). It was reported that only 1 in 5 mothers in China were expected by the grandparents to breastfeed their infants and around 25% of mothers were even persuaded to give up BF within the first month postpartum (Bai et al., 2016). Due to filial piety and respect for the elders, mothers are more likely to take grandmothers' advice and give up EBF. Therefore, in Chinese culture, the BF belief of grandparents should be taken into consideration in the future researches and clinic practice.

Breastfeeding models in China

In China, there are some models in the previous studies explaining the BF behaviors. A study focused on the effect of perinatal bio psychosocial stress on BF duration, finding that mediating by the delayed onset of lactation, cesarean section ($\beta = .08, p < .05$), more weight gain during pregnancy ($\beta = .08, p < .05$), preterm birth ($\beta = -.06, p < .05$), more stress in the first trimester ($\beta = .12, p < .05$), and less BF frequency in the first day postpartum ($\beta = -.09, p < .05$) can lead to a short BF duration

(Zhu et al., 2013). Another study focused on the influence of workplace social capital on BF behavior of professional women, indicated that BF knowledge ($\beta = .02, p < .05$), workplace social capital ($\beta = .23, p < .05$) and family support ($\beta = .45, p < .05$) are positive predictors of BF behaviors of professional women (Wang, 2020). Based on TPB model, a study conducted in Hong Kong found that mothers' BF attitude ($\beta = .32, p < .05$) and subjective norm ($\beta = .17, p < .05$) has direct positively effect on perceived control. And perceived control has a positively direct effect on BF duration ($\beta = .17, p < .05$) and indirect effect on BF duration through BF intention ($\beta = .42, p < .05$) (Dodgson et al., 2003). Mothers with better quality of life ($\beta = .32, p < .05$), higher income levels ($\beta = .45, p < .05$), planned pregnancy ($\beta = .35, p < .05$), BF experience ($\beta = .43, p < .05$), BF education during pregnancy ($\beta = .51, p < .05$) and higher education levels ($\beta = .59, p < .05$) are more likely to have positive BF attitude (Cheng, 2018). However, few models can be used to explain mothers' EBF sustainability for 6 months postpartum and the predictors of it are still unclear.

Breastfeeding promotion action in Jiangsu Province

Jiangsu is one of the leading provinces in finance and also one of the provinces with the highest population density in China. The permanent resident population of Jiangsu Province is around 80 million with an average of 710,000 new births per year. Although the number of new births is huge, the situation of EBF sustainability is not satisfactory. A study coming from Lancet reported that Jiangsu will not achieve the 6-month 50% target in EBF mentioned in the health-related Sustainable Development Goals and Healthy Jiangsu 2030 goals. EBF rate for 7-28 days is expected to be only 25.6% (Chen et al., 2018). Given the huge number of new births, the current situation of babies being exclusively breastfed in Jiangsu province deserves our attention. The government of Jiangsu province has been committed to promoting BF and has issued a series of policies, regulations and activities to promote BF.

In 2015, the "Measures of Jiangsu Province for the Implementation of the Law of the People's Republic of China on Maternal and Infant Health Care" was enacted to promote the government, society, families, medical and health care institutions to support BF, protect women's BF rights and create a good BF

environment. The measures require medical and health care institutions to play the role of the main front of BF publicity and strengthen publicity and guidance for pregnant women and their families; Manufacturers and sellers shall not advertise and market breast-milk substitutes in medical and health institutions; The employing unit shall ensure the lactation time of female employees. The employing unit shall set up a BF room according to the needs of female employees; In particular, it stipulates that public places such as airports, railway stations and large shopping malls should set up mother and baby rooms and be equipped with corresponding facilities to facilitate women's lactation ("Measures of Jiangsu Province for the Implementation of the Law of the People's Republic of China on Maternal and Infant Health Care 2015," 2015)

In 2021, "Maternal and Child Health Development Plan of Jiangsu Province during the 14th Five Year Plan period" was enacted. Its main tasks include improving the network of maternal and child health care services, strengthening the management of the whole maternity service, improving the health level of women in the whole life cycle, promoting the comprehensive and healthy development of children and strengthening scientific and technological personnel and information support. In the plan, it is also pointed out that by 2025, the EBF rate of infants within 6 months should reach more than 50% with strengthening the management of baby-friendly hospitals, and advocating EBF for infants aged 0-6 months (Li & Jiang, 2021).

In addition, Jiangsu Province has also promulgated policies related to the extension of women's maternity leave. The female population in Jiangsu account for 49.22% of the total population. Under the background of overall stable economic operation and sustained efforts of various policies to promote employment, the registered unemployment rate of Jiangsu was 2.97% at the end of 2018 (Lyu et al., 2019). Women employees in the province account for 46.34% of the total number of employees. The proportion of women among the registered unemployed in cities and towns does not exceed 47% (NWCCW, 2017). In China, female employees with a single birth can enjoy 98 days of maternity leave, and women with cesarean section can enjoy an additional 15 days of maternity leave. In order to thoroughly implement the spirit of the Decision of the CPC Central Committee and the State Council on Optimizing the Fertility Policy and Promoting the Long-term and Balanced Development of the Population, Jiangsu Province implements the extension of

maternity leave by 60 days to 158 days for women and 15 days for men on the basis of the national maternity leave ("Implementation Plan on Optimizing Fertility Policy and Promoting Long-term and Balanced Development of Population," 2022).

In order to further promote BF and call on the whole society to pay attention to BF, Jiangsu Provincial Health Committee and other units organizes breast-feeding Week celebrations every year. During this period, medical and health institutions will carry out a series of lectures, salons, free consultations and other activities related to maternal and perinatal health care, infant feeding, growth and development. WeChat public accounts such as "Healthy Jiangsu" will push BF knowledge, carry out health education activities, and hold BF knowledge contests. Jiangsu Provincial Health and Family Planning Commission will also broadcast the "World Breastfeeding Week" series of special programs in Jiangsu education channel and sports leisure channel. Several square publicities, free clinic and health education activities will also be held at the same time.

Theory related to exclusive breastfeeding

Theory of planned behavior

The Theory of Planned Behavior was developed out of the Theory of Reasoned Action and Self-efficacy theory by Icek Ajzen in 1985. It is a psychological theory that links beliefs to behavior. The core constructs of TPB model are attitude, subjective norm, perceived control, and individual's behavioral intention(Ajzen, 1991). Attitude toward a particular behavior refers to people's evaluation towards the behavior of interest as favorable or unfavorable. The definition of subjective norm is persons' beliefs about whether the significant people around them approve or disapprove their behavior. The significant people can be a person's families, peers and other people of importance to the person. Perceived control is people's belief related to the ease or difficulty of performing the behavior. Behavioral intention means an individual's readiness to perform behaviors. TPB model suggests that behavioral intention is the most proximal determinant of person's behavior. While TPB model also identifies that the behavioral intention is directly driven by attitude, subjective norm, and perceived control. The stronger the intention, the more likely an individual will engage in a behavior.

The TPB has been used successfully to predict and explain a wide range of health behaviors and intentions including smoking, physical activity, diet behaviors, health services utilization, BF, and substance use. Most studies have proved that the TPB model can explain and predict behavior well. Research has shown that 26-36% of variance of a particular behavior can be explained by TPB model, and 40-49% of the variance of behavioral intention can be predicted by behavioral attitude, subjective norm and perceived control (Wang, 2020). It was also reported that TPB model can predict physical activity and diet behavior well, explaining 23.9% and 21.2% variance respectively (McEachan et al., 2011). TPB model has good predictive capabilities to understanding individual behavior, and it is applicable to most health-related behaviors. In this study, the TPB model is used to predict EBF. As the behavioral achievement in the model, EBF can be determined by BF intention which depends on mothers' attitudes towards BF, subjective norm, and perceived control. Mothers with more positive attitudes towards BF, higher levels of subjective norm and perceived control are more likely to intend to breastfeed their infants. With high levels of BF intention, mothers are expected to insist on EBF.

Health belief model

The health belief model (HBM) was developed by the 1950s' social psychologists who worked in United States of America (Moradhaseli et al., 2019). As a social psychological model, it can be used to predict health behavior changes in individual. The major concepts of HBM includes perceived susceptibility (perceived threat related to disease), severity (perceived consequence related to a health problem), benefits (perceived benefits of taking action), barriers (perceived barriers to taking action) and self-efficacy (personal competence to perform a behavior), as well as cues to action (strategies to activate "readiness") (Sulat et al., 2018). The HBM posits that an individual health behavior can be determined by the personal perception of susceptibility and severity towards health problems, and the benefits of and barriers to perform the health behavior (Xiang et al., 2020). In addition, a person's confidence in changing behaviors is a key factor predicting health behavior change as well. Meanwhile, the "cue to action" including internal cues (e.g., a particular symptom) and external cues (e.g., information from media and important others) is also necessary to occur to change health behavior (Janz & Becker, 1984).

This model has been applied to a broad range of studies related to health behavior among different populations. A cross-sectional study aimed to find the determinants of cervical cancer screening behavior, indicating that perceived benefits, perceived fewer barriers and self-efficacy can influence the behavior of cervical cancer screening (Babazadeh et al., 2018). Another study focused on the predictors of engagement in preventive action in the Saudi population during the COVID-19 crisis. It was reported that perception of benefits, susceptibility, severity and the cue to action are predictors of performing practices related to COVID-19 prevention (Syed et al., 2021). A literature review used the HBM as a conceptual framework to identify the determinants of BF. This paper indicated that perceived susceptibility, severity, benefits, and barriers related to BF practice can make mothers produce the individual perception. Together with self-efficacy and cues to action, mothers' individual perception about BF can influence BF practice (Emmanuel, 2015). It is also supported by another study that mothers with positive perception towards BF will breastfeed their infants as recommended (Aryotochter et al., 2018).

Health promotion model

Health promotion model (HPM) theory was published by Pender in 1982 and revised in 1996 (Pender, 2011). HPM is the complementary counterpart to health protective model. It emphasizes on the better well-being and self-actualization (Galloway, 2003). It can be used to explain the factors underlying motivation to perform the health promoting behaviors. The major concepts of HPM are "individual characteristics and experiences", "behavior-specific cognition and affect", and "behavioral outcome". Individual characteristics and experiences contain the prior related behavior and personal factors. Factors about behavior-specific cognitions and affect are divided into 6 categories perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences. The elements included in behavioral outcomes are commitment to a plan of action, immediate competing demands and preferences, and health-promoting behavior. HPM proposed that "individual characteristics and experiences" can influence "personal commitment to a plan of action", mediating by "behavior-specific cognition and affect" (Pender, 2011). "Personal commitment to a plan of action" can affect whether an individual engages in a health promoting behavior or

not. In addition, interpersonal and situational influences together with competing demands and preferences can directly predict the individual engagement in the health promoting behavior.

HPM has been widely used to change unhealthy behaviors in the field of nursing research, education, and practice. It can help nurses understand the major determinants of health-promoting behaviors, providing a basis for health consultation and health promotion. A study indicated that HPM-based education can be applied to change lifestyle and eating habits among overweight and obese women (Khodaveisi et al., 2017). Based on HPM, another research found that adolescents' fruit and vegetable consumption behavior can be influenced by resistance to action, self-efficacy, parental interpersonal influence, and peer influence (Arbianingsih et al., 2021). Target interventions towards these factors can be taken into practice to promote healthy consumption behavior. With HPM, it was also found that education, age, competing work and family demands, social support, confidence, BF knowledge and attitude were predictors of EBF at 8 weeks (Wilson, 2018). Around 9% of the total variance can be explained by the final model.

Comparison of theories

The TPB, HBM and HPM are all used widely in health behavior change. Breastfeeding plays an important role in health promotion and disease prevention. All the 3 theory models mentioned above can be used to predict EBF practice. Which model can better explain the EBF behavior depends on the predictive power of each model. It was reported that HBM has poor predictive power towards most of health related behavior (Taylor et al., 2006). This could be due to the poorly defined construct and predictive validity in the HBM core (Armitage & Conner, 2000). While the constructs of TPB model is more accurately defined and mathematically better specified than the HBM model (Alhamad & Donyai, 2021). The predictive performance of the TPB model is superior to the HBM (Taylor et al., 2006). A study focused on the social psychology of seat belt use also supported that the basic TPB model fitted the data well, while the HBM showed a poor fit to the data (Şimşekoğlu & Lajunen, 2008). Another study also reported that the TPB was a stronger model to predict BF behavior than the HBM (Pettis, 2010).

HPM is widely used to explain health promotion behavior. Although HPM had additional components which is not included in HBM, HPM did not add more predictive power than HBM with the same data (Pettis, 2010). The HPM incorporates the components of attitude, subjective norm and intention which are included in the TPB model. However, behavioral intention is shaped by perceived control. Behaviors cannot be performed as intention without adequate behavioral control (Ajzen, 1991). The Theory of planned behavior integrates control factors into belief factors, providing a holistic view of EBF practice. With its strong predictive power and the integration of control factors, TPB has accumulated substantial empirical support through numerous studies across various contexts, reinforcing its credibility and reliability. Therefore, this study chooses the TPB model as the conceptual framework to study the factors predicting of EBF.

Factors influencing exclusive breastfeeding

The factors influencing EBF for the first 6 months postpartum are identified through the utilization of TPB and a systematic review. The predictors of 6-month EBF encompass BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, and BF intention.

Breastfeeding knowledge

Breastfeeding knowledge related to information and facts related to the benefits and practice or skills of BF. It has a positively direct effect on EBF. As a modifiable factor, maternal knowledge towards BF plays key roles in the process of BF. Knowledge is the first step of behavior change (Fan et al., 2018). A lack of knowledge about BF can lead to mothers making hasty decisions and easily giving up EBF. In global strategy for infant and young child feeding, it was mentioned that mothers and the important others (e.g., fathers, grandmothers) should be provided with objective, complete and consistent knowledge related to appropriate feeding way, especially the recommended BF and EBF duration (WHO, 2003). Without adequate BF knowledge, 65.8% mothers will add water to babies within 6 months, and 15.8% add solid, semisolid, and paste foods to children (Fang et al., 2019). Infant sucking is an effective method of stimulating milk secretion, since it can increase the secretion of prolactin (Kalarikkal & Pfleghaar, 2021). If mothers are equipped with this knowledge,

they may let their babies suck the breast frequently to have adequate breast milk production. These mothers were more likely to exclusively breastfeed their infants until six months than those with inadequate knowledge about this (Sandhi et al., 2020). Similarly, early initiation of BF, within an hour of birth, can lead to earlier colostrum secretion and successful establishment of EBF. Infants whose mothers had this knowledge were 43.7 percent more likely to suck during the first hour of life and 7.5 percent more likely to be exclusively breastfed than those whose mothers had no knowledge of early initiation of BF (Fang et al., 2019). It can be seen that BF knowledge is very important to EBF practice.

A study coming from China supported that BF knowledge could influence EBF duration ($\beta = .08, p < .001$) (Wan et al., 2015). A higher level of BF knowledge could predict longer EBF duration ($\beta = .22, p < .05$) (Al Ketbi et al., 2018a). Researches focused solely on interventions improving maternal BF knowledge also reported that mothers with more BF knowledge were more likely to lengthen their EBF duration ($p < .05$) (Lin et al., 2008; Lumbiganon et al., 2016). Higher level of BF knowledge was also a favorable factor of EBF for 6-month duration ($p < .01$) (El Shafei & Labib, 2014). Among mothers supported by social media, maternal BF knowledge had a significant influence on sustained EBF ($F = 4.96, p < .01$) (Wilson, 2018). Mothers who lacked information or knowledge on BF were at high risk of early termination of EBF ($p < .05$) (Babakazo et al., 2015; Raheel & Tharkar, 2018). All these findings were consistent with a qualitative research (Oliveira et al., 2017). There was a study proposed that professional support was a stronger predictor in the improvement of knowledge related to BF, while inconsistent communication among health care providers and gaps in practice were noted (Hamze et al., 2019). Family members particularly fathers also play an important supportive role in EBF. Ke et al. (2018) indicated that mothers received BF education together with their families significantly increased the knowledge level of BF. These mothers are more likely to exclusively breastfeed their infants (Ke et al., 2018). Multiple approaches improving maternal BF knowledge are needed for more mothers to exclusively breastfeed their infants.

Breastfeeding knowledge has a positively direct effect on BF attitude. With adequate knowledge, mothers can gradually form positive attitude resulting in good EBF practices (ul Haq et al., 2012). On the contrary, mothers with inadequate BF

knowledge may don't know how to prevent and deal with BF problems, increasing the uncomfortable feelings. While this uncomfortable feelings is one of the attributes of the negative BF attitude (Hamze et al., 2018). Mothers, who are not knowledgeable about the importance of early BF initiation and frequent infant sucking, may experience insufficient breast milk production (Fang et al., 2019; Kalarikkal & Pflughaar, 2021). These mothers may have a negative attitude that breast milk cannot achieve satiety in infants. Many mothers were not knowledgeable about how to store and use of expressing breast milk, positive BF attitudes can be thwarted when they return to work (Okonya et al., 2017). Knowledge related to benefits of BF is an important antecedent of informing positive attitude (Hamze et al., 2018). Some mothers may think BF is inconvenient, embarrassing, and adverse to mothers' figure, compared to formula, if they know little about the benefits of BF. There were 2 studies supported that mothers' BF knowledge had a positive influence on BF attitude ($\beta = .33, p < .001, \beta = .11, p < .05$, respectively) (Abdulahi et al., 2021; Al-Barwani, 2017). Another study coming from Saudi Arabia showed that mothers with more BF knowledge could have more positive BF attitude ($\beta = .31, p < .01$) (Amin et al., 2014). Breastfeeding knowledge had a positive association with BF attitude ($r = .16, p < .001$) (Hamade et al., 2014). This positive correlation between BF knowledge and BF attitude was also supported by a study from Saudi Arabia ($r = .90, p < .01$) (Khreshah, 2020). While mothers' BF attitude plays a key role in their choice of BF pattern. Mothers with negative BF attitude are easier to give up EBF early. It is important to provide BF education from antenatal to postpartum and periodical BF counseling, to improve maternal BF knowledge and help mothers develop positive attitude towards BF practice (Hamze et al., 2019).

Breastfeeding knowledge also has a positively direct effect on perceived control. Perceived control represents mothers' confidence in their ability to perform the targeted behavior (Ajzen, 1991). Adequate knowledge of BF, like skills dealing with common BF problems and understanding of newborn behaviors, can contribute to adequate preparation for BF (Waddill & Arnold, 2018). Preparedness of BF is the realistic understanding of the BF experience and all the factors which can influence the optimal BF practice. BF preparedness based on adequate BF knowledge can create a foundation for the development of perceived control (Spencer et al., 2014). The more new mothers prepared about BF, the more motivated and confident they are to

breastfeed. With more knowledge and skills of BF, mothers believed that they perceived ease when breastfeed their infants or performance of BF is within mothers' control (Al-Barwani, 2017). A previous study supported that BF knowledge had a positive influence on perceived control ($\beta = .11, p < .05$) (Al-Barwani, 2017). BF knowledge was reported as the antecedent of perceive control (Waddill & Arnold, 2018). There was a strong correlation between BF knowledge and mothers' BF confidence ($r = .26, p < .05$) (Chezem et al., 2003). Mothers could perceive more control over EBF if they had enough BF knowledge ($p < .05$) (Liu, 2014; Liu, 2015; Titaley et al., 2021). Therefore, BF knowledge was considered as a predictor of perceived control in the present study. Interventions to improve mothers' perceived control through BF knowledge may include educational programs, workshops, and informational resources. Additionally, offering personalized guidance and addressing individual concerns can contribute to improving mothers' confidence and perceived control.

Through these findings, it can be concluded that BF knowledge is an important predictor of EBF, as well as BF attitude and perceived control. To improve EBF practice, BF attitude and perceived control of mothers, it is necessary to help mothers acquire a deeper understanding of BF knowledge by implementing a series of measures.

Maternity leave

Maternity leave refers to the duration of time that mothers take away from their workplace following the birth of a child. It represents the period during which mothers are granted leave from work to focus on postpartum recovery, infant care, and the establishment of breastfeeding routines. Maternity leave has been found to have a positive and direct impact on exclusive breastfeeding (EBF), as it allows mothers dedicated time and support to initiate and maintain breastfeeding practices during the crucial early months of the infant's life. Compared with employed mothers, unemployed mothers have more time and energy to accompany their infants and practice EBF. After returning to work, mothers need to face intense competition, work pressure and the multiple responsibilities of being a wife, mother and employee (Li et al., 2003). Mothers can easily give up EBF if they can't balance work and caring for their babies. In addition, mothers who would like to insist on EBF need adequate feeding time, lactation rooms and facilities such as refrigerators for the storage of

breast milk, which enable them to breastfeed their babies in person during working hours or to squeeze the breast milk and store it. Although these 3 measures can increase the rate of EBF by 6.8%, 7.1% and 12.1% respectively, only 19.1% of mothers in China worked in units with lactation rooms, 49.0% with refrigerators capable of storing breast milk, and 32.8% of mothers cannot enjoy the legal right of 1-hour feeding time (Fang et al., 2019). All these could be used to explain why mothers with short maternity leave could stop EBF early.

This predictive relationship from maternity leave to EBF was in line with the finding of a previous study from Egypt. It was found that maternity leave had a positive influence on EBF duration ($\beta = .17, p < .001$) (Abou-ElWafa & El-Gilany, 2019). Among the first-time Chinese mothers, maternity leave was a strong predictor of EBF ($\beta = .22, p < .01$) (Wan et al., 2015). Return to work in the first 2 months postpartum could predict less EBF ($\beta = -.17, p < .05$) (Al-Barwani, 2017). Longer maternity leave is an important factor of longer EBF duration ($p < .05$) (Aikawa et al., 2015; Vieira et al., 2014; Xu et al., 2007). Compared with unemployed mothers, employed mothers who have to return to work before 6 months postpartum were less likely to maintain EBF ($p < .05$) (Al-Sahab et al., 2010; Alzaheb, 2017; Dun-Dery & Laar, 2016; Langellier et al., 2012; Sasaki et al., 2010). A study coming from Hong Kong indicated that short maternity leave increased the discontinuous risk of BF (Tarrant et al., 2002). The length of maternity leave varies greatly in different countries. Mothers in the UK can enjoy 52 weeks maternity leave (Vilas, 2018), while those living in Thailand and China only have 90 and 98 days for maternity leave respectively. The extension of maternity leave was associated with the duration of EBF. Chai et al. (2018) found that a 1-month increase in the duration of paid maternity leave can result in a 5.9 percent increase in EBF (Chai et al., 2018). All these finding reflects the significant effect of maternity leave on EBF. Therefore, Maternity leave policies were needed to be completed further in many countries. Workplaces should pay more attention to the needs of female workers in the lactation period and provide supportive environments for mothers to breastfeed their infants. Not only the lactation room with the refrigerators for milk storage, but also the 1-hour BF time should be guaranteed in the workplaces.

Maternity leave has positively direct effects on BF attitude, subjective norm

and perceived control. For BF attitude, women who return to work early after childbirth often face multiple difficulties in continuing to breastfeed due to lack of support from workplace, which has a negative impact on mothers' attitudes towards BF (Li et al., 2003). Workplace rarely provide EBF support for mothers, inadequate facilities for privacy protection and expressing breast milk and no lactation breaks are common in the workplace (Tarrant et al., 2002; Zhang et al., 2020). When mothers return to work, their attitude towards EBF can be changed. Some studies found that working mothers expressed positive attitudes toward benefits of EBF, as well as negative attitudes associated with inconvenience of EBF caused by work, indicating the conflict between benefits of EBF and difficulties of EBF related to returning to work (Al-Barwani, 2017; Altamimi et al., 2017; Horwood et al., 2020). Working mothers believed that it is impractical and time consuming to breastfeed infants exclusively after returning to work (Horwood et al., 2020). A previous study supported that a longer length of maternity leave could predict more positive BF attitude ($\beta = .10, p < .05$) (Al-Barwani, 2017). Compared to the employed mothers, housewife could have more positive attitude toward BF ($B=1.29, p < .05$) (Ghasemi et al., 2019). Another study also found that the length of maternity leave significantly related to mothers' BF attitude ($p < .05$) (Hanafi et al., 2014). Therefore, in future studies, further exploration will be conducted to understand the barriers that contribute to working mothers developing a positive attitude towards BF.

For subjective norm, not only insufficient workplace support, but also insufficient professional support also exists. Professional supports are important and necessary for working mothers to ensure EBF. However, it has been identified that there are still some barriers exist in health service in hospitals. The reports of the re-evaluation of baby friendly hospitals show that some medical institutions pay little attention to the management of baby friendly hospitals (Zhang, 2016). The division of responsibilities in different departments is unclear with inadequate management measures. Some medical institutions have not integrated BF indicators into their hospital quality management system, or have not been linked to reward and punishment appraisal system. Professional training and pre-job training of medical staff is not enough, leading to the outmoded knowledge of BF for medical staff. As the advocates and educators of BF, nurses were found to be lack BF knowledge and have poor execution

on BF education (Tillman, 2018). All these result in that few mothers were knowledgeable about the storage and use of expressing breast milk, making mothers feel frustrated without professional support to practice EBF in the workplace after their maternity leave is over (Okonya et al., 2017). It was reported that few working mothers can access to the lactation consultants and support groups (McCardel & Padilla, 2020). All of these have negative effects on subjective norm among working mothers. A study focused on predictors of BF intention and intensity supported that the that maternity leave could positively predict subjective norm ($\beta = .21, p < .05$) (Al-Barwani, 2017). The shorter maternity leave and more work demand, the less social support from the important others mothers perceived ($\beta = .18, p < .01$) (Wilson, 2018). Therefore, nurses with adequate BF knowledge and good execution on BF education are needed to provide professional BF support to working mothers, improving working mothers' perception of BF support from the important others.

For the predictive relationship between maternity leave and perceived control, it could be due to the insufficient support from both workplace and healthcare providers, mothers may feel helpless when it comes to EBF once they return to work (McCardel & Padilla, 2020; Tarrant et al., 2002; Zhang et al., 2020). In addition, faced with the pressures of multiple roles after returning to work, it is difficult for mothers to perceive enough control to continue BF their infants exclusively (Zhang, 2016). Previous studies supported that short maternity leave without BF support in workplace was determinants of less perceived control over BF (Al-Thubaity et al., 2023; Rashid et al., 2018). It was also supported by a study coming from Iran, which found that mother with short maternity leave had lower perceive control towards BF (Poorshaban et al., 2017). Mothers who working outside the house had lower BF self-efficacy than housewife ($p < .01$) (Titaley et al., 2021). Compared with mothers without support from workplace, those with workplace support were 1.59 times more likely to have strong perceived control ($p < .05$) (Kurniati et al., 2016). Tailored interventions improving BF support in the workplaces should be developed to make working mothers perceive more control over BF.

In summary, maternity leave not only directly predicts EBF but also serves as a significant influencing factor on BF attitude, subjective norm, and perceived control.

Delivery mode

Delivery mode refers to the method mothers choose for giving birth to a baby, which can be either vaginal delivery or cesarean section. The negatively predictive relationship between cesarean section and EBF suggests that the choice of cesarean section may impact EBF practices. Mothers experienced cesarean section can have more problems including latching, positioning and pain, compared to vaginal delivery (Hobbs et al., 2016). The incision pain and after pains from your uterus contracting back down in size can make mothers feel uncomfortable to breastfeed. Each 1-point increase in the average score of postoperative pain resulted in a 21% reduction in EBF (Babazade et al., 2020). It was also found that the hormonal pathway stimulating lactogenesis can be destroyed by cesarean section through mothers perceived stress or reduced oxytocin secretion, leading to the delayed onset of lactation (Hobbs et al., 2016). Similarly, certain types of anesthesia have a negative effect on lactation, leading to the delayed initiation of BF (Chen et al., 2018; Johar et al., 2021; Kling et al., 2016; Lin et al., 2011). Mothers may choose formula as their baby's first milk because of delayed lactation. Delivery mode was a major factor affecting EBF which is supported by strong evidence. Compared with spontaneous delivery, mothers with cesarean section were significantly at a greater risk of stopping EBF (Al-Sahab et al., 2010; Alzaheb, 2017; Chen et al., 2020; Dun-Dery & Laar, 2016; Fang et al., 2019; Tang, 2019; Zhu et al., 2019). Cesarean delivery can also affect mothers' perception of milk supply negatively. It was reported that caesarean section was also an determinant of PIM (Zhang et al., 2019). Cesarean section mothers with Epidural patient-controlled analgesia were found to have a higher perception of insufficient breast milk ($\beta = -.26$, $p < .001$) (Lin et al., 2011). Some studies reported that a cesarean delivery was an independent predictor of delayed BF initiation (Baxter, 2006; Raghavan et al., 2014). Wound pain, postoperative fasting can decrease the level of oxytocin and prolactin, which affected initiation of milk supply and milk synthesis. These mothers may think their breast milk was insufficient, leading to early EBF cessation and early introduction of formula in hospital (He, 2014). In a word, cesarean delivery can negatively affect EBF and also mothers' perception of breast milk supply.

Different from many other countries, China once had the highest cesarean section rate in the world. The cesarean birth rate rose dramatically in the past three

decades in China. It was reported that the national cesarean birth rate in rural areas increased from 1.5 to 23.6%. While in urban areas, it rose from 14.9 to 64.1% (Feng et al., 2012). WHO recommended that the optimal rate for cesarean sections should not exceed 15% (Mi & Liu, 2014). While data from a WHO investigation conducted in 2007-2008 showed that the cesarean birth rate in China was nearly 50%, which was 3 times higher than the WHO recommendation and the highest worldwide (Lumbiganon et al., 2010). After the introduction of the universal two-child policy, women began to take the consequences of cesarean birth into consideration for future pregnancies, making the proportion of cesarean birth on maternal request decrease. The cesarean birth rate declined to 34.1% in 2013 (Yan et al., 2020). But the situation was temporary. A rising trend was observed 2 – 3 years after the release of the two-child policy. Another study reported that the national rate of cesarean section is 54.5%, of which 38.4% was non-indicated cesarean (Wang et al., 2017). A study conducted in Jiangsu Province found that before and after the implementation of the two-child policy, the cesarean section rate was around 47% and 43% respectively (Deng, 2020). The cesarean birth rate is still an important issue.

There are 5 reasons which can explain the high rate of cesarean in China. First, Some mothers think caesarean section is safer, faster, and less painful, while vaginal birth can leads to vaginal tone and higher level of pain (Wang & Hesketh, 2017; Zhao et al., 2021). Second, some mothers wrongly believed that giving birth to a baby in a particular time can bring more lucky to the infants, which makes them choose caesarean section on auspicious delivery date (Wang & Hesketh, 2017). Third, some mothers mistakenly think that caesarean section is more helpful to make them regain their pre-pregnancy weight than vaginal birth (Mi & Liu, 2014). In addition, cesarean section is more profitable for the hospital. Because cesarean section costs at least twice as much as a natural birth in China (He et al., 2016) . At last, with the rapid development of China's economy in recent years and the opening of the two-child policy, macrosomia as well as woman in advanced maternal age are increasing which leads to more caesarean section (Mi & Liu, 2014). Driven by these reasons, the cesarean section rate in China is difficult to be controlled within a short time, which has a certain impact on improving EBF practice in China. Due to the high rate of cesarean in China and its effect on EBF, EBF among these women needs greater

concern.

Breastfeeding attitude

Breastfeeding attitude refers to a mother's established mindset or emotional disposition concerning BF, encompassing her perceptions of the advantages and disadvantages associated with BF. Breastfeeding attitude has a positively direct effect on EBF. This implies that a positive and favorable attitude towards BF contributes to an increased likelihood of successful and sustained EBF practices. Attitude involves a judgment, thought, and decision-making towards a behavior based on the belief which is very important for people to change the bad behavior into the healthy behavior through accepting others' positive suggestions (Fan et al., 2018; Hamze et al., 2019). The formation of behavioral attitude depends on the outcomes, if one believes that a certain behavior will lead to a desirable or favorable outcome, he or she will make a conscious decision that an action or a behavior should be taken into practice or changed, forming a positive attitude (Fishbein & Ajzen, 1977; Hamze et al., 2019). Mothers who have positive attitude toward a certain behavior will be more likely to follow their thoughts of this behavior or the conscious decision to perform this behavior (Hamze et al., 2019). Therefore, when mothers believe that the breast milk is the economic, convenient and optimal source of nutrition rather than formula, they are more predisposed towards EBF (Cox et al., 2015). On the contrary, mothers who believe that formula can achieve more satiety in infants than breast milk will have negative attitude towards the benefits of EBF and then supplement formula in advance.

A dissertation supported that BF attitude had a significantly positive influence on EBF ($\beta = .15, p < .05$) (Wilson, 2018). Mothers who were in the highest quartile of the BF attitude score were 5.40 times more likely to exclusively breastfeed their infants (Jessri et al., 2013). It was also reported that BF attitude could predict EBF at 4 months ($\beta = .06, p < .01$) (Wan et al., 2015). Another 2 studies with high quality found that mothers with more positive BF attitude could exclusively breastfeed their infants for a longer duration ($p < .05$) (Cox et al., 2015; Nnebe-Agumadu et al., 2016). Maternal attitude towards EBF is a modifiable factor through a multicomponent intervention. A meta-analysis indicated that education and supportive interventions based on e-technology like the internet, and mobile phone can significantly improve the BF attitude of mothers (Lau et al., 2016). Maternal attitude towards BF needs to be

taken seriously in the future study due to it is a strong predictor of EBF duration.

Breastfeeding attitude also has a positively direct effect on BF intention. Behavioral intention is the indication of a person's perceived likelihood or subjective probability to execute a behavior (Putra et al., 2018). BF attitude play an important role in forming BF intention. People can have a positive attitude towards a behavior, depending on the positive judgment and thoughts of a certain behavior and forming the conscious decision to take an action, then they will express their thoughts or intention verbally. Therefore, attitude can specifically lead to the behavioral intention (Hamze et al., 2019). People with positive BF attitude will also have more motivation or greater perceived likelihood or subjective probability to perform the particular behavior (Ajzen, 1991). Based on this, the more positive the attitude of BF, the stronger the motivation or intention to breastfeed. When mothers with negative attitude towards BF, they are less likely to have a strong intention to maintain EBF practice. With less BF intention, mothers will have less motivation to try hard to carry out EBF practice. The TPB model indicated that behavioral intention was predicted by attitude (Hale et al., 2002), which was consistent with the previous studies. A study focused on factors predicting BF intention reported that both positive and negative BF attitude had effects on BF intention ($\beta = .13, p < .05, \beta = -.16, p < .05$, respectively) (Al-Barwani, 2017). Another 2 studies also found that BF attitude could influence BF intention through the predictive analysis ($\beta = .20, p < .01, \beta = .27, p < .01$, respectively) (Hamid & Yahya, 2018; Mahbubi Ghazaani et al., 2015). BF attitude together with subjective norm could explain 27% of the variance in mothers' BF intention ($\gamma = .50, p < .000$) (Khatun, 2010). Breastfeeding attitude was also found to have a significant correlation with BF intention ($\gamma = .17, p < .05$) (Khresheh, 2020). Therefore, this study focused on BF attitude as a predictor of BF intention. Due to the effects of BF attitude on EBF and BF intention, helping mothers develop positive attitude towards BF was very important.

Subjective norm

Subjective norm refers to a woman's belief regarding the approval and support for BF from significant individuals in her life, such as parents, husband, friends, and healthcare providers. This encompasses her perception of whether these important individuals are likely to endorse and encourage BF or not. Subjective norm

has a positively direct effect on EBF. A study coming from China reported that subjective norm was a significantly positive determinant of EBF ($\beta = .18$, $p < .001$) (Wan et al., 2015). Higher scores of subjective norm predicted a longer EBF duration ($\beta = .06$, $p < .05$) (Alfianrisa et al., 2017). Combined with BF attitude and perceived control, subjective norm could explain 29.2% of the variance of EBF in Thailand ($F = 19.07$, $p < .05$) (Chansiri et al., 2017). It was also supported by many other studies that family supportive attitudes towards BF can affect EBF (Andrew & Harvey, 2011; Bai et al., 2010; Jama et al., 2017; Wu et al., 2017). Another study coming from Thailand indicated that perceived family support is one of the main reasons for mothers maintaining EBF. Mothers perceived family support including financial support, taking care of the baby or supporting BF were identified as an important facilitator to EBF (Thepha et al., 2018). With emotional support, instrumental support, information support and appraisal support related to BF from families, mothers were more likely to maintain EBF (Biswas, 2010; Nguyen et al., 2021).

It was found that although some grandmothers know about the benefits of BF, they still want to advise mothers to introduce water and other foods before 6 months postpartum (Thet et al., 2016). Because some grandparents think water can help infants quench thirst and prevent infants from some diseases, while formula and other foods should be introduced to set up bond between them and their infants (Grassley & Eschiti, 2008). Helping working mothers to get enough rest is also a reason for grandmothers to practice complemented feeding (Angelo et al., 2020). In China, as the main force of child-rearing, the grandparents in China are often found to be unsupportive of BF. They believe that breast milk only is not helpful to achieve satiety in infants, and “a fat baby is more healthy” (Hockenberry et al., 2021; Zhang et al., 2015). Therefore, they often persuade mothers to give up EBF and provide formula and early supplementation to infants (Bai et al., 2016; Takahashi et al., 2017; Xiao et al., 2020). Although some mothers believe that EBF is good for their babies’ health, they may have to accept the advice from grandparents to introduce formula early, since grandmothers are the first source of EBF advice for mothers, the central figure in family decision-making and also the main force of child-rearing (Angelo et al., 2020). Mothers often follow their grandmothers’ advice on how to feed their infants. It can be seen that mothers’ perceptions of whether grandmothers think it is worthwhile

to insist on EBF is an important factor related to EBF practice.

Lack of community support toward BF is an important factor influencing mothers' EBF duration (Bai et al., 2010; Jama et al., 2017). Another study indicated that subjective norm including perception of professional support can predict EBF at 4 months (Wan et al., 2015). Professional support related to BF can have a positive effect on a mothers' BF practice (Hannula et al., 2008). The average length of hospital stay for uncomplicated delivery is about 2-4 days. Due to the short hospital stay, inadequate support from hospital healthcare providers in some hospitals is provided to mothers and their families (Zhang et al., 2018). After discharge, these mothers need to transit from the hospital to the home. If there is no adequate and continued support from community, these mothers have to self-explore how to feed their infants without professionals' support (Li & Lin, 2016). Although community health nursing has been developing in China, it still has many difficulties needed to be overcome to meet people's health needs. Many community health centers now even do nothing about BF promotion. A survey showed that 47.52% of community nurses were unclear about the provision of BF guidance services in the community, and 5.54% indicated that their community health service centers did not provide BF related service (Zhang, 2016). When breastfeed infants, mothers can perceive little support from healthcare providers and encounter all kinds of problems such as insufficient milk, crying babies and cracked nipples. These mothers may worry that these problems could affect the health of mothers and babies if not handled properly. To be on the safe side, they choose to add formula and abandon EBF (Li & Lin, 2016). Therefore, with perception of inadequate professional support from healthcare providers, it is easy for mothers to give up EBF during the first 6 months postpartum.

In addition, according to the TPB model, behavioral intention can be positively predicted by subjective norm directly (Ajzen, 1991). How to breastfeed the infants is not just focused by mothers but also their families (Xiao, 2016). As important persons of mothers, families' beliefs and practices towards BF can have a great influence on infant feeding intention and practices (Al-Barwani, 2017). One mother may naturally consider the support of the important person as a necessary component in decision making of continued EBF (Bai et al., 2010). Both the families and the healthcare providers are the important source of suggestions related to BF for mothers.

Mothers' belief in maintaining EBF can be further strengthened with the supportive attitude from their families, as well as from the healthcare providers. With more supportive attitude from the important others, mothers will feel being encouraged to plan to perform EBF for a longer duration. Otherwise, their intention to exclusively breastfeed their infants will be weakened. Mothers can easily to be persuaded to supplement formula instead of breast milk, if these mothers cannot perceive enough support from the important others. Previous studies also supported that subjective norm had a significant influence on BF intention ($\beta = .29, p < .05, \beta = .46, p < .05, \beta = .09, p < .05$, respectively) (Al-Barwani, 2017; Chansiri et al., 2017; Sulaeman et al., 2018). It was the strongest determinant of mothers' intention to exclusively breastfeed their infants for 6 months ($\beta = .50, p < .001$) (Ritta et al., 2020). Another study also reported that subjective norm had significant effects on the BF intention of both the first-time and experienced mothers ($\beta = .26, p < .05, \beta = .25, p < .05$, respectively) (Bartle & Harvey, 2017).

According to TPB model and previous studies mentioned above, it can be concluded that subjective norm can directly affect EBF and BF intention in positive directions.

Perceived control

Perceived control refers to a mother's judgment about her capacity to influence BF behaviors. This encompasses her belief in the extent to which she can control and navigate various aspects of the BF process. Perceived control has a directly positive effect on EBF. Perceived control is an important part in the TPB model. It is important in changing a person's thinking patterns, emotional responses and the preparation towards a behavior (Ajzen, 1991). It is also associated with psychological effects of stress and performance improvement, increasing the likelihood of positive behavior change (Thompson & Spacapan, 1991). In addition, efficacious feeling is needed for an individuals to make a behavior-change decision, while feeling of helplessness can depress the attempts of people to make positive behavioral changes (Thompson & Schlehofer, 2008). Therefore, when mothers perceived little control over EBF, they may appear to be more indifferent to make efforts to maintain EBF. While with actual control over EBF behavior, mothers will think they are capable to perform EBF, thus taking actions to exclusively breastfeed

their infants. Two researches supported that perceived control was a direct and significant determinant of EBF behavior ($\beta = .38, p < .001, \beta = .43, p < .001$, respectively) (Alfianrisa et al., 2017; Bajoulvand et al., 2019). Another study indicated that EBF at 4 months can be predicted by perceived control towards BF ($\beta = .96, p < .05$) (Wan et al., 2015). Mothers who had more perceived physical strength, more perceived comfort of BF in public and less perceived BF difficulties were more likely to exclusively breastfeed their infants ($\beta = .62, p < .001$) (De Jager et al., 2014). Perceived control played an important role in sustaining EBF (De Roza et al., 2019; Jama et al., 2017; Nguyen et al., 2021; Zhu et al., 2019). Bandura also supported that behavioral achievement can be strongly affected by their perceived control (Ajzen, 1991).

Perceived control also has a positively direct effect on BF intention. Motivation is the result of assessment and comparison of the perceived gap between a current goal state and the desired goal state. Once a behavioral intention is formed, it means the individual has directed the behavior towards the goal state through the motivational process (Kidwell & Jewell, 2010). While the motivated process can be changed by one's perceived control to perform the certain behavior when forming the behavioral intention. When people have the perception of actual control over the behavior with related skills, time, money, and other resources, they can be more motivated to perform a behavior (Ajzen, 1991; Kidwell & Jewell, 2010). Therefore, mothers with sufficient ability to perform EBF may have more intention to exclusively breastfeed their infants. This predictive relationship between perceived control and BF intention had been supported by many studies from different countries ($\beta = .14, p < .05, \beta = .65, p < .001, \beta = .18, p < .05, \beta = .42, p < .001$, respectively) (Al-Barwani, 2017; Bajoulvand et al., 2019; Chansiri et al., 2017; Mahbubi Ghazaani et al., 2015). Mothers who believed themselves are capable to exclusively breastfeed their infants were more likely to intend to practice EBF ($\beta = .38, p < .001, \beta = .24, p < .001$, respectively) (Alfianrisa et al., 2017; De Jager et al., 2014). All these findings were consistent with TPB model. It can be observed that enhancing mothers' perceived control over BF is beneficial for improving EBF and maternal BF intention.

Perception of insufficient milk

Perception of insufficient milk refers to a mother's belief that her breast milk is either inadequate in quality or quantity to satisfy the needs of her infant. Mothers

perceived more milk supply could maintain EBF for a longer duration. Perception of insufficient milk is one of the most common reasons for stopping mothers from exclusively BF their infants with around 30% to 80% of mothers reported PIM (Gatti, 2008). Another study also indicated that 44% of mothers had a perception of insufficient breast milk (Hendaus et al., 2018). Some mothers with a proven adequate supply still reported PIM as long as their actual milk supply is not objectively measured (Hill et al., 2007). Infants' crying after BF is considered as insatiable cues, leading to mothers' perception of insufficient breast milk, and these mothers might worry that their babies' needs cannot be met without adding formula milk (Tang, 2019). The supplementation of formula can reduce the frequencies of nipple sucking in turn, and then the amount of lactation would decrease. Then the PIM among mothers could be more pronounced, leading to early EBF cessation. Three high quality studies examined the effect of mothers' perception of sufficient human milk on EBF outcome (De Roza et al., 2019; Hegazi et al., 2019; Tang, 2019). Mothers with a perception of insufficient human milk can negatively affect the maintenance of EBF. Another study also found that higher level of perceived sufficient milk production is a determinant of maintaining EBF (Sandhi et al., 2020). In addition, PIM is associated with low BF self-efficacy which contributes to early cessation of EBF (Kent et al., 2021). As an important reason for mothers stopping EBF early, anticipatory guidance should be provided during prenatal, in-hospital and early postpartum guidance, helping mothers have correct perception of breast milk supply and know more related behaviors affecting the milk supply. It is also very important for nurses to identify those mothers with high level of PIM with appropriate assessment tool. In China, the effect of perceived breast milk deficiency among mothers has not been appreciated, and there is no special assessment tool helping nurses identifying mothers with PIM. In a word, due to the negative effect of PIM on EBF, it needs a call for more attention to improve EBF practice.

Breastfeeding intention

Breastfeeding intention refers to the likelihood of mothers following through with optimal BF behavior. This entails the extent to which mothers express an intention or commitment to engage in and maintain recommended BF practices. It has positively direct effect on EBF. Not only the TRA model, but also the TPB model

states that people's intention to perform a certain behavior is a key determinant of performing a behavior. It is assumed to be an immediate antecedent of a certain behavior (Ajzen, 2020). Since it is the indication of one's motivation and readiness for performing a behavior, based on the individual attitude, subjective norm and perceived control towards a given behavior. Meanwhile, it can represent that how willing people are to give the behavior a try, of how much of an effort they are planning to put into, in order to achieve the behavior (Ajzen, 1991). Therefore, with stronger intention to perform a behavior, the given behavior will be more likely to be engaged in. Women with higher BF intention are more likely to exclusively breastfeed their infants. In the previous studies, maternal BF intention was also consistently identified as a strong predictor of EBF duration ($\beta = .09, p < .05$, $\beta = .54, p < .001$, respectively) (Alfianrisa et al., 2017; Bajoulvand et al., 2019). A study explored the determinants of EBF continuation among American mothers also reported a strong positive association between BF intention and EBF ($\gamma = .67, p < .01$) (Bai et al., 2016). Another 3 studies examined the effect of intention to breastfeed on EBF practice, and reported strong predictive power of maternal intention to breastfeed for EBF (De Jager et al., 2014; De Roza et al., 2019; Sasaki et al., 2010). Although BF intention is positive predictor of EBF, compared with studies coming from other countries, the studies conducted in China have focused less on BF intention and its effects on EBF practice.

Summary

Exclusive BF provides unmatched health benefits to both mothers and infants. However, the situation of EBF in China is suboptimal and far behind the global average. The factors influencing mothers to maintain EBF according to WHO recommendations are still unclear in the cultural context of China. The TPB encompasses psychological factors that influence behavior and possesses a robust ability to predict behavior. According to the TPB model and the findings of previous studies, it could be concluded that BF knowledge has positively direct and indirect effects on EBF through BF attitude, and perceived control. Maternity leave has positively direct and indirect effects on EBF through BF attitude, subjective norm, and perceived control. Delivery mode has negatively direct and indirect effects on EBF through PIM. Breastfeeding attitude, subjective norm, and perceived control have

positively direct and indirect effects on EBF through BF intention. Perception of insufficient milk also has a positively direct effect on EBF. Complex predictive relationships among multiple factors and EBF need to be explored in different countries and culture, helping mothers maintain EBF and maximize its health benefits.



CHAPTER 3

RESEARCH METHODOLOGY

This chapter included research design, target population, sample size, sampling, research instruments, translation of the instruments, and protection of human subjects, ethics, data collection and data analyses.

Research design

A prospective study design was used in the current study, since this design was well-suited for studying behaviors and outcomes that unfold over time. The present study employed this study design with follow-ups to examine the effect of BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, and BF intention on EBF sustainability until 6 months postpartum. SEM was used to test the direct, indirect, and mediating effects among multiple variables.

Population and sample

Setting

This study took place in Jiangsu province in the eastern part of China. According to the hospital's capacity in medical care, medical education, and conducting medical research, the hospitals in China were classified in a 3-tier system- Primary (I class), Secondary (II class) or Tertiary (III class) institutions. Primary hospitals include township health centers, town hospitals, and urban neighborhood clinics. Secondary hospitals mainly consist of city and county hospitals, as well as some staff hospitals. Tertiary hospitals mainly refer to large hospitals directly administered by national, provincial, or municipal authorities, as well as affiliated hospitals of medical colleges. In comparison to Secondary and Tertiary hospitals, Primary hospitals are more oriented towards people with lower educational levels and relatively lower economic incomes. Tertiary hospitals possess the medical resources with the highest quality. With this, Tertiary hospitals could provide optimal care services for the puerpera. Jiangsu Province has 13 cities, and the maternity leave duration is 158 days for all of them. According to the list of hospitals published by the

government of Jiangsu province, how many tertiary, secondary and primary hospitals in each city could be determined. Based on these, with certain sampling methods this study determined the specific study settings.

Target population

The target population was adult mothers of full-term singletons living in Jiangsu Province in China. These mother-infant dyads had no serious long-term health problems.

Participants

The participants were mothers who gave birth in the postpartum ward of selected target hospitals using a multi-stage random sampling method, and resided in Jiangsu Province. These mothers who met the inclusion criteria were invited to participate in the study before discharge. Inclusion criteria of the mothers as the following:

1. Age ≥ 18 years old;
2. having a normal or cesarean section delivery;
3. having a healthy singleton baby at birth with gestational age for at least 37 weeks;
4. having no pre-existing health conditions and special dietary requirements;
5. spouse, mother, and mother-in-law still alive;
6. being able to communicate, read and write in Chinese;
7. having a mobile phone for being contacted during data collection.

The exclusion criterion of participants is as following:

1. having diseases (such as COVID-19, hepatitis, HIV, infectious tuberculosis, severe cracked nipples, and mastitis with secretion of pus and others), taking medications (like central depressant) which might be harmful to the infant or illegal drugs during the process of studies, and BF is not allowed by their doctors;
2. having infants with medical complications such as anemia, being underweight and others which BF is not allowed by a doctor;
3. having mentally or emotionally incompetent to respond to the questions during the study.

Sample size

The sample size was calculated by the number of parameters. In the

hypothesized model, there were 17 paths, 9 variances and 9 covariances. The number of parameters was the sum of paths, variances and covariances. Therefore, the number of parameters in the hypothesized model was 35. It is recommended that 10 participants for each estimated parameter is appropriate in the model (Schreiber et al., 2006). Therefore, 350 participants ($35 \times 10 = 350$ participants) were needed if there was no attrition. Given the estimated 10% attrition rate (35 participants) for the follow-up interview, the final sample size of this study was 385 mothers.

Sampling method

The multi-stage random sampling was used to recruit participants. It contained 3 stages of sample selection. Sampling procedures as following:

1. First stage: lottery method was used to randomly select cities. Among the 13 cities in Jiangsu Province, each city was given a number which was put in a box. One number (one city) was drawn from this box randomly. At last, Xuzhou was selected as the target city.

2. Second stage: the hospital systems were divided into 3 tiers, including level I, II and III. Level I, level II and level III hospitals are similar to community hospitals, regional hospitals or district hospitals and tertiary referral hospitals in the western countries. There were 91 level I, 19 level II and 10 level III hospitals in Xuzhou. In this step with the same method as at stage 1 (lottery method), 1 level III, 1 level II and 1 level I hospital was chosen respectively from Xuzhou city.

3. Third stage: participants were recruited from the selected hospitals before their discharge. Mothers who met the inclusion were invited to participate in this study after being informed the research objectives, confidentiality, risks and benefit of this research and their right to withdraw from participation. Lottery method was still be used to randomly select the participants, and the mixed bed numbers of mothers who met the inclusion criteria and were volunteer to participate in this study, were put in the box. The recruitment continued until the sample size was reached.

Research instruments

Maternity leave and delivery mode were collected by demographic record form. EBF was collected as days of EBF. The other variables were collected by the self-report research instruments, including BF knowledge questionnaire, Breastfeeding

Attrition Prediction Tool, PIM Questionnaire, and the Infant Feeding Intention scale. More details as following:

1. **Demographic record form** was used to collect participants' personal data including maternity leave, delivery mode and other demographic information of mothers. Mothers were asked how many days mothers had on maternity leave, and whether they delivered the baby by vaginal or cesarean section.

2. **BF knowledge questionnaire** in Chinese version (Zhao, 2008) was used to measure BF knowledge. This questionnaire was developed by Zhao Min on the basis of domestic and foreign literature to measure the BF knowledge of mothers. It included 17 items, covering the BF benefits and skills. The responses were yes/no/unsure. Correct answer to each item scored 1 point and incorrect or unsure answer scored 0 point. The total score was 0-17 points. The higher the score, the more the mother knew about BF. The content validity index (CVI) of the questionnaire was .9 (He, 2018; Sun, 2016). In 2 studies, the Cronbach's alpha coefficient of this questionnaire was tested to be .74 (Zhao, 2008) and .86 (He, 2018) respectively.

3. **Breastfeeding Attrition Prediction Tool** in Chinese version (Zhu et al., 2017) was used to test mothers' belief variables toward BF. This tool was a self-report instrument originally developed by Janke in 1994 (Janke, 1994). This original version of BAPT had 3 subscales including attitudinal scale (positive BF statements, negative BF statements), subjective norm scale, and perceived control scale. This instrument was a 6-point Likert-scale (from strongly disagree to strongly agree) with 29 items in the attitudinal scale, 12 items in the subjective norm scale, and 10 items in the perceived control scale. In the original version, the Cronbach's alpha coefficients of the attitudinal scale, subjective norm scale, and perceived control scale were .81 .85, and .81 respectively. Its construct validity was evident in successfully factoring in the items with factor loading ranging from .31-.70. It was translated and revised into Chinese with 44 items (29 items in the attitudinal scale, 5 items in the subjective norm scale, and 10 items in the perceived control scale) and a 5-point response (strongly disagree, disagree, neutral, agree, strongly agree) through cultural adaptation (Zhu et al., 2017). Higher scores meant higher level of BF belief or more acceptance of BF. The Cronbach's alpha coefficient was .88 in this total scale. The Cronbach's alpha coefficients of the attitudinal scale, subjective norm scale, and perceived control scale

were .72, .83, and .86 respectively (Zhu et al., 2017).

4. **Perception of Insufficient Milk Questionnaire** in Chinese version (Wu & Wacharasin, 2022) was used to assess the PIM of the participants in the present study. This self-report questionnaire was developed by McCarter-Spaulding and Kearney (McCarter - Spaulding & Kearney, 2001). It has 1 global question about mothers' perception of milk supply (answered by yes or no), followed by an invitation for mothers to list reasons and indicators supporting their belief. With 11-level scale (ranging from 0=strongly disagree to 10=strongly agree), 5 subsequent questions were used to assess mothers perceived levels of breast milk deficiency. Higher scores of the subsequent questions indicated higher perception of adequate milk supply. The Cronbach's alpha coefficient was .70, which was enough for a 5-item (5 subsequent questions) scale (McCarter - Spaulding & Kearney, 2001). A Japanese study focused on the relationship between mothers' PIM and BF self- efficacy reported that the Cronbach alpha coefficient of the PIM Questionnaire in Japanese version was .81 (Otsuka et al., 2014). This questionnaire was translated into Chinese, and it was adapted as a 5-Likert questionnaire (ranging from 1=strongly disagree to 5=strongly agree) (Wu & Wacharasin, 2022). It was found that the Cronbach's alpha coefficient of the Chinese version was .94.

5. **The Infant Feeding Intention scale** in Chinese version (Wu et al., 2018) was used to check mothers' BF intention. There were 5 items in this instrument with Cronbach's alpha .90 (Nommsen-Rivers & Dewey, 2009). The response of each item was scored from 0 to 4. The mean value of items 1 and 2, summing with the score of item 3,4,5 was the total IFIS score. Higher score meant higher intention to fully breastfeed until 6 months. The construct and criterion validity of this scale was found good through significant associations between IFIS score and both intended and actual EBF duration ($P < .0001$) (Nommsen-Rivers & Dewey, 2009). This tool was translated into Chinese version by a researcher from Taiwan in 2018. The Cronbach's alpha of translated version was .77 and it also had good construct validity with goodness-of-fit index .997 (Wu et al., 2018).

6. **Exclusive Breastfeeding** (EBF) was measured with number of days for EBF. When the infants were 2 months (60 days), 4 months (120 days) and 6 months (180 days), mothers were asked that how many days do their babies only receive

breast milk, without any other liquids or solids except for oral rehydration solution, or drops/ syrups of vitamins, minerals or medicines through telephone interviews. To get accurate data, a daily record form for EBF was used in this study. All the participants were taught how to use the daily record form during the hospitalization and they needed to record whether their infants were exclusively breastfed or not every day. This study rewarded those who finished the daily record forms for EBF with money or gifts. According to the EBF data collected on 2 months (60 days), 4 months (120 days) and 6 months (180 days), the EBF was estimated by the total number of days for EBF during the first 6 months postpartum. If the number of days for EBF were 15 days more than 2, 3, 4, and 5 months, it was round up and count as a month.

Translation of PIM Questionnaire

After obtaining the translation permission from the developer of the PIM questionnaire, the questionnaire was translated into Chinese with a forward-backward translation process. The translation steps as following:

1. Forward translation. 2 professional translators (translator A and B) translated the PIM questionnaire into Chinese independently. Translator A was familiar with the terminology of health care and related research area, while translator B was familiar with colloquial language, medical slang, idioms and emotional words. In this study, translator A was a lecturer in nursing who had doctoral degree. Translator B was a lecture in English with master degree, coming from college of international exchange of Jiangsu vocational college of medicine. Through this step, translated version 1 (TL1) and translated version 2 (TL2) were formed.

2. Comparison of TL1, TL2 and the original version. A BF expert was invited to compare the 2 translated versions and the original version. Ambiguities and discrepancies were discussed and resolved together with translator A and B, deriving the preliminary initial translated version (PI-TL).

3. Blind back-translation (both translator C and translator D had no prior knowledge of original version of instrument). Translator C was knowledgeable about terminology related to health care and the content area of the instrument. Translator D was knowledgeable about the cultural and linguistic nuances. In this study, translator C was a nursing professor with master degree. Translator D was an English teacher

who graduated from the Chinese department and whose mother tongue was English. Then the version of back translation 1 (B-TL1) and version of back translation 2 were developed (B-TL2).

4. Comparison of B-TL1, B-TL2 and original version. 4 translators (A, B, C, and D), a senior obstetrician with doctoral degree and the researcher made up a multidisciplinary committee. The committee compared instruction, items, response format, sentence structure, meaning and relevance of B-TL1 and B-TL2 with the original questionnaire, and resolved ambiguities and discrepancies as well. According to the suggestions of the multidisciplinary committee, the researchers adjusted the content of PI-TL. Then pre-final version (P-FTL) was formed.

5. Pilot testing of P-FTL. A pilot testing of P-FTL was conducted among 10 Chinese mothers. The 10 mothers were selected from a target hospital with convenience sampling. The inclusion criterion of these women was the same as the participants of this study. Through face-to-face investigations, they were asked to evaluate instruction, items, and response format with answer “clear” and “unclear” before discharge. An expert panel, including 4 nurses, 1 nursing educator, and 1 obstetrician, also evaluated the clarity of the instruction, items and response format with answer “clear” and “unclear” through emails. The inclusion criteria of these experts were as follows: 1) familiar with gynecology and obstetrics field; 2) major in clinical nursing, nursing education, nursing administrators or clinicians; 3) senior title of professional. The instruction, items, or responses rated “unclear” by over 20% of mothers or experts needed to be revised by the translation committee based on the suggestions of both mothers and experts (Unoki et al., 2021).

6. Psychometric testing of P-FTL among Chinese mothers. It was appropriate to use at least 10 participants per item of the instrument for general psychometric approaches, including exploratory factor analysis (EFA) and 200 participants for confirmatory factor analysis (CFA) (Yang et al., 2021). In this study, the researcher used 120 participants for general psychometric approaches and 228 participants for CFA. Content equivalence (content-related validity) was evaluated by the 6 experts who participated in the pilot test. The experts were asked to assess content validity by evaluating each item of the PIM questionnaire with 4-level Likert scale: 1 = not relevant; 2 = unable to assess relevance; 3 = relevant but needs minor alteration and 4

= very relevant and succinct. The content validity was calculated with these scores. The translation procedure was showed in Figure 2.

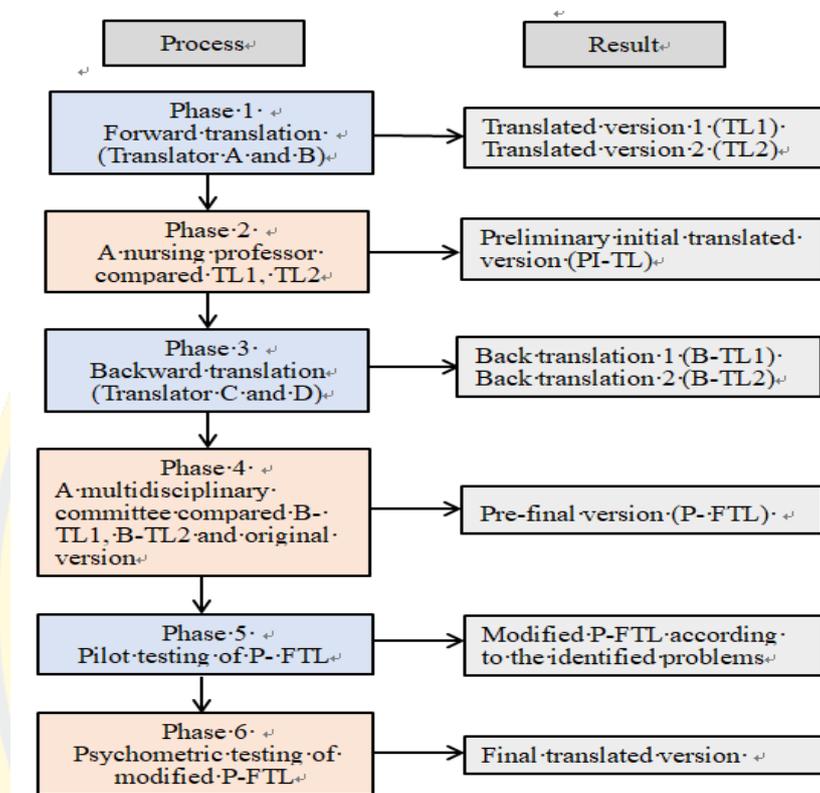


Figure 2 Translation procedure of the PIM questionnaire

Psychometric property of instruments

Content validity with Item-CVI $\geq .78$ and Scale-CVI $\geq .90$ was acceptable. Goodness of fit statistics criteria for CFA were GFI $> .90$, AGFI $> .90$, CFI $> .90$, NFI $> .90$, RMR $< .50$, RMSEA value between $.05$ and $.08$ and Chi-Square/df ratio ≤ 2 . KMO $< .60$ and Bartlett's Test of Sphericity $> .05$ were unacceptable for EFA. Cronbach's alpha coefficient and Intraclass Correlation Coefficient were a measure of alpha reliability, and test-retest reliability respectively. Cronbach's alpha coefficient higher than $.70$ and Intraclass Correlation Coefficient more than $.75$ indicated acceptable reliability. Since the first item of the PIM questionnaire was a global question, and the developer of the PIM questionnaire only used item 2 to 6 to validate the original questionnaire (McCarter - Spaulding & Kearney, 2001). This study also

only used items 2 to 6 to assess the questionnaire's validity and reliability, except for the content validity.

Validity

The BF knowledge questionnaire, BF Attrition Prediction Tool and the Infant Feeding Intention scale had been validated in Chinese studies previously. Therefore, the validity of these 3 instruments was not assessed in this study. Item-level content validity, scale-level content validity and construct validity were used to assess the validity of translated PIM Questionnaire among 328 Chinese mothers, who had the same characteristics as the study participants. For construct validity of the PIM Questionnaire, a single factor explained 68.22% of the total variance with $KMO > .60$ ($KMO = .87$) and Bartlett test $< .05$. In the verification of the single-factor model, the indexes of CFA including GFI, AGFI, CFI, NFI, RMSEA and RMR were .98, .93, .99, .99, .07 and .02 respectively. According to the evaluation of 6 experts, its item-level content validity index ranged between .83 and 1.0, and the scale-level content validity index was .92. All these indices showed that both the content and construct validity of the PIM Questionnaire in Chinese version were good.

Reliability

The internal consistency reliability and test-retest reliability were used to test the reliability of the PIM Questionnaire (Chinese version) in the same 328 Chinese mothers. It was found that the reliability of the PIM Questionnaire was good. Its Cronbach alpha coefficient for the internal consistency was .94, and the intraclass correlation coefficient for test-retest reliability ranged between .87 and .97. This study also tested the reliability of the BF knowledge questionnaire, BF Attrition Prediction Tool and the Infant Feeding Intention scale. A pilot study was conducted among 30 mothers who had the same characteristics as the study participants. Results from the pilot study showed that the Cronbach alpha coefficient of the BF knowledge questionnaire, BF Attrition Prediction Tool and the Infant Feeding Intention scale was .88, .90 and .83 respectively. The reliability of all these instruments was good.

Protection of human subjects

Before data collection, research proposal was approved by the Institutional Review Board, Burapha University and Jiangsu Vocational College of Medicine. The

researcher introduced the study to the leaderships of the selected hospitals in Jiangsu Province for the permission of data collection. All participants were informed clearly about purposes of the study, the data collecting procedure and time spent for the study. There was minimal risk to the participant as this was not an intervention study. Consent was voluntary and participants were aware of their right to withdraw from the study at anytime. All participants were reminded that withdrawal from the study might take place at anytime and in no way affected the care of them. The survey was conducted anonymously and the data was used for research purposes only. After giving the above information, all the participants were asked to sign the informed consent form. No one had access to the information acquired from this study except the researcher. Code numbers were used in each questionnaire of the participants for confidentiality purpose.

Data collection

The data collection in this study was performed as following steps:

1. After IRB approval, the researcher contacted the directors of the selected hospitals in Jiangsu Province, informing the objectives, significance, and methods of this study.
2. After getting the permission of those selected hospitals, the researcher contacted with the mothers who met the inclusion and exclusion criteria.
3. The researcher provided the brief information related to self-introduction and human protection, purpose and method of this study, their right to withdraw from the study and then asked them to sign consent form according to their will to participate in this study. The researcher obtained permission from these participants.
4. The questionnaires were filled out by the participants before discharge. 20-30 minutes were needed for the participants to answer the whole questionnaires. Questionnaires and demographic record form were filled out by the participants through face-to-face survey. All the participants were taught how to use the EBF record form during the hospitalization and they needed to record whether their infants were exclusively breastfed or not every day. With the EBF record form, EBF sustainability was estimated when the infants were 2 months (60 days) and 4 months (120 days) and 6 months (180days) via telephone interviews. Mothers were asked that

how many days did they exclusively breastfeed their babies according to their records. The researcher continued collecting data until the required sample size was met. Either a mother or a baby was admitted at a hospital during the first 6 months of life for any health problems and could not follow EBF or mothers could not be reached through mobile phone after 2 weeks of trying during data collection were regarded as discontinued data and excluded from the final data of participants.

5. Completed questionnaires were checked and immediately kept in a secure box accessible only by the researcher.

6. During the interview before participants discharge from the hospital, this study followed the guidelines to prevent COVID-19: 1) Participants and the researcher were required to wear masks; 2) Participants and the researcher needed to disinfect their hands with quick hand disinfectant or wash their hands with soap solution before and after the interview; 3) Participants and the researcher needed to maintain a safe distance of at least 1 meter; 4) The pens and other objects touched by participants were cleaned and disinfected before being handed over to the next participant; 5) The completed questionnaires and unfilled questionnaires were stored separately; 6) The place for data storage was disinfected daily by ultraviolet light.

Data analyses

A statistic software program was used to perform data analysis. Statistical significance level was set at a level of .05.

1. A statistical software program was used to describe the characteristics of participants and the study variables, and perform data management and analysis.

2. With AMOS program, SEM was used to test the pre-assumed causal relationships in the model, including both direct and indirect effects of the independent variables on 6-month EBF. The assumptions of AMOS software application were as follows: 1) sample size should be appropriate; 2) endogenous variables should be continuously and normally distributed.

CHAPTER 4

RESULTS

This chapter presented the results of this research. There were characteristics of participants, descriptive statistics of the study variables, assumption testing for SEM analysis, correlation among study variables and hypothesized model testing.

Characteristics of participants

A total of 385 mothers from Pizhou people's Hospital (n=180), Xinan hospital (n=180), Fuyou hospital (n=25) were randomly selected to participate this study. Among these mothers, 374 mothers completed the questionnaires and the response rate was 97.14%. A total of 11 mothers dropped out this study across the three follow-ups. In the first follow-up, 4 mothers dropped out: 2 due to incorrect phone numbers, making it impossible to establish contact; 1 mother had a baby intolerant to lactose, and another had a baby with low weight. During the second follow-up, 3 mothers dropped out: 1 did not answer the phone, 1 mother contacted COVID-19, and another underwent an appendectomy. In the third follow-up, 4 mothers dropped out: 2 did not answer the phone, 1 went to the United Kingdom for studies, and 1 mother contacted COVID-19.

The average age of participants was 30.29 years (SD=4.53). Most of them were in 21 to 30 years age group (52.41%). The gestational age ranged from 37 to 41 weeks. The height of participants ranged from 143 to 174 cm with an average height 161.57 cm. Most of the participants had 41-100kg of pre-pregnancy weight, while 33.69% of them had 71-80kg of current weight. Most of participants lived in Urban (69.52%) and 96.26% were married. Most of participants had household income of more than 10000 CNY per month (58.82%), following by 6000-10000 CNY per month (27.81%). As to their education, 75.94% of them completed junior college or below. 47.33% of participants have more than 1 child (43.85% had 2 children and 3.48% had at least 3). 39.30% of them had BF experience. 51.07% of participants were planned pregnancy and 47.59% of the participants received no BF education. 61.23% of the participants experienced cesarean section. In terms of occupation, 66.84% of them chose to return to work and 48.93% had maternity leave less than 180 days. These

employed mothers had a mean of 153.57 days maternity leave (ranged from 30-180 days), and 44.65% of them had paid maternity leave. Except for mothers, the primary caregivers of babies were grandparents (93.85%). As a traditional postpartum practice, almost all the participants chose “sitting the month”, and all of them thought “sitting the month” was helpful to maintain EBF. Demographic characteristics of the 374 participants are showed in table 1.

Table 1 Demographic characteristics of the participants (n=374)

Characteristics	n	%
Age (years) (Range= 19-47 years, Mean=30.29 , SD=4.53)		
≤20	2	0.53
21-30	196	52.41
31-40	168	44.92
≥41	8	2.14
Gestational age (weeks) (Range= 37-41 weeks, Mean=38.74 , SD=0.94)		
37-38	35	9.36
38 ⁺¹ -39	112	29.95
39 ⁺¹ -40	154	41.18
>40	73	19.52
Height (CM) (Range=143-174 cm, Mean= 161.57 , SD=4.51)		
≤160	157	41.98
161-170	207	55.35
≥171	10	2.67
Pre-pregnancy weight (kg) (Range= 41-100 kg, Mean= 60.91 , SD=9.71)		
41-50	56	14.97
51-60	150	40.11
61-70	122	32.62
≥70	46	12.30
Current weight (kg) (Range=48-110 kg, Mean=69.84 , SD=10.48)		
48-60	73	19.52
61-70	125	33.42
71-80	126	33.69
≥80	50	13.37
Residence		
Urban	260	69.52
Rural	114	30.48
Marital status		
Married	360	96.26
Single or divorced	14	3.74

Table 1 (Continued)

Characteristics	<i>n</i>	%
Monthly household income (CNY)		
<3000	3	0.8
3000-6000	47	12.57
6000-10000	104	27.81
>10000	220	58.82
Education		
Junior college or below	284	75.94
Bachelor degree or above	90	24.06
Number of children (Range= 1-3, Mean= 1.508 , SD=0.57)		
1	197	52.67
2	164	43.85
≥3	13	3.48
Having breastfeeding experience		
Yes	147	39.30
No	227	60.70
Planned pregnancy		
Yes	191	51.07
No	183	48.93
Having received breastfeeding education		
Yes	195	52.14
No	179	47.86
Forms of breastfeeding education (answer > 1 choice)		
Receive no breastfeeding education	179	47.86
Pregnant mothers' class	31	8.29
Hospital staff	99	26.47
Mass media	112	29.95
Brochures	115	30.75
Others	19	5.08
Delivery mode		
Vaginal delivery	145	38.77
Cesarean section	229	61.23
Post-natal work Plan		
Return to work	250	66.84
Temporarily out of work	124	33.16
Maternity leave (days) (Range= 30-180 days, Mean=153.57, SD=39.04)		
<90	25	6.68
90-120	45	12.03
121-150	38	10.16
151-180	266	71.12
Paid maternity leave		
Yes	167	44.65
No	207	55.35

Table 1 (Continued)

Characteristics	<i>n</i>	%
Primary caregiver, except for mothers (answer > 1 choice)		
Grandparents	351	93.85
Spouse/partner	194	51.87
Baby sitter	19	5.08
Others	15	4.01
“Sitting the Month”		
Yes	374	100
No	0	0
“Sitting the Month” is helpful to maintain EBF		
Yes	374	100
No	0	0

Descriptive statistics of the study variables

The independent variables in this study were BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, and BF intention. The dependent variable was EBF. Descriptive statistics of all the independent variables were detailed as table 2 and the dependent variable (EBF) were detailed as table 2.

Table 2 Descriptive statistics of the predictive variables (n=374)

Variable	Possible range	Actual Range	<i>M</i>	<i>SD</i>	<i>SK</i>	<i>KU</i>
Breastfeeding Knowledge	0-17	1~17	11.01	3.25	-.22	-.54
Skill					-.60	.66
Benefits					-.07	-.83
Maternity leave	0-180	30-180	153.57	39.04	-1.49	1.17
Delivery mode					-.43	-1.83
Breastfeeding attitude	29-145	59~143	99.78	13.67	.13	.18
Negative sentiment					-.01	-.35
Positive sentiment					-.79	1.44
Subjective norm	5-25	11~25	21.06	3.89	-.63	.14
SN1					-.32	-1.10
SN2					-.81	-.87
SN3					-.87	-.74
SN4					-1.34	.42
SN5					-.68	-.15

Table 2 (Continued)

Variable	Possible range	Actual Range	<i>M</i>	<i>SD</i>	<i>SK</i>	<i>KU</i>
Perceived Control	10-50	11~50	34.90	9.57	-.10	-.97
PC1					.11	-1.44
PC2					-1.35	.98
PC3					-.58	-.75
PC4					-1.21	.41
PC5					-1.04	.08
PC6					-.35	-1.21
PC7					.23	-1.31
PC8					.39	-1.30
PC9					-.37	-.98
PC10					-.04	-1.04
Perception of insufficient milk	5-25	6~25	16.72	5.03	.02	-.96
PIM1					-.25	-1.15
PIM2					-.07	-1.14
PIM3					-.57	-.59
PIM4					-.78	-.31
PIM5					.30	-1.43
Breastfeeding intention	0-16	0~16	10.23	4.22	-.24	-.85
BI1					-1.01	1.44
BI2					-.32	-.97
BI3					-.43	-.84
BI4					.07	-1.09

Breastfeeding knowledge, maternity leave, and delivery mode: the total score for BF knowledge ranged from 1 to 17 with a mean of 11.01 (SD=3.25). The results showed relatively moderate level of BF knowledge. On individual items, 75.13%, 61.23%, 62.30% and 46.79% of participants know little about the role of BF in preventing babies from childhood obesity, rickets, diarrhea, and intellectual development, respectively. 81.82 % of participants thought that EBF should be maintained for 6 months postpartum. More than half of participants (57.49%) did not know that urine output was a reliable indicator of whether babies having get enough breast milk. The descriptive statistics of maternity leave and delivery mode had been showed in the part of characteristics of participants.

Breastfeeding attitude, subjective norm, and perceived control: as belief

variables, BF attitude, subjective norm and perceived control ranged from 59 to 143, with mean score of 99.78 (SD=13.67); from 11 to 25 with mean score of 21.06 (SD=3.89); and from 11 to 50, with mean score of 34.90 (SD=9.57) respectively. For BF attitude, the results showed that there were 51.60% and 47.33% of participants believed that BF made going to work hard and breasts sag. In the subjective norm scale, around 44.65% of participants chose “strongly disagree”, “disagree” or “neutral” in listening to the opinions of important person. For perceived behavior control, 62.57% of participants did not think they have necessary skills to breastfeed. Most of participants (67.38%) thought that they have little control over BF. Breastfeeding was not easy for 70.05% of participants.

Perception of insufficient milk: results revealed that the mean score was just a little higher than the half of possible range. The score was between 6 and 25, with mean score 16.72 (SD=5.03). Before discharged, most of mothers (63.90 %) believed that their breast milk supply was insufficient to meet their infants’ needs. The lowest score was for item 6 “My breasts seem to have enough milk” with a mean score of 2.73 (SD=1.55), being followed by item 3 “My baby generally appears satisfied after feedings” and item 2 “My breast milk looks like it is nutritious enough to nourish my baby” with a mean score of 3.19 (SD=1.31) and a mean score of 3.20 (SD=1.40) respectively.

Breastfeeding intention: average BF intention score was 10.23 (SD=4.22). The results showed that there were 45.45% of participants planned to breastfeed infants without any formula or other milk at 1 month postpartum, and only 49.20% and 34.22% participants at 3 months and 6 months, respectively.

Table 3 Descriptive statistics of the outcome variable (n=374)

Variable	Rate (%)	Possible Range	Actual Range	<i>M</i>	<i>SD</i>	<i>SK</i>	<i>KU</i>
EBF duration	/	0-180	0-179	69.29	72.06	.26	-1.7
2-month EBF	43.58	60-75	64-73	69.13	3.09	-.85	-.28
3-month EBF	41.44	76-105	78-105	90.79	8.46	.16	-1.28
4-month EBF	35.03	106-135	106-135	122.07	8.83	-.07	-1.27
5-month EBF	22.99	136-165	136-165	153.77	8.39	-.62	-.86
6-month EBF	12.30	166-180	166-179	173.04	3.11	-.55	.36

Exclusive breastfeeding: The total number of days for EBF in the first 6 months postpartum ranged from 0 to 179 days, with a mean of 69.29 (SD=72.06) days. There were 43.58% of the participants maintained EBF for 2 months with a mean of 69.13 (SD=3.09), and 41.44% for 3 months with a mean of 90.79 (SD=8.46). The rate of the participants who maintained EBF for 4 months was 35.03% (Mean=122.07, SD=8.83), for 5 months was 22.99% (Mean=153.77, SD=8.39), and for 6 months was 12.30% (Mean=173.04, SD=3.11). Nearly half of the participants (47.33%) completely chose mixed feeding or formula feeding in the first 6 months. There were 174 participants initiated EBF during the first 2 months postpartum. Among these 174 participants, all of them maintained EBF until 2 months postpartum, 90.23% until 4 months, and only 25.29% until 6 months.

Assumption testing for SEM testing

In order to derive accurate results, the assumption testing of SEM analysis needed to be performed (Hair et al., 2010). The major assumptions associated with SEM analysis included outliers, normality, linearity, and multicollinearity (Ganeshkumar & Mathan Mohan, 2014; Phakiti, 2018).

First, univariate outliers and multivariate outliers were used to detect data outlier. Univariate outliers are cases which fall outside the range of z-scores. Any z-score greater than +3.29 or less than -3.29 was classified as an outlier case (Mowbray

et al., 2019). If there were univariate outliers, they should be deleted from data. Multivariate outliers, distribution of normality, linearity, and multicollinearity should be tested with the remained cases. Based on the chi-square distribution, Mahalanobis' distances could be used to examine multivariate outliers. If a probability value of chi-square distribution less than .001, the distance was considered to be an outlier (Prykhodko et al., 2018; Tabachnick et al., 2007). The results revealed that there were no univariate outliers. So, the multivariate outliers were not tested in this study.

Second, multivariate normality was tested by statistical tests and graphical approaches. A useful test for examining multivariate normality was a combination of Skewness and Kurtosis. Data with Skewness (SK) between -2 to +2 and Kurtosis (KU) between -7 to +7 can be considered to be normal (Hair et al., 2010). The SK and KU values of each variable indicated that all the variables in the present study were normally distributed, which could be seen in table 2 and 3.

After examining multivariate normality, Pearson correlation coefficient was used to test linearity assumption (Hair et al., 2010; Schober et al., 2018). A zero-correlation coefficient indicates no relationship between 2 variables. The results showed that there was a non-zero correlation coefficient in the pairwise relationship of the study variables. At last, multicollinearity assumption was evaluated. Multicollinearity occurs when 2 or more independent variables were too highly correlated with correlation coefficient higher than .90, which could effect on interpretability of the results (Senthilnathan, 2019). Another 2 ways to detect Multicollinearity were variance inflation factor (VIF) and tolerance value. If VIF value greater than 4 and tolerance value less than .20, it signified there were Multicollinearity among predictors (Duxbury, 2021; Senaviratna & Cooray, 2019). The results presented that correlation coefficients ranged from -0.12 to 0.62, no more than .90. All the tolerance values were greater than .20 and VIF values less than .40. This signified that no multicollinearity was found among the study variables.

Correlation among study variables

From the correlation matrix of study variables showed in table 4, it could be seen that there were relationships among study variables. BF intention had a significantly positive relationship with perceived control, BF knowledge, maternity

leave, BF attitude, subjective norm, and PIM ($r = .63, r = .36, r = .22, r = .43, r = .43, r = .30, p < .001$, respectively). Perceived control had a significantly positive relationship with BF attitude, subjective norm, and BF knowledge ($r = .51, r = .51, r = .42, p < .001$, respectively). Followed by EBF had a significantly positive relationship with BF intention ($r = .50, p < .001$) and it also had significantly positive relationships with perceived control, BF knowledge, maternity leave, BF attitude, subjective norm, and PIM ($r = .45, p < .001, r = .26, p < .001, r = .17, p < .05, r = .36, p < .001, r = .30, p < .001, r = .19, p < .01$, respectively). Breastfeeding attitude had a significantly positive relationship with BF knowledge and maternity leave ($r = .44, p < .001, r = .21, p < .001$). Subjective norm had a significantly positive relationship with BF knowledge, BF attitude and maternity leave ($r = .34, p < .001, r = .34, p < .001, r = .16, p < .05$). The relationship between PIM and perceived control was also significant ($r = .22, p < .001$).

Table 4 Correlation matrix of the study variables (n=374)

Variable	1	2	3	4	5	6	7	8	9
1. Breastfeeding knowledge	1								
2. Maternity leave	.14	1							
3. Delivery mode	-.11	.07	1						
4. Breastfeeding attitude	.44***	.21**	-.03	1					
5. Subjective norm	.34***	.16*	-.08	.34***	1				
6. Perceived control	.42***	.10	-.12	.51***	.51***	1			
7. Perception of insufficient milk	.14	-.01	-.05	.06	-.02	.22***	1		
8. Breastfeeding intention	.36***	.22***	-.02	.43***	.43***	.63***	.30***	1	
9. Exclusive breastfeeding	.26***	.17*	-.10	.36***	.30***	.45***	.19**	.50***	1

* $P < .05$, ** $P < .01$, *** $P < .001$

Model testing and results

Measurement model assessment

Before proceeding to the structural model assessment, the assessment of measurement model should be conducted to ensure the quality of construct. Confirmatory Factor Analysis (CFA) can be used to validate measurement models of latent constructs. In CFA, standardized CFA loadings, Average Variance Extracted (AVE) and Composite Reliability (CR) are necessary criteria to assess the measurement quality. Standardized CFA loadings can be used to assess whether the observed variables converge sufficiently with latent variables. Average Variance Extracted is a measure of the amount of variance which the latent variables extract from the observed variables. The CR measures the internal consistency of indicator variables loading on the latent variables. The value of Standardized CFA loading at least .5, AVE at least .36 and CR at least .7 were acceptable (Cheung et al., 2023; Zeng et al., 2021). Except for observed variables (maternity leave, delivery mode) and latent variables (BF knowledge, BF attitude) with only 2 observed variables in the model, Standardized CFA loadings, AVE and CR of other variables were presented in table 5.

Table 5 Standardized CFA loadings, AVE, and CR

Observed variables		Latent variables	S.E.	Z	P	std	CR	AVE
SN1	<---	Subjective_norm				0.72	0.90	0.64
SN2	<---	Subjective_norm	0.06	17.82	***	0.94		
SN3	<---	Subjective_norm	0.07	17.30	***	0.90		
SN4	<---	Subjective_norm	0.05	13.79	***	0.72		
SN5	<---	Subjective_norm	0.08	12.90	***	0.68		
PC1	<---	Perceived_control				0.66	0.91	0.51
PC2	<---	Perceived_control	0.06	11.94	***	0.69		
PC3	<---	Perceived_control	0.07	11.57	***	0.67		
PC4	<---	Perceived_control	0.06	13.24	***	0.78		
PC5	<---	Perceived_control	0.06	13.24	***	0.78		
PC6	<---	Perceived_control	0.08	12.19	***	0.71		
PC7	<---	Perceived_control	0.08	11.37	***	0.65		
PC8	<---	Perceived_control	0.09	10.91	***	0.63		
PC9	<---	Perceived_control	0.07	13.24	***	0.78		
PC10	<---	Perceived control	0.07	12.86	***	0.75		

Table 5 (Continued)

Observed variables		Latent variables	S.E.	Z	P	std	CR	AVE
PIM1	<---	PIM				0.65	0.83	0.50
PIM2	<---	PIM	0.10	12.19	***	0.81		
PIM3	<---	PIM	0.08	11.39	***	0.73		
PIM4	<---	PIM	0.07	8.72	***	0.52		
PIM5	<---	PIM	0.11	11.78	***	0.76		
BI1	<---	BF_intention				0.65	0.91	0.71
BI2	<---	BF_intention	0.17	14.90	***	0.92		
BI3	<---	BF_intention	0.17	15.25	***	0.96		
BI4	<---	BF_intention	0.17	13.68	***	0.82		

Note: SN= Subjective norm; PC=Perceived control; PIM= Perception of insufficient milk; BI=Breastfeeding intention

Model fit indices

Structural equation modeling is a statistical technique which can be used to measure and analyze multivariate causal relationships among theoretical constructs. Although there are many fit indices can be applied in causal model testing, this study chose 5 widely used model fit indices. These 5 model fit indices were model chi-square statistic (χ^2), root mean square error of approximation (RMSEA), the goodness of fit index (GFI), comparative fit index (CFI) and norm-fit indices (NFI).

Chi-square test can be used to test the null hypothesis that the sample data equals to the expected model. It is a test of statistical significance. A significant chi-square test ($p < .05$) indicates the null hypothesis is rejected and the model fit is not good (Hair et al., 2010). In addition, the accepted minimum chi-square value (CMIN) / degree (df) should be no more than 2 (Aloba et al., 2016; Hair et al., 2010; Nugraha & SETYANTO, 2018). But some researchers supported that the CMIN/ df between 2-5 is acceptable (Danish et al., 2015; Liu et al., 2019). A value of RMSEA less than .05 represents a good fit, ranged from .05 to .08 indicates a fair fit, ranged from .08 to .10 represents a marginal fit, and exceeded .1 means a poor fit (Kim et al., 2016). The GFI greater than .90 indicates an excellent fit (Kim & Lee, 2019). The value of CFI greater than .90 indicates an acceptable fit, and NFI value more than .90 means a satisfactory fit (Ilker, 2013).

The analysis of moment structures (AMOS) program was used to measure

model fit. Through assessing the relationship among BF knowledge, maternity leave, delivery mode, belief variables (attitude toward the behavior, subjective norm and perceived control), BF intention and EBF, AMOS program could be used to measure how well does the sample data correspond to the hypothesized model. The results about fit indices are showed in table 6.

Table 6 Statistics of model fit index of the hypothesized and the modified models (n=374)

Model fit criterion	Acceptable score	Hypothesized model	Modified model
CMIN	$P > .05$	1511.89 $P < .001$ ($df=417$)	951.14 $P < .05$ ($df=656$)
CMIN/df	<2.0	3.63	1.45
RMSEA	.05-.08	.08	.06
GFI	.90-1.00	.77	.91
CFI	.90-1.00	.85	.91
NFI	.90-1.00	.80	.91

The hypothesized model

The results of hypothesized model testing showed that the score of CMIN was 1511.89 ($p < .001$, $df=417$), CMIN/df was 3.63, RMSEA was .08, GFI, CFI and NFI was .77, .85 and .80 respectively. The results can be seen in Table 6. These scores indicated that the hypothesized model did not fit the sample data. Therefore, the hypothesized model needed to be modified to improve model fit. The proportion of total variance explained by the hypothesized model was 26.0%, which was showed in Table 8.

The parameter estimates were used to test the path diagram of the hypothesized model, and they were presented in table 7 and figure 3. In the hypothesized model, the exogenous variables were BF knowledge, maternity leave, and delivery mode. The mediators were BF attitude, subjective norm, perceived control, PIM, and BF intention. The endogenous variables were EBF.

The relationships between exogenous and endogenous variables as follows: There were significant parameter estimates from BF knowledge to BF attitude and perceived control in a positive direction ($\beta = .95$, $p < .001$, $\beta = .79$, $p < .001$, respectively). There was also a significant parameter from maternity leave to subjective norm in a

positive direction ($\beta = .14, p < .05$). However, the parameter estimates from BF knowledge to EBF ($\beta = .10$), from maternity leave to BF attitude, perceived control and EBF ($\beta = .19, \beta = -.02, \beta = .08$, respectively), from delivery mode to PIM and EBF ($\beta = -.05, \beta = .07$, respectively) were not significant ($p > .05$).

The relationship between mediators and exogenous variables: The path from subjective norm to BF intention was significant in a positive direction ($\beta = .09, p < .05$). The path from perceived control to BF intention was also significant in a positive direction ($\beta = .61, p < .001$). There was also a significant estimate from BF intention to EBF ($\beta = .37, p < .001$). However, the parameter estimates from BF attitude to BF intention and EBF ($\beta = .02, p > .05, \beta = -.03, p > .05$, respectively), from subjective norm to EBF ($\beta = .05, p > .05$), from perceived control to EBF ($\beta = .18, p > .05$), from PIM to EBF ($\beta = .06, p > .05$) were not significant.

Table 7 Parameter estimates of the path diagram in the hypothesized model (n = 374)

Path	Estimate	SE	C.R.	p-value
Breastfeeding knowledge				
Breastfeeding attitude	5.90	1.05	5.60	<0.001
Perceived control	0.98	0.13	7.59	<0.001
EBF	9.72	9.12	1.07	0.29
Maternity leave				
Breastfeeding attitude	0.01	0.01	1.08	0.28
Subjective norm	0.00	0.00	2.54	<.05
Perceived control	0.00	0.00	-0.40	0.69
EBF	0.15	0.09	1.70	0.09
Delivery mode				
Perception of insufficient milk	-0.11	0.14	-0.83	0.41
EBF	-10.39	6.58	-1.58	0.11
Breastfeeding attitude				
Breastfeeding intention	0.01	0.01	0.83	0.41
EBF	-1.02	1.17	-0.88	0.38
Subjective norm				
Breastfeeding intention	0.06	0.03	1.99	<.05
EBF	4.58	4.58	1.00	0.32
Perceived control				
Breastfeeding intention	0.30	0.04	7.92	<0.001
EBF	12.63	7.43	1.70	0.09
Perception of insufficient milk				
EBF	3.49	2.89	1.21	0.23
Breastfeeding intention				
EBF	46.15	9.95	4.64	<0.001

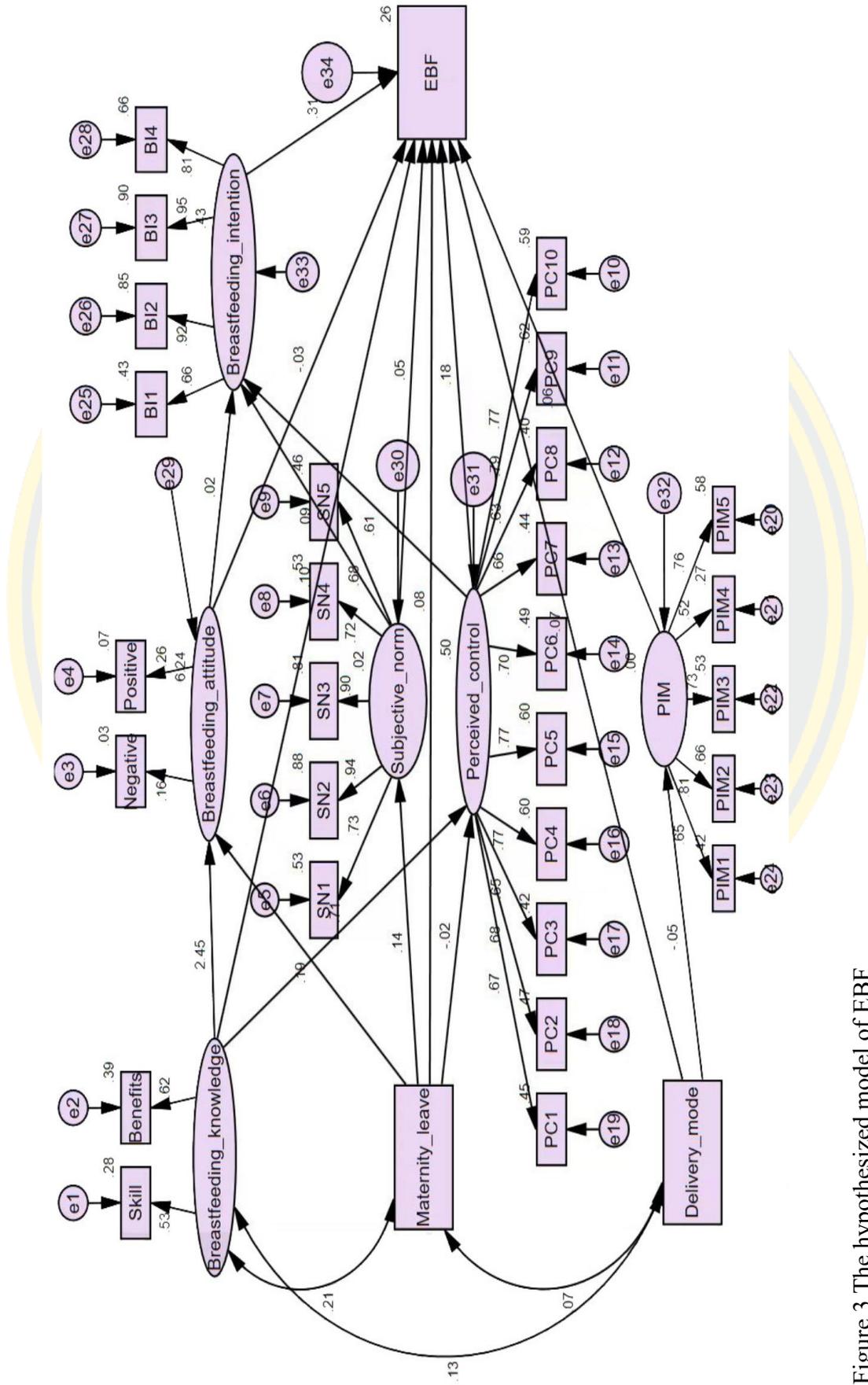


Figure 3 The hypothesized model of EBF

Table 8 Direct, indirect, and total effects of independent variables on the dependent variable in the hypothesized model

Independent variables	BA			SN			PC			PIM			BI			EBF		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Breastfeeding knowledge	.95***	-	.95***	-	-	-	.79***	-	.79***	-	-	-	-	.50***	.50***	.10	.30***	.40***
Maternity leave	.19	-	.19	.14*	-	-.02	-.02	-	-.02	-	-	-	.00	.00	.08	.01	.09	.09
Delivery mode	-	-	-	-	-	-	-	-	-.05	-	-.05	-	-	-	-.07	-	-.07	-.07
BA	-	-	-	-	-	-	-	-	-	-	.02	.02	-	-	-.03	.01	.02	.02
SN	-	-	-	-	-	-	-	-	-	.09*	.09*	-	.09*	-	.05	.03	.08*	.08*
PC	-	-	-	-	-	-	-	-	-	.61***	.61***	-	.61***	-	.18	.23	.41	.41
PIM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.06	-	.06	.06
BI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.37***	-	.37***	.37***
Structure equation fit	R ² =.24			R ² =.02			R ² =.50			R ² =.002			R ² =.43			R ² =.26		

BA= Breastfeeding attitude; SN= Subjective norm; PC=Perceived control; PIM= Perception of insufficient milk; BI=Breastfeeding intention; EBF=Exclusive breastfeeding

The modified model

Since the sample data did not support the hypothesized model, the hypothesized model was revised to improve the model fit. The modification indices in the output of SEM can provide suggestions about which parameters should be added (McCoach, 2003). It is also recommended to check whether the paths are all statistically significant. If a path is estimated as no significance, the related parameters in the hypothesized model should be deleted to improve the model fit (McCoach, 2003). One parameter can be deleted at a time until the rest of the parameters achieve a good model fit. The parameter estimate with the highest probability value was the first one to be deleted. After removing this parameter estimate, the model needs to be tested again. Then repeat the above step until the model achieves the model-fit criteria. The modification indices suggested that the paths from BF knowledge to subjective norm and PIM, from BF attitude to subjective norm, and from PIM to BF intention should be added. While the paths from BF knowledge to EBF, from maternity leave to BF attitude, subjective norm and perceived control, from delivery mode to PIM and EBF, from BF attitude to BF intention and EBF, from subjective norm to EBF and PIM to EBF should be deleted.

After adjusting some parameters in the hypothesized model, the results of the modified model showed that CMIN was 951.14 ($p < .05$, $df = 656$), CMIN/ df was 1.45, RMSEA was .06, GFI, CFI and NFI was .91, .91 and .91 respectively. With these model fit indexes, it can be seen that the modified model fitted the sample data well. Except for the CMIN, other values of fit indices were within the range of acceptable score. The results of chi-square test showed that the CMIN was less than .05. The sample size can influence the chi-square value. A sample size more than 200 can make chi-square value tend to be less than .05, indicating a rejection of the null hypothesis (Schumacker & Lomax, 2004).

The parameter estimates were also used to test the path diagram of the modified model, and they were presented in table 9 and figure 4. In the modified model, the exogenous variables were BF knowledge and maternity leave. The mediators were BF attitude, subjective norm, perceived control, PIM, and BF intention. The endogenous variables were EBF.

The relationships between exogenous and endogenous variables as follows: There were significant parameter estimates from BF knowledge to BF attitude, perceived control, subjective norm and PIM in a positive direction ($\beta=.94, p<.001, \beta=.78, p<.001, \beta=.43, p<.001, \beta=.18, p<.01$, respectively). There were also significant parameters from maternity leave to EBF in a positive direction ($\beta=.07, p<.05$). Moreover, there was a correlation between BF knowledge and maternity leave ($\gamma=.22$).

The relationships between mediators and endogenous variables as follows: the parameter estimate from BF intention to EBF was significant ($\beta=.29, p<.001$). There was also a significant estimate from perceived control to EBF ($\beta=.29, p<.001$). The parameter estimates among mediators as follows: the parameter estimates from BF attitude to subjective norm, from subjective norm to BF intention, from perceived control to BF intention and from PIM to BF intention were also significant ($\beta=.05, p<.05, \beta=.10, p<.05, \beta=.61, p<.001, \beta=.20, p<.001$, respectively).

In addition, BF knowledge had a positive direct effect from BF knowledge to BF attitude, perceived control, subjective norm and PIM in a positive direction ($\beta=.94, p<.001, \beta=.78, p<.001, \beta=.43, p<.001, \beta=.18, p<.01$, respectively), indirect effect ($\beta=.25, p<.001$), and total effect ($\beta=.25, p<.001$) on EBF. The parameter estimates of direct, indirect, and total effects can be seen in table 10.

The modified model explained 30.0% ($R^2=.30$) variance in EBF respectively. In the modified model, BF knowledge in combination with maternity leave accounted for 26.0% of the variance of BF attitude, accounted for 31.0% of the variance of subjective norm, accounted for 61.0% of the variance of perceived control, accounted for 3.0% of the variance of PIM, accounted for 51.0% of the variance of BF intention, and accounted for 30.0% of the variance of EBF. Among all these predictive factors, perceived control had the strongest effect on EBF.

Table 9 Parameter estimates of the path diagram in the modified model (n = 374)

Path	Estimate	SE	C.R.	p-value
Breastfeeding knowledge				
Breastfeeding attitude	6.28	1.15	5.47	<0.001
Perceived control	1.20	0.15	7.97	<0.001
Subjective norm	0.45	0.09	4.86	<0.001
Perception of insufficient milk	0.31	0.12	2.69	<0.01
Maternity leave				
EBF	0.14	0.04	3.21	<0.001
Breastfeeding attitude				
Subjective norm	0.02	0.01	2.03	<0.05
Subjective norm				
Breastfeeding intention	0.07	0.03	2.03	<0.05
Perceived control				
Breastfeeding intention	0.28	0.03	9.41	<0.001
EBF	19.73	4.74	4.16	<0.001
Perception of insufficient milk				
Breastfeeding intention	0.08	0.02	4.37	<0.001
Breastfeeding intention				
EBF	43.74	10.08	4.34	<0.001

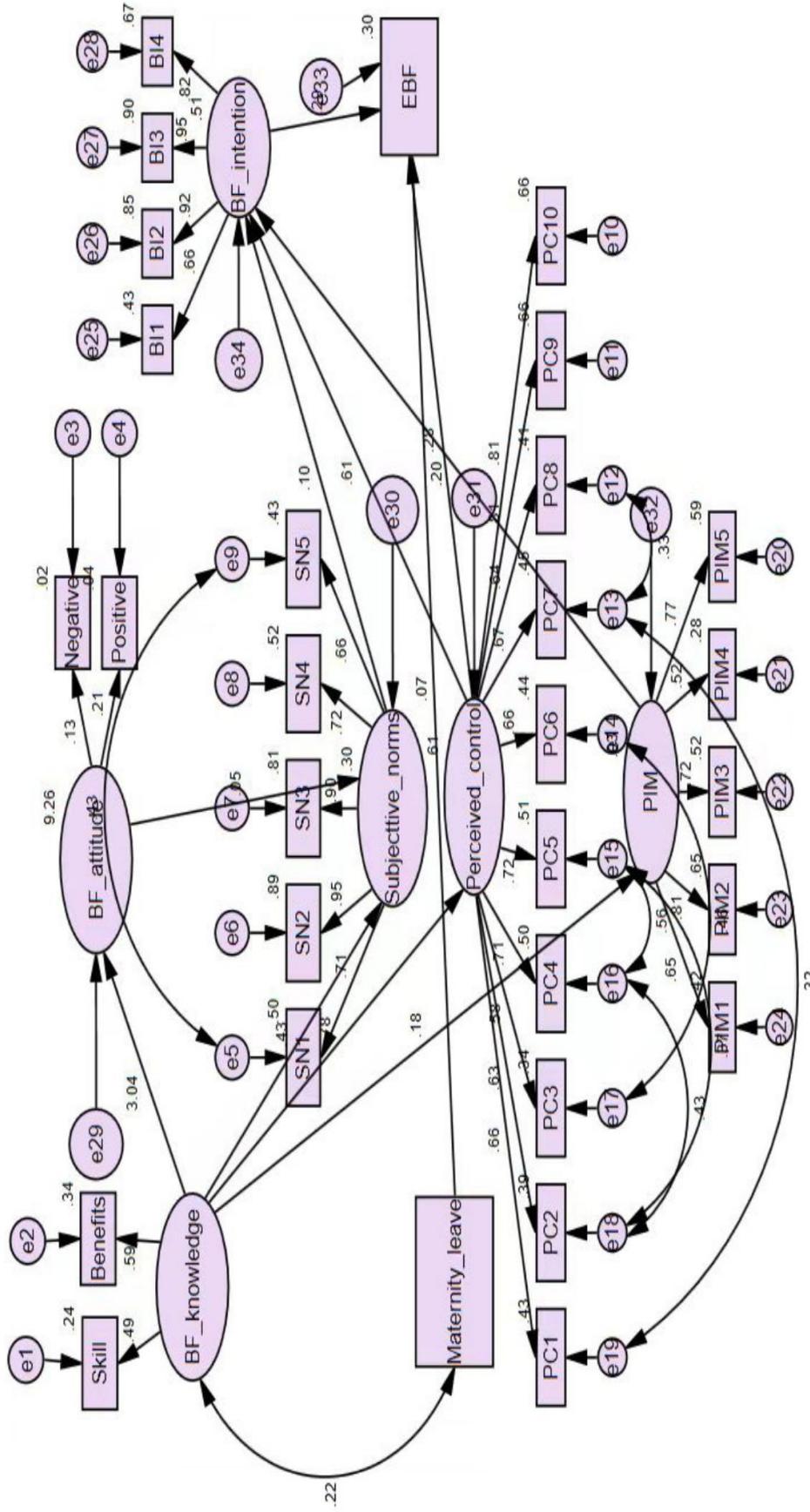


Figure 4 The modified model of EBF

Table 10 Direct, indirect, and total effects of independent variables on the dependent variable in the modified model

Independent variables	BA			SN			PC			PIM			BI			EBF		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Breastfeeding knowledge	.94***	—	.94***	.43***	.04*	.47***	.78***	—	.78***	.18**	—	.18**	—	.55***	.55***	—	.25***	.25***
Maternity leave	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.07*	—	.07*
BA	—	—	—	.05*	—	.05*	—	—	—	—	—	—	—	—	—	—	—	—
SN	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PIM	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Structure equation fit	R ² =.26			R ² =.31			R ² =.61			R ² =.03			R ² =.51			R ² =.30		

BA= Breastfeeding attitude; SN= Subjective norm; PC=Perceived control; PIM= Perception of insufficient milk; BI=Breastfeeding intention; EBF=Exclusive breastfeeding

CHAPTER 5

DISCUSSION AND CONCLUSION

This chapter consisted of three parts. The first part informed the summary and results of the study. The second part discussed the research findings related to the research hypotheses and the results of the final model. The last part presented the limitation, strengths, and recommendations of this study.

Summary of the study

The purpose of this study was to test the model of EBF among mothers in China. With multi-stage random sampling method, a sample of 374 mothers was recruited in Jiangsu province. The inclusion criteria of the mothers as the following: 1) Age ≥ 18 years old; 2) having a normal or cesarean section delivery; 3) having a healthy singleton baby at birth with gestational age for at least 37 weeks; 4) having no pre-existing health conditions and special dietary requirements; 5) spouse, mother, and mother-in-law still alive; 6) being able to communicate, read and write in Chinese; 7) having a mobile phone for being contacted during data collection. The exclusion criterion of participants was as following: 1) having diseases (such as COVID-19, hepatitis, HIV, infectious tuberculosis, severe cracked nipples and mastitis with secretion of pus and others), taking medications (like central depressant) which might be harmful to the infant or illegal drugs during the process of studies, and BF is not allowed by their doctors; 2) having infants with medical complications such as anemia, being underweight and others which BF was not allowed by a doctor; 3) having mentally or emotionally incompetent to respond to the questions during the study. Research instruments included demographic questionnaire, BF knowledge questionnaire (Chinese version), BF Attrition Prediction Tool (Chinese version), PIM Questionnaire (Chinese version) and Infant Feeding Intention Scale (Chinese version). The Cronbach's alpha reliabilities of these instruments ranged from .74 to .88. The findings of this study were as following:

1. Mean age and gestational age of the participants was 30.29 years old (SD=4.53) and 38.74 weeks (SD=.94) respectively. Most of participants lived in

Urban (69.52%) and 96.26% were married. 47.33% of participants have more than 1 child and 39.30% had BF experience. Many participants (47.59%) had never received any kinds of BF education. Participants had a high cesarean section rate of 61.23%. As to occupation, most of them (66.84%) chose to return to work and the mean maternity leave of these employed mothers was 153.37 days (ranged from 30 to 180). Only 44.65% of the employed mothers had paid maternity leave.

2. The scores of Breastfeeding knowledge were between 1 and 17 with a mean of 11.01 (SD=3.25). Mean scores of BF attitude, subjective norm and perceived control were 99.78 (SD=13.67), 21.06 (SD=3.89) and 34.90 (SD=9.57) respectively. Perception of insufficient milk had a mean score of 16.72 (SD=5.03). Breastfeeding intention had its mean score of 10.23 (SD=4.22). The EBF duration had its mean score of 69.29 (SD=72.06). The EBF rate at the 1st, 2nd and 3rd follow-up was 46.52%, 47.86% and 13.10% respectively. It was also found that 47.33% of participants had never exclusively breastfeed their infants during the first 6 months postpartum.

3. Model test found that BF knowledge had positive direct effects on BF attitude ($\beta=.94, p<.001$), subjective norm ($\beta=.43, p<.001$), perceived control ($\beta=.78, p<.001$) and PIM ($\beta=.18, p<.01$). Maternity leave, BF intention and perceived control had positive direct effects on EBF ($\beta=.07, p<.05$; $\beta=.29, p<.001$; $\beta=.29, p<.001$, respectively). Breastfeeding attitude had a direct effect on subjective norm ($\beta=.05, p<.05$). Subjective norm, perceived control and PIM had positive direct effects on BF intention ($\beta=.10, p<.05$; $\beta=.61, p<.001$, $\beta=.20, p<.001$, respectively).

Discussion of research findings

Although WHO recommends that all the mothers should exclusively breastfeed their infants for 6 months postpartum, the EBF state in China was suboptimal. The present study found that around half of the participants (n=177) did not exclusively breastfeed their infants even for 1 day. The EBF duration of the participants in the first 6 months postpartum was astonishingly short with a mean of 69.29 (SD=72.06) days. A review from China also reported that a short average EBF duration in Zhejiang and Shanghai, which was around 3.5 months (Li et al., 2020). Among the infants younger than 6 months, no more than 30% of them were found to be exclusively breastfeed (Duan et al., 2022). The short EBF duration might be

attributed to the low initiate rate and the early termination of EBF. In the present study, it was found that the initiation rate of EBF among the participants in the first 2 months after delivery was only 46.5% (n=174), and the EBF rate sharply declined from the second follow-up to the third one. Finally, only 12.30% of the participants (n=374) maintained EBF for 6 months. Similarly, a Chinese study focused on the factors of EBF among the new mothers reported that the EBF rate decreased from 34.19% at 4 months to 3.31% at 6 months (Wan et al., 2015). It seemed to be quite difficult for mothers to initiate EBF in the first 3 days after birth, and insist on it when their babies being 4 months old (Zhu et al., 2014).

During the investigation, many participants reported the reasons of delayed EBF initiation. Many of the participants said that “breast milk was insufficient to satisfy the babies”, “breast milk was too thin”, and “the baby might be thirsty without feeding water”. As a result, many participants and their families in the present study fed their babies with water and / or formula in the early postpartum period. However, the unnecessary supplement of water and formula would reduce the numbers of breast sucking, leading to the reduced amount of breast milk. Then, it would be difficult for these mothers to initiate EBF with actually insufficient breast milk. For those participants who had initiated EBF, some of them thought babies should be fed with supplementary food at 4 months postpartum. These mothers always reported that “their friends or grandmothers suggested like this”, “the babies looked very eager to eat other foods”, or “breast milk was undernutrition”. Maternity leave also was a common reason for the participants to wean EBF early. The participants who needed to return to the work before 6 months commonly said that they would partially or completely replace breast milk with formula. Due to this, it could be easy for mothers to give up EBF after 4 months postpartum.

The predictive relationships among BF knowledge, maternity leave, delivery mode, BF attitude, subjective norm, perceived control, PIM, BF intention and 6-month EBF are discussed as following:

Breastfeeding knowledge

The findings of this study supported that BF knowledge has direct effects on BF attitude and perceived control. These findings implied that higher levels of BF knowledge could predict more positive BF attitude and perceived control directly. BF

knowledge in this study was assessed through the benefits and skills of EBF. While according to the TPB theory, BF attitude was defined as the way in which a person viewed and evaluated BF behavior, a predisposition to respond positively or negatively toward BF. With higher scores of BF knowledge, it meant that mothers knew more about benefits and skills of BF, which could be useful to help mothers develop positive response or positive attitude toward BF (Abdulahi et al., 2021). Sufficient knowledge in BF contributes to building a mother's confidence. Mothers with confidence are more likely to adopt a positive attitude because they believe in their ability to successfully breastfeed. Conversely, mothers lacking knowledge and confidence may be more prone to feeling discouraged when facing challenges, leading to the development of a negative attitude. This could explain why BF knowledge could predict BF attitude directly. Besides, perceived control in this study referred to mothers' perception of the difficulty of enacting BF (Esquerra-Zwiers et al., 2022). With more knowledge about benefits and skills of BF, mothers could form more efficacious feeling or perceive more ability to breastfeed their infants. The lack of BF knowledge might make mothers feel helpless and even lose confidence in BF their children, and eventually give up EBF (Ghasemi et al., 2019). That is why BF knowledge could predict perceived control positively. Therefore, it could be concluded that BF knowledge has positively direct effects on BF attitude and perceived control. Consistent with the findings of this study, previous studies also found that BF knowledge could positively affect BF attitude (Abdulahi et al., 2021; Al-Barwani, 2017). Similarly, 5 studies from different countries supported that BF knowledge had a significant influence on perceived control (Liu, 2014; Liu, 2015; Titaley et al., 2021). Breastfeeding education is a good way for mothers to gain BF knowledge. The present study found a lack of adequate BF education. Only 8.29% of participants ever took part in the pregnant classes, and 47.86% had never received any types of BF education. In the future, various programs for BF education will be needed to improve mothers' BF knowledge, helping mothers develop more positive BF attitude and perceived control, and finally promoting EBF. Breastfeeding can be challenging, especially for first-time mothers and those without BF experience. In this study, more than half of the participants were the first-time mothers (52.67%), and having no BF experience (60.70%). These 2 types of mothers need special attention in BF knowledge education.

There was a direct effect of BF knowledge on subjective norm. This indicated that more BF knowledge could predict more support from the important others for insisting on BF directly. Al-Barwani (2017) also reported that BF knowledge could positively predict the scores of subjective norm (Al-Barwani, 2017; Wilson, 2018). The important others were the critical source of maternal BF knowledge. A study coming from Holland divided the sources of BF knowledge into two categories: professional source (e.g., midwives, nurses and doctors) and popular sources (e.g., husbands, grandparents, friends) (Oosterhoff et al., 2022). Around 30% of the mothers got BF information from the antenatal class (Tan et al., 2008). Nearly 50% of the mothers were reported to gain BF knowledge from the midwives (Zielinska et al., 2017). With the correct information provided by these important others, mothers could have higher levels of BF knowledge. So, mothers with higher BF knowledge could perceive that the important others thought it was worthwhile to insist on BF. This could be used to explain the positively predictive relationship from BF knowledge to subjective norm. A systematic review concluded that prenatal BF education should take interpersonal support into consideration (Wouk et al., 2017). However, another systematic review reported that the current educational program increasing mothers' BF knowledge only focused on mothers and no social network (Oliveira et al., 2017). This can easily lead to conflicts in the understanding of BF between mothers and their significant others during the BF practice, thereby affecting the actual BF experience. The results of this study also confirm this point, with nearly half of the participants (44.65%) expressing reservations or opposing views towards BF advice from significant others. Future studies and practice can explore a family or the important persons centered educational program as a more effective format to increase mothers' BF knowledge. Thus, mothers can get scientific and consistent BF information from the important persons, enhancing the level of BF knowledge of mothers, as well as the scores of subjective norm.

The present study also found that BF knowledge had a positively direct effect on PIM. This means higher scores of BF knowledge could predict higher scores of PIM directly. Perception of insufficient milk has been a prevalent concern. It was reported that in 60-90% of mothers coming from low- and middle-income countries had PIM (Piccolo et al., 2022). In the present study, it was found that more than 60%

of the participants believed their breast milk was insufficient to satisfy their infants. This indicated that most mothers perceived inadequate breast milk in quantity and quality (Hindu et al., 2023). However, breast milk contained all the nutrition that infants needed in the first 6 months. And most mothers could produce enough volumes of breast milk (Gatti, 2008). During the investigation process of this study, many participants with limited knowledge reported that their breast milk appeared like rice water, often considered a sign of insufficient nutritional quality. Item 3 in the PIM questionnaire also had a very low average score, indicating that many participants in this study thought their milk supply seemed insufficient to meet the babies' needs. Babies' steady growth, sufficient elimination, and mothers' softer breast after BF were reliable signs of enough milk intake (Kent et al., 2021). While without enough BF knowledge, some common behaviors (e.g., crying, frequent feeding) were always wrongly regarded as insatiable cues of babies (Wu & Wacharasin, 2022). Consistent with this study, another study from Chiang mai university also supported that BF knowledge was an important factor influencing PIM (Ansook et al., 2020). Mothers lacked of EBF knowledge were 4.22 and 7.10 folds more likely to perceive insufficient milk supply, leading to early termination of EBF (Huang et al., 2022). For mothers who do not have enough milk, there are also many ways helping them to improve milk supply. Higher milk supply has been found to be associated with good latching, early initiation, and on demand BF (Johar et al., 2021; Joshi et al., 2016). Frequently and completely emptying the breasts of milk is also a magic way to improve milk supply. Therefore, professional guidance helping mothers know how to correctly assess and improve the milk supply is necessary in the future. Otherwise, mothers could have high levels of PIM, stopping mothers from exclusively breastfeed their infants.

Based on the estimated parameter, the findings of this study showed that BF knowledge had no positively direct effect on EBF. For the non-significant effect of BF knowledge on EBF, it might be because EBF behavior was complicated. Mothers might encounter all kinds of BF problems during the 6 months postpartum. During the postpartum period, cracked nipples, mastitis, and blocked ducts were common BF problems, which could be barriers for mothers to maintain BF (Anderson et al., 2019; Karaçam & Sağlık, 2018). Although mothers had the knowledge about the benefits and skills of BF, they might have no ideas about how to deal with those BF problems.

Almost 18% of mothers said that they had a need for BF education and counselling (Karaçam & Sağlık, 2018). Among the participants in this study, there were more mothers (47.86%) who received no BF education. Another qualitative research also reported that the professional support helping mothers deal with BF problems was not enough (Durmazoğlu et al., 2020). Therefore, the continued BF education and support were needed for mothers maintaining EBF.

Maternity leave

This study found that maternity leave had a positively direct effect on EBF. It indicated that a longer maternity leave could predict a longer EBF duration. The predictive relationship between maternity leave and EBF might be because the workplaces were not baby friendly. There were about 60% of employed mothers in the world worked in the places which were not regulated by the state (Horwood et al., 2020). This study also found that 21.14% of participants enjoyed less maternity leave than the statutory number of days. Similarly, 55.35% of the participants had no paid maternity leave. Under the pressure of life, some mothers even returned to work 1 month after giving birth. Moreover, when these mothers returned to work, they would find that there was no suitable BF environment in the workplaces (Zhang et al., 2020). However, BF friendly workplaces were effective measures to make mothers insist on BF (Horwood et al., 2020). Due to the busy work, some mothers even found that they had no enough time to breastfeed their infants (Altamimi et al., 2017). It will be easy for mothers to give up EBF early (Cox et al., 2015; Nnebe-Agumadu et al., 2016; Wilson, 2018). Instead of EBF, mothers preferred to add formula and any other milk substitutes. The predictive relationship between maternity leave and EBF was also supported by the previous studies. Aikawa et al. (2015) and Alzaheb et al. (2017) found that maternity leave was a significant predictor of EBF (Aikawa et al., 2015; Alzaheb, 2017). Abou-ElWafa & El-Gilany (2019) supported that maternity leave had a positive effect on EBF for 6 months (Abou-ElWafa & El-Gilany, 2019). Some studies also showed that short maternity leave was an important determinant of preventing mothers from sustaining EBF for 6 months postpartum (Dun-Dery & Laar, 2016). In order to improve EBF duration, both legislative and policy measures should be developed to ensure all the mothers enjoy the benefits of regulated maternity leave, as well as build BF-friendly workplaces.

According to the estimated parameter, it was found that maternity leave had no direct effects on BF attitude and subjective norm. This could be explained by the content of attitude and subjective norm scale in BF attrition prediction tool. In these 2 scales, only 1 item in the attitude scale (BF makes going to work hard) could be used to assess BF attitude related to return to work. These 2 scales focused more on the settled perception of both mothers and their important others toward BF. Although BF might make returning to work hard, the length of maternity leave could not change mothers' and their important others' attitude or thinking regarding the advantages of BF and disadvantages of formula feeding. Their belief toward BF, like BF was economical, BF helped bond with baby, BF was healthy and formula caused allergies, was formed by their BF knowledge, but had nothing to do with the length of maternity leave. A study from Thailand also supported that mothers with positive attitude toward BF did not rely on the BF support in the workplaces, while those with ambivalent attitude would give up EBF easily once they met barriers like no time to breastfeed and no BF room (Tangsuksan et al., 2020). For mothers with a positive attitude towards BF, a short maternity leave had little impact on their EBF practice. Inconsistent with the findings of this study, the previous studies supported that maternity leave had positive effects on BF attitude (Al-Barwani, 2017; Tangsuksan et al., 2020) and subjective norm (Cox et al., 2015; Nnebe-Agumadu et al., 2016; Wilson, 2018). In the future, tailored tools evaluating BF attitude and subjective norm of working mothers were needed, and the predictive relationship between maternity leave and BF attitude needed to be further explored.

The findings of the present study also showed that maternity leave had no positively direct effect on perceived control. It indicated that longer maternity leave could not determine higher levels of perceived control. Perceived control included locus of control and self-efficacy (Ajzen, 2020). With a good sense of perceived control, mothers could believe that personal action could control EBF (internal locus of control) and they had skills to enact EBF (self-efficacy). But due to the lack of BF education and counselling, long maternity leave did not mean that mothers could have more chances to develop adequate locus of control and get more skills to control over EBF (Karaçam & Sağlık, 2018). If mothers had a longer maternity leave, but not equipped with adequate BF skills and unbelieved EBF could be controlled through

taking actions, they could still lose control over EBF. It explained why maternity leave could not predict perceived control. Inconsistent with this study, some studies reported that maternity leave had a positive influence on mothers' perceived control towards EBF (Rashid et al., 2018; Wallenborn et al., 2019). Only one study supported that returning to work was not the determinant of mothers' perceived control (Al-Barwani, 2017). Futures studies were also needed to explore whether maternity leave had an influence on perceived control.

Delivery mode

The negatively direct effect of delivery mode on EBF was not supported by the finding of this study, which showed that delivery mode could not determine EBF duration directly. It could be explained that factors influencing mothers' maintenance of EBF were complex. Cesarean section was not per se a barrier of BF, but the feeding difficulties could prevent mothers from exclusively breastfeed their infants (Antonakou & Papoutsis, 2021). Not only mothers with cesarean section, but also those with natural birth commonly experienced BF difficulties (e.g., PIM, sore nipples) (Babakazo et al., 2022). There were also some other factors that might prevent natural birth mothers from insisting on EBF, like short maternity leave, low BF intention and perceived less control over BF. Therefore, a significant effect of delivery mode on EBF was not found in the present study. Awaliyah et al. (2019) also mentioned a rebuttal results that there was no association between delivery type and BF duration, which was consistent with the findings of this study (Awaliyah et al., 2019). However, some studies mentioned that cesarean section could adversely affect EBF (Al-Sahab et al., 2010; Alzaheb, 2017; Chen et al., 2020; Dun-Dery & Laar, 2016; Fang et al., 2019; Tang, 2019; Zhu et al., 2019). These studies believed that mothers with cesarean section experienced problems in incision pain, latching and delayed lactation, compared to vaginal delivery (Hobbs et al., 2016). Delayed lactation was also responsible for delayed BF initiation and PIM. All these factors could become barriers for mothers to adherence to EBF for 6 months. Among the participants of the present study, 61.23% of them chose cesarean section. Considering the large number of cesarean deliveries in China, whether cesarean deliveries had a negative effect on EBF needed to be further explored in the future.

The findings of the present study also showed that delivery mode had no

negatively direct effect on PIM. This indicated that mothers with cesarean section might not perceive less milk supply. Compared to the natural birth mothers, mothers who underwent cesarean section transferred less breast milk to their infants during the first 2 to 5 days postpartum (Evans et al., 2003). The unsatisfied babies might make mothers concern about their milk supply. However, the gap in breast milk transfer between natural birth and cesarean section was transient, which disappeared 5 days later (Evans et al., 2003). In the present study, the length of hospital stay among participants with cesarean section was about 4 to 7 days. Data collection was conducted before discharge, which might lead to the unapparent difference of breast milk transfer among participants with different delivery mode, as well as the PIM. Besides, although the milk supply of most mothers was just fine, PIM was still one of the most common reasons for mothers with different delivery mode to give up EBF (Gatti, 2008). This study also found 63.90% of the participants believed that their milk supply was insufficient in both quality and quantity. The wrong PIM was stemmed from the anxiety related to the nutrition of both mothers and infants, formula feeding, advice from family members and infant satiety (Safon, 2016). This anxiety was essentially due to a lack of knowledge and BF confidence (Huang et al., 2022). So, whether it was a natural delivery or a cesarean section, mothers with lack of BF knowledge and confidence might perceive insufficient breast milk. Another study reported that patient controlled epidural analgesia, multiparous and delayed BF initiation time were the factors of PIM among cesarean section mothers (Lin et al., 2011). Mothers underwent cesarean section without these factors might not perceived insufficient milk supply. All these could be used to explain why no directly predictive relationship was found between delivery mode and PIM, as well as the indirect predictive relationship between delivery mode and EBF through PIM.

Breastfeeding attitude

In this study, BF attitude was found to have a positively direct effect on subjective norm. It indicated more positive BF attitude could predict more perception of BF expectations from the important others directly. According to the TPB theory, there was a correlation between BF attitude and subjective norm (Ajzen, 2002). The social influence could affect mothers' intention to exclusively breastfeed their infants. Mothers would like to follow the BF suggestions from their important others. On the

contrary, mothers' BF attitude could affect the supportive attitude towards BF from the important others. Since BF was a personal experience, the important others should respect mothers' own evaluation of BF (also called BF attitude) (Reeves et al., 2006). If mothers preferred formula, the BF expectation of the important others would be weakened. In addition, a positive attitude might lead mothers to seek social support for BF, contributing to the development of a positive subjective norm. That might be the reason why BF attitude could positively predict subjective norm directly. However, this predictive relationship was relatively rare in previous studies and needed to be further verified in more studies.

Although BF attitude had been reported as an important determinant of BF intention in previous study (Grano et al., 2022; Hamid & Yahya, 2018; Khresheh, 2020; Li et al., 2018; Mitra et al., 2004), the present study had a distinctive finding that there was no predictive relationship between BF attitude and intention. The TBP theory presumes that if people have positive attitude toward a behavior, combined with supportive attitude from the important others, and perceive higher level of behavioral control, then the strong behavioral intention can be expected (Ajzen, 2002). Although the BF attitude of the participants in the present was relatively moderate, most of them perceived little control over BF (67.38%) and insufficient milk supply (63.9%). So, if the participants had positive attitude towards BF, but due to a lack of perceived control or PIM, they could also think that EBF was not feasible. These participants would have little internal energizing or intention to exclusively breastfeed their infants. This could be used to explain the non-predictive relationship between BF attitude and intention.

Based on the estimated parameter, the findings of this study showed that BF attitude had no positively direct effect on EBF. Multiple factors could contribute to the EBF behavior. For working mothers, even though they had adequate BF knowledge and positive BF attitude, they might find formula more convenient and give up EBF intention, due to the lack of support for BF in the workplaces (Ishak et al., 2014; Vilar-Compte et al., 2021). Mothers might also encounter unexpected BF challenges, such as latch issues, insufficient milk supply, or maternal health concerns. These challenges can influence a mother's ability to continue EBF, irrespective of her initial attitude. The level of support a mother receives from her family, friends, and healthcare

professionals can impact her ability to sustain EBF. A positive attitude alone may not be sufficient if there is a lack of practical support, education, or resources to address challenges that may arise. So, that is why the participants in this study had relatively moderate BF attitude, but suboptimal EBF practice. Some studies showed that BF attitude was a significant predictor of EBF (Cox et al., 2015; Nnebe-Agumadu et al., 2016). However, the TPB implied that attitude had no effect on a particular behavior without the mediation of behavioral intention (Ajzen, 1991), which was consistent with the findings of the present study. A study coming from Malaysia also reported that knowledge and attitude were not the predictors of BF (Ishak et al., 2014).

Subjective norm

According to the estimated parameter, this study found that subjective norm had a positively direct effect on BF intention. It indicated more perception of BF expectations from the important others could predict stronger BF intention directly. According to the TPB theory, subjective norm related to EBF refers to mothers' perceptions of whether their important others (e.g., partners, and grandmothers) approve and support EBF. As the important others, partners could provide emotional support, responsiveness to needs and decisions, household and childcare support, and assistance with BF difficulties to induce the chances of EBF practices by mothers (Ouyang & Nasrin, 2021). As the primary caregiver of babies in the most of developed country, grandmothers also played important roles in mothers' BF decisions. They might provide BF suggestions to mothers according to their previous experience (Ke et al., 2018). With these supports, mothers might believe that their important others thought it was worthwhile to practice BF. When mothers perceived supportive attitude towards BF from the important others, they might feel under social influence or pressure, which drove them to believe the necessity of EBF (Werdani et al., 2021). Subjective norm was also proved to be a positive predictor of BF intention by previous studies (Al-Barwani, 2017; Mitra et al., 2004; Raheel & Tharkar, 2018; Ritta et al., 2020). In the present study, it was found that the participants perceived relatively high levels of supportive attitude towards BF from the important others. But only half of the participants (55.35%) reported that they would like to follow the opinions of the important others. This contradiction might be due to differences between significant others and mothers in terms of BF practices. During the investigation, we found that

some mothers believed that, despite the approval of significant others regarding BF, their ideas about the practical aspects of BF were too outdated. As a result, some mothers were unwilling to follow the advice of significant others. This undermined the impact of subjective norm on BF intention. Further research is needed to explore how to update significant others' perceptions of BF practices, enabling mothers to sense their supportive attitude for BF while being more receptive to their advice. This, in turn, could lead to the formation of a stronger intention to breastfeed.

The findings of this study also indicated that subjective norm had no positively direct effect on EBF. Although some studies reported that subjective norm was the determinant of EBF (Thepha et al., 2018; Werdani et al., 2021), the TPB stated that subjective norm had an indirect effect on a particular behavior through behavioral intention, but no direct effect existed (Ahmed, 2020). This means that when mothers had strong enough intention to exclusively breastfeed their infants, the EBF could be taken into practice. While not only subjective norm, but also behavioral attitude and perceived control had influence on behavioral intention (Ajzen, 1991). If mothers had negative attitude toward BF and no confidence in controlling over BF, even they perceived strong supportive BF attitude from the important others, they might not exclusively breastfeed their infants. A study also supported that BF decision was ultimately made by mothers rather than support from their social network (Reeves et al., 2006). All these can be used to explain the non-predictive relationship between subjective norm and EBF.

Perceived control

This study found a predictive relationship between perceived control and EBF. It indicated that mothers perceived more control over BF could exclusively breastfeed their infants for a longer duration. Consistent with the TPB theory, a behavior could be predicted by perceived behavioral control directly (Ajzen, 1991). Perceived control could reflect the degree to which people believed that they had control over behaviors. Perceived control is composed of locus of control and self-efficacy (Ajzen, 2002). A high perceived control means people believed that they could get desired outcomes through taking actions (internal locus of control) and had skills to enact the actions (self-efficacy). With these 2 important components, high perceived control played an important role in forming efficacious feeling for a person to achieve

a behavior through changing a person's thinking patterns, emotional responses and also the psychological effects of stress (Ajzen, 1991). The feelings of efficacy would motivate mothers to practice EBF and exert the effort for it. That was why mothers perceived more control over EBF can exclusively breastfeed their infants with a longer duration. Many studies also implied that perceived control was an important determinant of EBF (Alfianrisa et al., 2017; De Roza et al., 2019; Sulaeman et al., 2018). In the present study, it was found that most of the participants thought BF was not easy. They knew little about BF skills. For them, BF was out of their control. Therefore, health education and peer role model of successful EBF were needed to gain mothers' perceived control over BF. This would be conducive to achieve EBF for the first 6 months postpartum.

It was also supported by this study that perceived control had a positively direct effect on BF intention. This indicated that with more perceived control over BF, mothers could have a stronger BF intention. With perceived control, people could be more likely to decide to perform a behavior with an efficacious feeling (Ajzen, 2002). Since high perceived control may indicate a strong sense of self-efficacy, which is the belief in one's capability to successfully execute a specific behavior. This confidence in their ability to breastfeed can positively influence individuals' BF intentions. People with more perceived control would believe that the behavior was more feasible, leading to more internal energizing or intention to enact the behavior (Barba-Sánchez & Atienza-Sahuquillo, 2017; Kidwell & Jewell, 2010). Therefore, perceived control served as a valuable predictor of BF intention. The predictive relationship between perceived control and BF intention was also observed in many other studies (Al-Barwani, 2017; Mitra et al., 2004; Raheel & Tharkar, 2018; Ritta et al., 2020). Consistent with the TPB model, which indicated that perceived control played an important role in shaping people's intention to perform a behavior (Ajzen, 1991). However, around 70% of the participants in the present study perceived little control over EBF, which might make mothers unlikely to attempt to exclusively breastfeed their infants. In this situation, mothers with less perceived control might think EBF was unfeasible.

Perception of insufficient milk

The present study also found that PIM had a positively direct effect on BF intention. It indicated that perceived more adequate breast milk could predict higher BF intention directly. As far as our knowledge, few studies had shown a predictive relationship between PIM and BF intention. This predictive relationship found in this study might be because that PIM came from mothers' anxiety in the quantity and quality of breast milk (Galipeau et al., 2017). While adequate milk supply laid the foundation for the feasibility of EBF. Based on this, mothers perceived more adequate breast milk would be more motivated to decide to initiate and continue BF with higher intensity. Finally, BF intention was improved. That was why PIM could directly predict mothers' BF intention. Due to commonly cited PIM, nursing intervention helping mothers perceive the actual milk supply were suggested to be included in perinatal BF education. The findings of this study also indicated that PIM had no positively direct effects on EBF. Some previous studies supported that mothers perceived more adequate milk were more likely to persist on EBF for a longer duration (De Roza et al., 2019; Hegazi et al., 2019; Tang, 2019). These were inconsistent with the finding of the present study. Perception of insufficient milk reflected mother's concerns about the quantity and quality of breast milk. While it had no relationship with actual milk supply (Galipeau et al., 2017). Moreover, during the investigation, it was found that some mothers reported insufficient breast milk within 1 month postpartum, but having enough breast milk 1 month later. This finding suggested that mothers' PIM could change over time. Therefore, the PIM of the participants investigated before discharge were not found to predict subsequent EBF duration.

Breastfeeding intention

The TPB theory indicated that behavioral intention was a key predictor of a behavior, which was consistent with the findings of the present study (Ajzen, 2020). In the TPB model, BF intention was declared as immediate antecedent and motivational factor of a behavior, which reflected mothers' perceived likelihood or subjective probability that they would engage in EBF. With more behavioral intention, people would be more willing to give the behavior a try (Ajzen, 1991). That was why mothers with stronger intention could exclusively breastfed their infants for a longer duration. Another 6 studies also supported that mothers' intention to breastfeed had a

strong power predicting EBF duration (De Jager et al., 2014; De Roza et al., 2019; Sasaki et al., 2010). In this study, BF intention was assessed by the duration and certainty of BF infants without any formula or other milk. However, this study found that percentage of participants planned to breastfeed infants without any formula or other milk was only 45.45%, 49.20% and 34.22% at 1st, 3rd, 6th month postpartum. This can be an important reason why the WHO's recommendations about 6-month EBF cannot be reached. For the future studies and clinical practice, it is better to assess mothers' BF intention first, analyze its reasons and then take targeted interventions for improving EBF rate.

In summary, this study found that maternity leave, BF intention and perceived control had directly causal relationships with EBF. BF knowledge had indirect effects on EBF through belief variables (BF attitude, subjective norm, perceived control) and PIM in positive directions. Breastfeeding attitude had a positively indirect influence on EBF through subjective norm. Likewise, subjective norm, perceived control and PIM could indirectly predict EBF through BF intention in positive directions. According to the parameter estimates, perceived control had the strongest influence on EBF for the first 6 months postpartum among all the predictive factors.

Limitations of the study

There was 1 limitation needed to be addressed for the generations of the findings in this study. The findings of this study was limited by the number of the selected province. There were 34 provincial-level administrative regions in China. The cultures of these regions or provinces are diverse. Factors influencing mothers' EBF behavior may vary in different cultural contexts. However, the data collection was conducted in only 1 city of 1 province in this study, which might influence the generation of its results and findings.

Study strengths

The strengths of this study can be seen as follows:

1. To our knowledge, this was the first model test to address Chinese

mothers' EBF duration with a follow-up of 6 months postpartum. The 6-month follow-up conducted in this study was helpful in observing whether the EBF behaviors of Chinese mothers met the WHO recommendations. Through SEM, the causal relationship among the factors of EBF duration within 6 months postpartum could be explained with the model.

2. To our knowledge, this study covered different population. Data collection in this study was carried out in different levels of hospitals, not just in 1 certain level of hospital. The existing study selected the corresponding sample size proportionally based on the annual number of deliveries at hospitals of 3 levels. Mothers from different levels of different hospitals had different characteristics, such as healthcare services, education background, and income. Therefore, the findings of the present study can be generalized to different population from different levels of hospitals.

Recommendations for nursing science

1. In terms of nursing research, researchers from different countries can further explore the predictors of EBF postpartum based on their own culture with high-quality literature, providing more rigorous results for promoting EBF. Based on the predictive factors and causing model, researchers can combine the clinical practice and many literatures to develop intervention strategies for improving EBF. The effectiveness of the intervention strategies can be verified through clinical trials, which can lay a foundation for subsequent clinical practices.

2. In terms of nursing practices, the findings of the present study can help nurses gain understanding of the factors predicting EBF. Nurses can apply the instruments used in this study to evaluate mothers' BF knowledge, BF attitude, subjective norm, PIM and BF intention, with particular emphasis on perceived control. With this, nurses can identify those mothers who may give up EBF early and then target interventions for both mothers and their important others (partners, mothers, mothers-in-law, healthcare providers, and friends) can be taken to increase their likelihood of EBF. The interventions may comprise a multifaceted approach to health education, incorporating various forms of educational materials and resources. For example, this could involve the distribution of informative leaflets and the use of videos as part of health education. Additionally, a BF skills workshop could be implemented to enhance

perceived control.

3. In terms of nurse training, except for routine knowledge and skills related to EBF, healthcare institutions should be encouraged to make efforts to train nurses with the predictors of EBF, the application of investigation instruments related to predictors, and the interventions to promote EBF based on predictors, so as to update their ideas about EBF and help nurses better carry out related nursing practice in clinical work.

4. In terms of health policy, the benefits and skills related to EBF should be vigorously publicized to make people have a brand-new understanding of EBF with making full use of the mass media, so as to promote the sustainable development of maternal and child health. Evidence-based EBF guidance or health education should be integrated into the daily work of obstetrics in Baby-friendly hospitals and communities. The important role of mothers' significant others in EBF should be emphasized. More policies should be introduced to ensure the implementation of legal maternity leave.

Conclusion

This study found that the current situation of EBF among Chinese mothers was not ideal. Nearly half of the participants did not choose EBF during the first 6 months postpartum. The EBF rate dropped dramatically from the first visit to the last visit. This suggests that the issue of EBF among Chinese mothers deserves more attention. Based on SEM, this study found that maternity leave, perceived control, and BF intention were the predictors of EBF. Breastfeeding knowledge had indirect effects on EBF through BF attitude, subjective norm, perceived control, and PIM. Breastfeeding attitude had an indirect effect on EBF through subjective norm. Subjective norm, perceived control, and PIM had indirect effects on EBF through BF intention. Findings strategic approaches to improve BF knowledge, maternity leave, BF attitude, subjective norm, perceived control, PIM, and BF intention should be developed to promote EBF. In the future, more studies are needed on predictors of EBF, related EBF promotion interventions and nurse training at a nationwide level, further promoting EBF among Chinese mothers.

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APPENDIX



Appendix A

The institutional review board and permission letter for data collection

สำเนา

ที่ IRB3-020/2565



เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS001/2565

โครงการวิจัยเรื่อง : การคาดคะเนปัจจัยการเลี้ยงลูกด้วยนมแม่อย่างเดียวในประเทศจีน: โมเดลสมการโครงสร้าง

หัวหน้าโครงการวิจัย : MRS.QIAN WU

หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 2 : 3 March 2022
2. Research Protocol Version 2 : 3 March 2022
3. Participant Information Sheet Version 2 : 3 March 2022
4. Informed Consent Form Version 1 : 17 February 2022
5. Research Instruments Version 2 : 3 March 2022
6. Others (if any) Version - - -

วันที่รับรอง : วันที่ 21 เดือน มีนาคม พ.ศ. 2565

วันที่หมดอายุ : วันที่ 21 เดือน มีนาคม พ.ศ. 2566

ลงนาม นางสาวรมร แยมประทุม

(นางสาวรมร แยมประทุม)

ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา

ชุดที่ 3 (กลุ่มคลินิก/ วิทยาศาสตร์สุขภาพ/ วิทยาศาสตร์และเทคโนโลยี)



邳州市人民医院
医学伦理委员会临床试验伦理审查批件

伦审编号 20220906-01

临床开展项目	中国母亲纯母乳喂养预测因素：结构方程模型		
临床试验专业/ 科室	护理	本院主要研究者	吴倩
审查地点	邳州市人民医院	审查日期	2022. 09. 05
审查方式	会议审查	<input checked="" type="checkbox"/> 快速审查	紧急会议审查
<p>审查意见：</p> <p>根据国家药品食品监督管理局《药物临床试验质量管理规范》、世界医学会《赫尔辛基宣言》、卫生部《涉及人的生物医学研究伦理审查办法(试行)》(2007)、以及国际医学科学组织委员颁布的《人体生物医学研究国际道德指南》的伦理原则，经本伦理委员会审查，同意按临床治疗方案开展。</p> <p>本批件将在本院及伦理委员会备案。如果对本治疗在本院的可行性（包括手术者的资格与经验、设备与条件等）有不同意见，请及时与本伦理委员会联系。暂停/提前终止/完成本项诊疗技术，请及时通知伦理委员会。</p> <p>如发生严重不良事件及影响诊疗风险受益比的非预期不良事件，应及时报告本伦理委员会。</p> <p>如临床诊疗方案、知情同意书的任何修改，主要受试者更换，应及时通知伦</p>			

邳州市人民医院
医学伦理委员会临床试验伦理审查批件

伦审编号 20220906-01

理委员会，重新审查，获得批准后执行。

伦理审查批件有效期：三年

江苏省邳州市人民医院
医学伦理委员会（章）

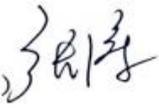
日期：2022年9月6日

1 张

主任委员（签字）：

日期：2022年9月6日

睢宁县妇幼保健院
数据收集许可审批表

临床开展项目	中国母亲纯母乳喂养预测因素：结构方程模型		
科 室	产 科	主要研究者	吴 倩
审查地点	睢宁县妇幼保健院	审查日期	2022.09.02
审查方式	会议审查	<input checked="" type="checkbox"/> 快速审查	紧急会议审查
<p>审查意见：</p> <p>根据国家药品监督管理局《药物临床试验质量管理规范》、世界医学会《赫尔辛基宣言》、卫生部《涉及人的生物医学研究伦理审查办法》（2016年）、以及国际医学科学组织委员颁布的《人体生物医学研究国际道德指南》的伦理原则，经本伦理委员会审查，同意开展本项研究。</p> <p style="text-align: right;">  医学伦理委员会（章） 日期： 2022年09月04日 </p> <p style="text-align: right;"> 主任委员（签字）  日期： 2022年09月04日 </p>			

致泰国东方大学研究生院：

根据泰国东方大学研究生院提供的数据收集许可申请，获知泰国东方大学护理学院博士研究生吴倩女士，将于2022年9月11日至2023年3月15日进行题为“中国母亲纯母乳喂养预测因素：结构方程模型”研究的数据收集。吴倩女士需要25位在徐州市新沂市新安中心卫生院分娩并符合纳入标准的母亲在出院前参与该研究。研究对象纳入标准：1) 年龄 ≥ 18 周岁，2) 顺产或剖宫产，3) 娩出健康单胎，4) 胎龄 ≥ 37 周，5) 无既往健康状况和特殊饮食要求，6) 配偶、母亲和岳母仍健在，7) 能够用中文交流、阅读和书写，有手机，在数据收集过程中方便取得联系。

以上方面，根据泰国东方大学提供的伦理评审报告，新沂市新安中心卫生院允许吴倩女士在该伦理评审报告规定的时间范围内收集研究数据。





Appendix B

Participant's information sheet and consent form

เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัย**(Participant Information Sheet)**

รหัสโครงการวิจัย : G-HS001/2565

(การคาดคะเนปัจจัย การเลี้ยงลูกด้วยนมแม่อย่างเดี่ยวในประเทศจีน: โมเดลสมการโครงสร้าง)

โครงการวิจัยเรื่อง : Predicting Factors of Exclusive Breastfeeding among Mothers in China: Structural Equation Modeling

Dear Participants,

My name is Qian Wu, a postgraduate student at School of Nursing, Burapha University, Thailand. My research topic is "Predicting factors of exclusive breastfeeding among mothers in China: Structural equation Model". The purpose of this study was to explore the situation of EBF in Jiangsu Province, China and examine the causal relationship between dependent variables among BF knowledge, delivery mode, maternity leave, BF attitude, subjective norm, perceived control, perception of insufficient milk, BF intention and EBF.

The study will be a survey study. Participation in the study is voluntary. If you agree to participate in the study, you will have to answer a series of questionnaires about exclusive breastfeeding, which will take about 20-30 minutes. We will collect questionnaire data by interview before your discharge from the hospital and telephone interview for the number of days of exclusive breastfeeding at 2, 4, 6 months after delivery. Any questions raised by participants will be explained during data collection and any questions about language or content will be clarified by the researcher. You won't get any immediate benefit from taking part in the study. However, the results of this study have some value for the development of nursing models, nursing interventions and health policies related to exclusive breastfeeding, and thus helping hospitals and health care workers provide higher quality breastfeeding guidance for mothers and their families, thus promoting the maintenance of exclusive breastfeeding.

Participation in the study does not pose any physical or psychological risk to the participants, nor does it pose any risk to society.

All data and information collected in this study will be kept confidential. The results will not reveal any specific information about the participants. All data will be made available only to researchers for access and will be destroyed one year after the results are published. You have the right to withdraw from the study at any time and this will not affect the quality of service you receive from the hospital.

This study will be conducted by Qian Wu, and my main supervisor, Professor Dr. Chintana Wacharasin, will supervise the whole project. If you have any questions, please contact me on my mobile phone number: +8615751135256 or via email xiaoguaiwq@163.com, or my advisor's email chintana@buu.ac.th. Alternatively, you can contact the University of Burapha Institutional Review Board (BUU-IRB) at +66-3810-2620 or at buuethics@buu.ac.th. Thank you very much for your cooperation. We will provide you with a retained copy of this consent form.

Qian Wu

เอกสารแจ้งผู้เข้าร่วมโครงการวิจัย

(Participant Information Sheet)

参与者信息表

研究代码: G-HS001/2565

泰国东方大学伦理评审委员会办公室负责研究项目代码发行者

标题: 中国母亲纯母乳喂养的预测因素:结构方程模型

亲爱的参与者:

我是吴倩，泰国布拉法（Burapha）大学护理学院的研究生。我研究的题目是“中国母亲纯母乳喂养的预测因素:结构方程模型”。该研究的目的是了解中国江苏省纯母乳喂养现状，验证母乳喂养知识、分娩方式、产假、母乳喂养态度、典范认同、感觉控制、感知母乳不足、母乳喂养意愿及纯母乳喂养之间因果预测关系。

这项研究将是一项调查研究。参加这项研究是自愿的。如果您同意参加此研究，您将需要回答关于纯母乳喂养的一系列问卷，大约需要占据您 20-30 分钟的时间。我们将在您出院前通过面谈的方式进行问卷数据收集，并在您产后第 2/4/6 个月，以电话访谈的形式了解您纯母乳喂养的天数。在数据收集过程中，研究人员将向参与者提出的任何问题加以解释，研究人员将澄清参与者提出的关于语言或内容的任何问题。参加这项研究不会给你带来任何直接的好处。然而，该研究结果对于发展相关护理模型、制定相关护理干预措施及卫生政策具有一定的价值，进而帮助医院和卫生保健工作者为产妇及家属提供更高质量的母乳喂养指导，以促进纯母乳喂养的维持。参与该项研究不会对参与者产生任何身体和心理风险，也不会对社会造成任何风险。

本研究中收集的所有数据及信息都将保密。研究结果不会披露任何参与者的具体信息。所有数据将只提供给研究人员访问，这些数据将在研究结果公布

一年后销毁。您有权随时退出此项研究，并且这不会影响您从医院获得的服务质量。

这项研究将由吴倩进行，我的主要导师，副教授金塔纳·瓦查拉斯博士（Dr. Chintana Wacharasin）将会对整个课题进行指导。如果您有任何问题，请拨打手机号码联系我：+8615751135256 或通过电子邮件 xiaoguaiwq@163.com，或者我导师的电子邮箱联系 chintana@buu.ac.th。您也可以联系布拉法大学机构审查委员会（BUU-IRB），电话号码（+66-3810-2620），电子邮件地址是 buuethics@buu.ac.th。非常感谢您的合作。我们将向您提供一份本同意书的副本保留。

吴倩



เอกสารแสดงความยินยอม

ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

รหัสโครงการวิจัย : G-HS001/2565

(การคาดคะเนปัจจัยการเลี้ยงลูกด้วยนมแม่อย่างเดียวนในประเทศจีน: โมเดลสมการโครงสร้าง)

โครงการวิจัยเรื่อง: Predicting Factors of Exclusive Breastfeeding among Mothers in China:
Structural Equation Modeling

Date of data collectionMonth.....Year

.....

Before signing, researcher Wu Qian has fully informed me of the purpose, process, method, benefits and possible risks of this study. I volunteered to participate in the study. I acknowledge my right to withdraw from the study at any time without fear that this will affect the quality of medical care I receive from the hospital and maternity ward in the future

At the same time, researcher Ms. Qian Wu has explained to me that the data and information of the participants will be kept strictly confidential and only used in this study. I have clearly read and understood the information related to my participation in this study and I am willing to sign this consent form.

Signature Participant

(.....)

Signature Witness

(.....)



เอกสารแสดงความยินยอม

ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

知情同意书

研究代码： G-HS001/2565

泰国东方大学伦理评审委员会办公室负责研究项目代码发行者

标题：中国母亲纯母乳喂养的预测因素:结构方程模型

资料采集时间：月.....年.....

在签名之前，研究员吴倩已经充分告知本人该研究的目的、过程、方法、益处和可能的风险。本人自愿参加该研究。本人知晓自己有权随时退出该研究，无需担心这会影响本人今后从医院和产科病房获得的医疗服务质量。同时，研究人员吴倩女士已向我解释，参与者的数据和信息都将严格保密，仅用于本研究。

本人已清楚阅读并理解参与本研究的相关信息，并愿意签署本同意书。

签字.....参与者

签字.....见证者



Appendix C

Instruments English version

Demographic record form (English version)

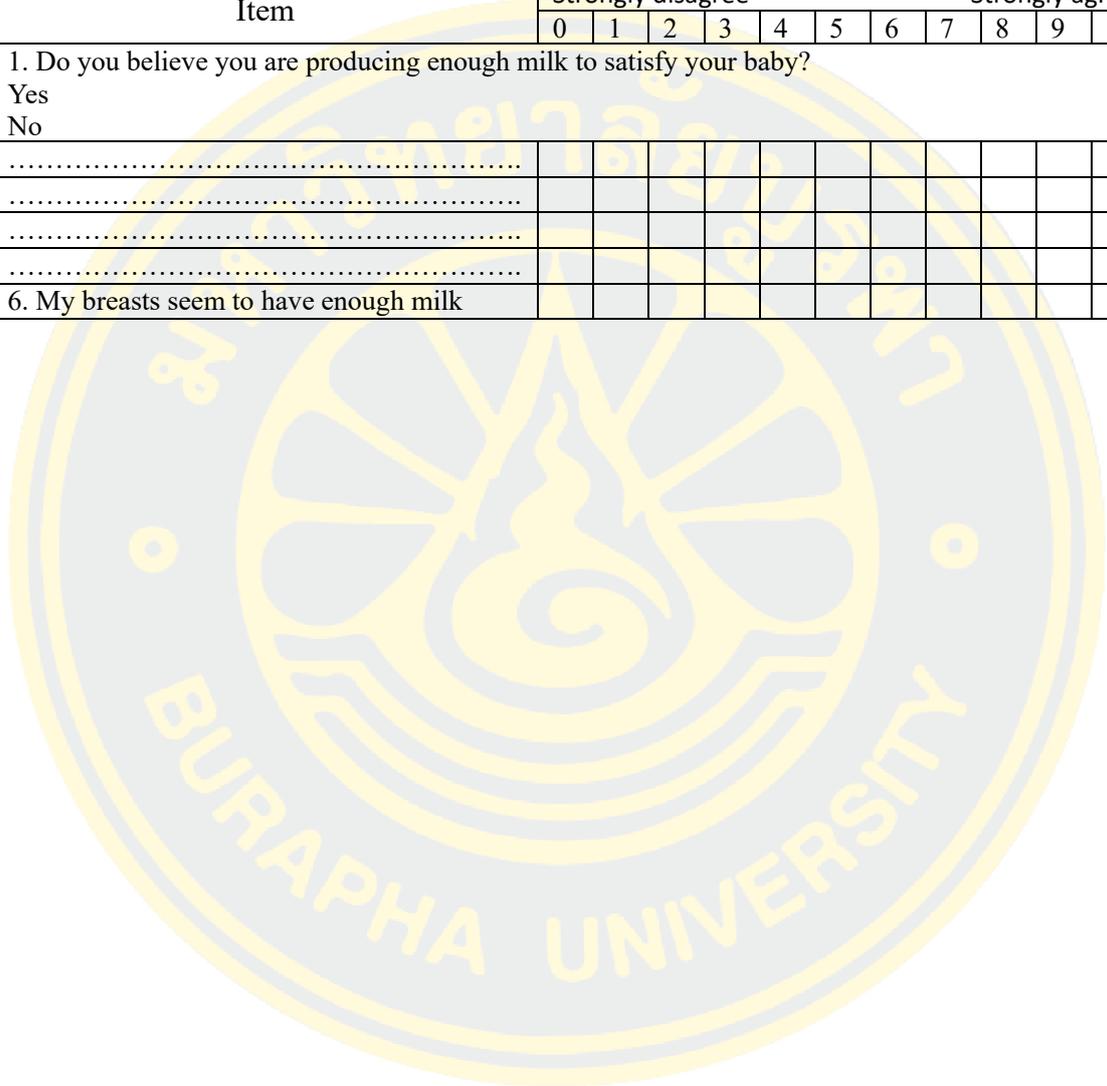
The following is the questionnaire on the basic information of parturient. Please fill in or tick(√) the corresponding column.

1. Age:_____, Gestational age:
2. Height:_____, Pre-pregnancy weight:_____,Current weight:
3. Residence: Urban Rural
4. Marital Status: Married Single or divorced
5. Monthly household income:
 <3000 CNY 3000-6000 CNY 6000-10000 CNY > 10,000 CNY
6. Education: Junior college or below Bachelor degree or above
7. Number of children:
8. Previous breastfeeding experience: Yes No
9. Planned pregnancy: Yes No
10. 1) Receiving breastfeeding education during pregnancy: Yes No
 2) If you have received relevant breastfeeding education during pregnancy, the specific forms are:
 Pregnant mothers class Hospital staff Mass media
 Brochures Others
11. Complications of pregnancy:
 No Gestational diabetes or hypertension Other complications
12. Delivery mode: Vaginal delivery Cesarean section
13. 1) Work plan after production: Return to work Temporarily out of work
 2) If required to return to work, how many days of maternity leave do you have?
 (180 days if you are a stay-at-home mom)
 3) Do you have paid maternity leave if you need to return to work?
 Yes No
14. In addition to the mother herself, the baby's primary caregivers will be:
 Grandpa/grandma/grandpa/grandma Spouse/partner Baby sitter
 Others
- 15.1) Do you "Sit the Month"? Yes No
 2) Do you think "Sit the Month" is helpful for mothers to maintain EBF?
 Yes No

Perceived Insufficient Milk Questionnaire (Original version)

In item 1, please tick (✓) your answer with “Yes” or “No”. Item 2 to item 6, please read the following statements and write down the corresponding score that best fits them, from 0 to 10 indicating “strongly disagree” to “strongly agree”.

Item	Strongly disagree _____ Strongly agree										
	0	1	2	3	4	5	6	7	8	9	10
1. Do you believe you are producing enough milk to satisfy your baby?											
Yes											
No											
.....											
.....											
.....											
.....											
6. My breasts seem to have enough milk											



Infant Feeding Intentions scale (Original version)

Please read the following statements and write down the corresponding score that best fits them, from 0 to 4 indicating “strongly disagree” to “strongly agree”.

Item	Strongly disagree (0)	Disagree (1)	Neutral (2)	Agree (3)	Strongly agree (4)
1. I am planning to only formula feed my baby (I will not breastfeed at all)					
..... ..					
..... ..					
..... ..					
5. When my baby is 6 months old, I will be breastfeeding without using any formula or other milk					

Record form for exclusive breastfeeding (English version)

Exclusive breastfeeding record sheet

The following table is for you to record your daily exclusive breastfeeding status in time. Each column represents your status of exclusive breastfeeding for 7 days a week. If you are breastfeeding exclusively that day, tick \checkmark in the appropriate box, otherwise tick \times . Thank you for your cooperation.

Date	Yes (\checkmark)					
	No (\times)					
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						



Appendix D

Instruments Chinese version

产妇一般情况调查表

以下是产妇基本信息情况调查表，请您在相应栏内进行填写或者进行勾选。

1. 年龄：_____，孕周：_____
2. 身高：_____，孕前体重：_____，现体重：_____
3. 居住地：城市 农村
4. 婚姻状况：已婚 未婚或离异
5. 家庭月收入： <3000 元 3000-6000 元 6000-10000 元 >1 万元
6. 教育程度： 大专及以下 本科及以上
7. 现有几个孩子：_____
8. 以前有无母乳喂养经验： 有 无
9. 是否计划内怀孕： 是 否
10. 1) 孕期是否接受过母乳喂养宣教： 是 否
 2) 如果孕期接受过相关母乳喂养宣教，具体形式是：
 孕妈咪课堂 医院医务人员 大众媒体 宣传手册 其它
11. 是否有妊娠合并症： 无 有妊娠期糖尿病或高血压 其他合并症
12. 分娩方式： 阴道分娩 剖宫产
13. 1) 生产后的工作打算： 返回工作岗位 暂不工作
 2) 如需返岗工作，产假天数是多少?(如果你是全职妈妈，请填写 180 天)
 3) 如需返岗工作，是否拥有带薪产假? 是 否
14. 除了您，宝宝的主要照顾者将是：
 爷爷/奶奶/外公/外婆 配偶/伴侣 保姆 其他
15. 1) 您产后是否坐月子： 是 否
 2) 您认为坐月子对纯母乳喂养是否有利： 是 否

自觉母乳不足问卷

请您阅览下列陈述，勾选出（√）最符合您自身情况的选项。在第1项中，请在您的答案中打上“是”或“否”。第2项到第6项，请阅读下面的陈述，并写出最适合它们的相应分数，从1到5表示“非常不赞同”到“非常赞同”。

条目	非常 不赞同 (1)	赞同 (2)	中立 (3)	赞同 (4)	非常 赞同 (5)
1. 您认为您有足够的母乳满足宝宝吗? A 是 B 否					
.....					
.....					
.....					
.....					
6. 我的乳房似乎有足够的母乳					

哺乳意图量表

请您阅览下列陈述，并在各条目后面写出最符合的分数，0~4分表示“非常不赞同”到“非常赞同”。

条目	非常 不赞同 (0)	赞同 (1)	中立 (2)	赞同 (3)	非常 赞同 (4)
1. 我正打算只喂我的宝宝配方奶（将完全不喂母乳）					
.....					
.....					
.....					
5. 当我的宝宝6个月大时，我将会喂母乳而不使用任何配方奶或其他乳品					

纯母乳喂养记录表

以下表格是为了方便您及时记录每天的纯母乳喂养情况。每一列代表您1周7天每天的纯母乳喂养情况。如果您当天是纯母乳喂养，请在相应空格中打√，否则请打×。谢谢您的配合。

日期	是(√) 否(×)	是(√) 否(×)	是(√) 否(×)	是(√) 否(×)	是(√) 否(×)	是(√) 否(×)
周一						
周二						
周三						
周四						
周五						
周六						
周日						



Appendix E
Permission instrument

Permission of Using Breastfeeding Knowledge Questionnaire (Chinese version)

恳请获得“母乳喂养知识问卷”使用授权     安全浏览模式 优化阅读 | 精简信息

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

收件人: jasmine010<jasmine010@gmail.com>

时间: 2021年12月19日 14:03 (星期日)

发送状态: **发送成功** [查看详情](#)

 您的邮箱安全待提升! 仅需1分钟, 安全性提升30%, 一键升级>>

尊敬的赵老师:

您好!

我是来自江苏省江苏医药职业学院护理学院的吴倩老师, 因研究生课题研究需要, 恳请获得您在研究生论文《北京地区初产妇母乳喂养自我效能及其影响因素的研究》中提到的“母乳喂养知识问卷”的使用授权, 为了遵循科研学术活动的纪律法规, 尊重您的劳动成果, 现发邮件征求赵老师您的意见, 由于该问卷在我的课题研究中十分重要, 恳请赵老师帮忙, 期待您的回信, 万分感谢! 

祝: 工作顺利, 身体健康!

江苏医药职业学院护理学院

吴倩

回复: 恳请获得“母乳喂养知识问卷”使用授权    

发件人: krzzm@sina.com<krzzm@sina.com>

收件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

时间: 2021年12月19日 18:24 (星期日)

 您可以使用泛微的流程审批, 点击启用

您好, 同意使用, 祝研究顺利

赵旻

发自我的华为手机

----- 原始邮件 -----

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>
日期: 2021年12月19日周日 14:01
收件人: krzzm@sina.com
主题: 恳请获得“母乳喂养知识问卷”使用授权

Permission of Using Breastfeeding Attrition Prediction Tool (Chinese version)

回复: 恳请获得“母乳喂养行为预测量表”中文版使用授权

发件人: hong_whw<hong_whw@aliyun.com>

收件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

时间: 2020年11月13日 10:47 (星期五)

附件: 1个 (BAPT.docx) 查看附件

邮件已被回复 查看详情

您可以使用泛微的流程审批... 点击启用

同意使用

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

发送时间: 2020年11月13日(星期五) 10:18

收件人: Hong_whw <Hong_whw@aliyun.com>

主题: 恳请获得“母乳喂养行为预测量表”中文版使用授权

想联系万老师, 恳求获得“母乳喂养行为预测量表”中文版

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

收件人: Hong_whw<Hong_whw@aliyun.com>

时间: 2020年11月13日 10:18 (星期五)

发送状态: 发送成功 查看详情

您的邮箱安全待提升! 仅需1分钟, 安全性提升30%, 一键升级>>

尊敬的万老师:

您好!

我是江苏医药职业学院护理学院的吴倩, 因课题研究需要, 恳请获得您和您的团队在论文“Impact of intervention on breastfeeding outcomes and determinants based on theory of planned behavior”中提到的中文版“母乳喂养行为预测量表”, 为了遵循科研学术活动的纪律法规, 尊重万老师的劳动成果, 现发邮件征求万老师的意见, 恳请万老师帮忙, 再三叨扰, 望万老师见谅, 期待您的回信。

祝: 工作顺利, 身体健康!

江苏医药职业学院护理学院

吴倩

Permission of Using Perceived Insufficient Milk Questionnaire

RE: The request for obtaining the approval to use PIM questionnaire   

发件人: Deborah McCarter <DMcCarter@Anselm.Edu>

收件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

时间: 2021年03月25日 19:27 (星期四)

附件: 1个  PIM.pdf 查看附件

... 您可以使用之前的流程审批... 点击启用

Dear Ada,

This is my current email address. The others are no longer valid. You are most welcome to translate the Perception of Insufficient Milk questionnaire.

Deb McCarter

From: Ada (Wu Qian) <xiaoguaiwq@163.com>
Sent: Wednesday, March 24, 2021 11:54 PM
To: Deborah McCarter <DMcCarter@Anselm.Edu>
Subject: The request for obtaining the approval of translating PIM questionnaire

The request for obtaining the approval of translating PIM questionnaire     安全浏览模式 优化阅读 | 精简信息

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

收件人: 母乳喂养5个条目作者第三个邮箱 <dmccarter@anselm.edu>

时间: 2021年03月25日 11:53 (星期四)

发送状态: **发送成功** 查看详情

 翻译成中文 x

 您的邮箱安全待提升! 仅需1分钟, 安全性提升30%, 一键升级>>

Dr. Deborah McCarter:

Hi, I am Ada, a Ph.D. student coming from Burapha University in Thailand. How are you doing? Hope everything is fine.

I drafted this mail to request for obtaining the approval of translating Perception of Insufficient Milk (PIM) questionnaire. I'm interested in the problems that women have with breastfeeding, and the PIM questionnaire is very important to my current study. I want to ask for your permission to translate this questionnaire. It will be translated in a strict manner to ensure the quality of translation.

I have send another 2 emails to mccartdw@bc.edu and mccarter@spaulding.cc. I don't know which one is the frequently-used email address. I hope I'm not disturbing you.

Looking forward to your reply. Thank you very much!

Have a nice day. Take care...

Ada

25th March, 2021

Permission of Using Infant Feeding Intention Scale (Chinese version)

恩请获得“哺乳意图量表的中文译本”的使用授权     安全浏览模式 优化阅读 | 精简信息

发件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

收件人: 107328<107328@ctust.edu.tw>

时 间: 2021年12月19日 13:54 (星期日)

发送状态: **发送成功** [查看详情](#)

 您的邮箱安全待提升! 仅需1分钟, 安全性提升30%, 一键升级>>

尊敬的何教授:

您好!

我是来自大陆地区 江苏医药职业学院护理学院的吴倩老师, 因博士课题研究需要, 恩请获得您和您的团队在论文“[探討產後婦女之母乳哺育自我效能與哺乳意图對母乳哺育行为的影響](#)”中提到的“[哺乳意图量表的中文译本](#)”的使用授权, 为了遵循科研学术活动的纪律法规, 尊重您和您的团队老师的劳动成果, 现发邮件征求何教授的意见, 由于该量表在我的课题研究中十分重要, 恩请何教授帮忙, 期待您的回信, 万分感谢! 

祝: 工作顺利, 身体健康!

江苏医药职业学院护理学院
吴倩

Re: “[哺乳意图量表的中文译本](#)”的使用授权   

发件人: 何艳如<107328@ctust.edu.tw>

收件人: Ada (Wu Qian) <xiaoguaiwq@163.com>

时 间: 2021年12月20日 13:29 (星期一)

 你可以用泛微OA来审批... [点击启用](#)

同意吳倩的研究使用由本研究團隊所翻譯的“[哺乳意图量表的中文译本](#)”

預祝研究順利

敬祝 順心平安

何艳如 中臺科技大學護理系
Yen-Ju Ho PhD, RN, College of Nursing
Central Taiwan University of Science and Technology
666, Buzih Road, Beitun District, Taichung, 40601, Taiwan, ROC
TEL: +886-4-22391647 ext.7363 FAX: +886-4-22398540
107328@ctust.edu.tw

----- Original Message -----

From: Ada (Wu Qian) <xiaoguaiwq@163.com>
To: 107328@ctust.edu.tw
Sent: 2021/12/19 13:54
Subject: “[哺乳意图量表的中文译本](#)”的使用授权

BIOGRAPHY

NAME	Qian Wu (Ada)	
DATE OF BIRTH	08 Feb 1990	
PLACE OF BIRTH	Jiangsu Province, China	
PRESENT ADDRESS	Faculty of nursing, Jiangsu Vocational College of Medicine, Yancheng, China	
POSITION HELD	2017-2019	Assistant Faculty of nursing, Jiangsu Vocational College of Medicine, Yancheng, China
	2019-present	Lecture Faculty of nursing, Jiangsu Vocational College of Medicine, Yancheng, China
EDUCATION	2006-2010	Bachelor of Nursing Science, Nantong University, Nantong, China
	2010-2013	Master of Nursing Science, Nantong University, Nantong, China
	2019-2023	Doctor of Philosophy in Nursing Science (International Program), Burapha University, Thailand