

INVESTIGATING THE EFFECTIVENESS OF INFANT FEEDING SCHOOL-BASED
EDUCATION ON THE BREASTFEEDING KNOWLEDGE AND ATTITUDES OF
ADOLESCENT FEMALE STUDENTS

by

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Abstract

Objective: To design and pilot test a school-based educational breastfeeding intervention on the breastfeeding knowledge, attitudes and future infant feeding intentions of secondary school adolescent females.

Design: A one-group, pre-test/post-test, quasi-experimental design

Methods: A convenience sample of 77 adolescent secondary school female students received one 70-minute educational breastfeeding session during health education classes in a secondary school in Ontario. Data was collected using self-administered questionnaires at baseline and one day post-intervention. A modified version of the Iowa Infant Feeding Attitude Scale (IIFAS) and a modified Breastfeeding Knowledge Scale were used to measure breastfeeding attitudes and knowledge of participants. Additional outcomes measures included future breastfeeding intentions and students' perceptions of the educational session.

Results: Breastfeeding knowledge ($p < 0.001$), attitude ($p < 0.001$) and future intentions of participants to exclusively breastfeed increased significantly ($p < 0.05$) at post-test. The participant feedback indicated that they found the content useful, interesting and the information was presented in an engaging manner.

Conclusion: These findings suggest that adolescent female students may be receptive to learning about breastfeeding in school and a single school-based educational breastfeeding intervention can positively impact their breastfeeding knowledge, attitude and future intentions. The secondary school setting may be an appropriate setting for the inclusion of educational breastfeeding content to increase awareness of the benefits, importance and physiology of human lactation and enable future informed decision making.

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Chapter 1: Introduction

Background

The aim of this study was to contribute to the growing body of literature that has identified the positive impact of introducing breastfeeding content to adolescent students through educational curricula. Secondary school settings and educational curricula have the potential to serve as successful and appropriate platforms for introducing breastfeeding education to larger populations of adolescents prior to conception. An objective of this study was to examine the impact of disseminating accurate and reliable breastfeeding information as an effective means of increasing breastfeeding knowledge, as well as cultivating positive breastfeeding attitudes and intentions amongst grade 9 and 10 adolescent females. The study operated under the general premise that the provision of quality breastfeeding education that sought to enhance the attitudes and knowledge of the lactation process of secondary school female students could influence the development of informed infant feeding decisions and potentially increase future breastfeeding success rates. The results of this study might suggest and provide support for the inclusion of breastfeeding content within the Ontario Secondary School Curriculum.

Breastfeeding is the most natural method of infant feeding for humans (Public Health Agency of Canada, 2015). Infants that are fed breastmilk following birth are provided with the appropriate amounts of macronutrients (fats, carbohydrates, proteins) and micronutrients (vitamins, iron, calcium) necessary for optimal growth and development (Kim & Froh, 2012). Breastmilk offers both nutritional and immunological properties that are species-specific and essential to an infant's growth and development (Kim & Froh, 2012). The immunological properties of breastmilk consist of numerous antibodies and white blood cells. When these bioactive components are transferred from mothers to infants, they actively protect infants from bacteria and germs, while also facilitating the development and maturation of the infant's own

underdeveloped immune system (Field, 2005). Feeding infants breastmilk as their first food has been shown to reduce the risk of morbidity and mortality caused by various childhood infections, such as urinary tract infections, thrush, acute otitis media, conjunctivitis and acute gastroenteritis (Ladomenou, Moschandreas, Kafatos, Tselentis, & Galanakis, 2010; Duijts, Ramadhani, & Moll, 2009). Breastfeeding is also found to reduce the risk of childhood obesity (Owen, Martin, Whincup, Smith, & Cook, 2005) and incidences of sudden infant death syndrome (Hauck, Thompson, Tanabe, Moon, & Vennemann, 2011).

Research suggests that mothers who breastfeed are at a decreased risk of developing ovarian cancer (Luan, et al., 2013), Type 2 Diabetes (Groer, Jevitt, Sahebzamani, Beckstead, & Keefe, 2013) and metabolic bone diseases such as osteoporosis (Blincoe, 2005). Both the nutritional composition and immune protective properties of breastmilk place it as the highest standard for infant feeding practices. Due to the numerous benefits of breastfeeding and breastmilk, many leading health authorities such as the World Health Organization (2011), Canadian Pediatric Society (2013), Health Canada (2015), and the American Academy of Pediatrics (2012) support the recommendations that infants be breastfed exclusively for the first 6 months of life, with the introduction of nutritious solid foods at 6 months and the continuation of breastfeeding up to and beyond 2 years of age.

Nevertheless, the overall breastfeeding rates in Canada remain below the current public health breastfeeding recommendations. In 2011-2012, 89% of Canadian women initiated breastfeeding shortly after delivery; however, the rates of exclusive breastfeeding decreased significantly thereafter to 51% at 4 months and 26% at 6 months (Gionet, 2015). Although initial post-partum breastfeeding rates are encouraging, the significant decline in duration and continuation of breastfeeding is concerning. Declining rates of breastfeeding within the first few months following birth may be related to a lack of educational and health-promoting

breastfeeding resources available at a population level. Most public health strategies that intend to encourage and increase breastfeeding rates target mothers, families and pregnant women during the prenatal and postnatal periods (de Oliveria, Camacho, & Tedstone, 2001), or they target healthcare professionals who provide healthcare services to women during pregnancy or postpartum care. However, researchers have found that breastfeeding intentions and decisions may be established prior to conception, early on in pregnancy (Earle, 2002), or prior to any discussions with a healthcare provider (Earle, 2002; Meedya, Fahy, & Kable, 2010).

While research findings support breastfeeding as a necessary and valuable biological process, the acceptance of breastfeeding as the most natural and beneficial infant feeding method continues to be challenged by the dominant bottle-feeding culture, in which infant formula is often purported to be a nutritional equivalent of breastmilk (Thompson, 2001; Thompson, 2005). The main messages about infant feeding made available to women and men are delivered primarily by formula companies which tend to market infant formula as a more convenient and equally nutritious substitute for breastmilk and breastfeeding (Pries et al., 2016). This has contributed to the entrenchment of infant formula and bottle-feeding culture within the greater Canadian culture and particularly, maternal-newborn care (Rosenberg, Eastham, Kasehagen, & Sandoval, 2008). Breastfeeding advocates have identified the need to support the resurgence of a breastfeeding culture through initiatives such as the Baby Friendly Hospitals Initiative, a global initiative developed by the World Health Organization (WHO) and UNICEF in 1991 designed to encourage and acknowledge healthcare institutions that support the initiation and continuation of breastfeeding (Baby Friendly Initiative, 2016). Breastfeeding advocacy, support and education such as this are important tools for increasing breastfeeding success rates across Canada.

Public health strategies, legislation and laws including the Baby Friendly Initiative (Baby Friendly Initiative, 2016; Breastfeeding Committee for Canada, 2014) and the Human Rights

Code (Ontario Human Rights Commission, 2014) have been instrumental in establishing support, promotion and protection for breastfeeding mothers in Canada. The aim of these national initiatives is to establish breastfeeding as the cultural norm. Nevertheless, national breastfeeding rates remain low and opportunities to increase awareness and education of breastfeeding at the population level are still needed to increase national rates. Public health education is an important component in refocusing and re-normalizing breastfeeding as a natural biological phenomenon. Strategies to increase the rates of breastfeeding initiation and continuation should continue to place emphasis on breastfeeding as a public health issue rather than merely a personal choice or infant feeding preference (American Academy of Pediatrics, 2012). Currently, an expectation within the Ontario Health and Physical Education Curriculum for grades 9 through 12 is to provide education that will encourage informed lifestyle decisions important to supporting healthy development throughout the lifespan (Ministry of Education, 2015). To situate school-based breastfeeding education within the Ontario Secondary School Curriculum would allow the visions and goals of the curriculum to be aligned with public health initiatives that seek to increase breastfeeding awareness through education and promotion.

Dominant attitudes and knowledge regarding breastfeeding influence infant feeding choices (Shaker, Scott, & Reid, 2004; Fingy, McInnes, Tappin, Wallis, & Oprescu, 2008). As such, the provision of accurate, evidence-based information should be made accessible on a population level to enable individuals to make informed infant feeding decisions. Ineichen, Pierce & Lawrenson (1997) and Marten (2001) found ideas and decisions related to infant feeding preferences were being formed before adolescent students graduated high school. As such, secondary school may be an ideal platform for providing this information; public health initiatives seeking to increase breastfeeding rates and success need to target multiple populations at different stages in life. Exclusively targeting individuals during prenatal and postnatal periods

may be untimely due to culturally influenced attitudes, beliefs and perceptions of breastfeeding that may already be established (Earle, 2002).

Statement of Problem

The results of this research study suggest that breastfeeding education and resources should target members of the population prior to the development of infant feeding preferences, particularly non-pregnant adolescents. Without this breastfeeding education, attitudes and knowledge related to infant feeding practices may be influenced by cultural advertisements and messages that strongly support infant formula and bottle-feeding practices. Currently, only a small body of literature exists that investigates the effectiveness and impact of school-based breastfeeding education on breastfeeding knowledge, attitudes and intentions when provided to adolescents during preconception. This is important to note as school-based breastfeeding education may be a viable means for increasing future breastfeeding rates. Breastfeeding promotion strategies often neglect addressing populations of young and non-pregnant adolescents. This may be due to the perception that breastfeeding is a health-related topic that only becomes relevant once a woman becomes pregnant. This may result in non-pregnant adolescents having insufficient breastfeeding knowledge. When coupled with the exposure to socio-cultural events—such as formula company advertisements that perpetuate the dominance of a bottle-feeding culture—this can lead to the development of negative attitudes towards breastfeeding. Such factors can influence younger and non-pregnant populations who may lack the educational tools, necessary knowledge, or skill sets required to make informed health-related decisions about infant feeding practices in the future.

As breastfeeding education is often provided during the prenatal and postnatal stages, breastfeeding information tends to become more readily available after a woman becomes

pregnant or requires breastfeeding support. At this point, women and families may have beliefs and views of breastfeeding established, with their preferred method of infant feeding having potentially been determined during the early stages of adolescence (Ineichen, Pierce, & Lawrenson, 1997; Goulet, Lampron, Marcil, & Ross, 2003; Marten, 2001). Therefore, breastfeeding education should also target women and men prior to conception to ensure they receive accurate information from which they can cultivate appropriate health-related decisions about infant feeding practices.

Purpose

The purpose of this study was to evaluate the impact of a single school-based educational breastfeeding session on the breastfeeding attitudes, knowledge and intentions of adolescent females in grades 9 and 10. An educational breastfeeding session was delivered during health class as a part of the secondary school reproductive health curriculum. The Theory of Planned Behavior (TPB) was used as the theoretical framework to design and pilot test this intervention because it suggests that attitudes and beliefs can be altered by knowledge, impact intention and future behaviour (Ajzen, 1991). Therefore, it was hypothesized that making breastfeeding education available to adolescents during preconception stages of development may improve breastfeeding knowledge, encourage positive breastfeeding attitudes and increase future intentions to breastfeed. Furthermore, the inclusion of breastfeeding education within school curricula should be examined as an important public health initiative to increase breastfeeding rates as infant feeding decisions may be formed prior to adolescents graduating from secondary school (Ineichen, Pierce & Lawrenson, 1997). Introducing breastfeeding education during secondary school might allow for public health information to be communicated to a larger, underserved population while they are still readily accessible through the public school system.

This may also help to establish healthy and positive views of breastfeeding as the normal infant feeding method while providing a safe and open environment to engage in dialogues about topics that are either not openly discussed, or are viewed as potentially sensitive and personal such as breastfeeding in public spaces. Finally, the timely provision of this education may aid in challenging and shifting the current bottle-feeding culture towards the ideal of breastfeeding as the cultural norm.

Research Objectives

The primary research objectives were to:

1. Evaluate the impact of a school-based educational breastfeeding session on adolescent females' breastfeeding knowledge and attitudes;
2. Examine if breastfeeding education influences future intentions to breastfeed;
3. Examine non-pregnant adolescents' perceptions of a school-based educational breastfeeding session.

Significance of Study

This study aimed to contribute to the growing body of literature on providing school-based breastfeeding education, specifically, with adolescent populations during preconception stages of development. Breastfeeding is an important public health issue and the education and advocacy in support of breastfeeding may play a significant role in the initiation, duration and continuation of breastfeeding. As this study was completed in a secondary school, it measured the effectiveness of the setting and timeliness in which breastfeeding education takes place for adolescent populations. Adolescence is a transitional stage where young adults are becoming more independent and autonomous in their decisions and choices. They are building

attitudes and beliefs that they may carry into adulthood, which will shape their future behaviours and choices. It may be possible to comfortably situate breastfeeding education within the secondary school curriculum by including it as part of a reproductive unit in health education, or in any courses where reproduction is taught, such as biology. The intervention used in this study was specifically designed to align with content taught within the Ontario Secondary School Health and Physical Education curriculum (Ministry of Education, 2015) and took into consideration issues pertaining to time restrictions resulting from class schedules. The results of this study provided valuable information on student readiness and willingness to learn about topics related to breastfeeding within the reproductive curriculum and the effectiveness of this intervention on breastfeeding knowledge, attitudes and future intentions.

The findings of this study may be used to inform educational policy makers on the importance of mandating the inclusion of breastfeeding education within secondary school curricula. These results may also assist policy makers in recognizing that the inclusion of educational breastfeeding content is congruous with the provision of current education on different reproductive physiological processes taught to secondary school students. Teaching breastfeeding content in schools may be an effective means for promoting positive views of breastfeeding. The delivery of the content may also help to foster positive breastfeeding attitudes and increase breastfeeding knowledge, intentions and future breastfeeding behaviour. This may increase future breastfeeding exclusivity and duration rates, a public health priority due to the importance of breastfeeding to the health of mothers and their infants.

Chapter 2: Literature Review

This chapter provides an overview of the current state of literature related to (1) adolescent breastfeeding knowledge, attitudes and intentions and the factors that influence intentions; (2) school-based educational breastfeeding interventions, their effectiveness and intervention design, and (3) the Theory of Planned Behavior (TPB) and how this framework supports the design and evaluation of the school-based intervention evaluated in this study. This review reflects evidence that suggests providing quality breastfeeding education to adolescents may increase breastfeeding knowledge, aid in the development of positive attitudes and potentially impact their future breastfeeding intentions, all of which are strong predictors of the successful implementation of this health practice.

This literature review was conducted using PubMed Database, ProQuest, UOIT Library Journals, Google Scholar and the reference list of related journal articles. Key search words used to identify articles included: adolescents, attitudes, breastfeeding, duration, curriculum, education, initiation, knowledge, reproductive health, students and school-based and health education. A total of 20 full-text articles related to youth and adolescents' breastfeeding knowledge, attitude, and intentions were retrieved and used for this literature review. An additional 11 articles which evaluated school-based breastfeeding interventions among primary and secondary school-aged youth were also included. Inclusion criteria for this literature review required all articles to have addressed or included a student population and have been published in English within the last 20 years. A specific age for study participants was not stipulated for inclusion criteria as there was a large age range presented, ranging from grade school to university students. Both national and international studies were included in the review. Articles that focused primarily on the attitudes and knowledge of adult populations over the age of 26 or parent populations were excluded.

Adolescents Breastfeeding Knowledge, Attitudes and Intentions

Twenty studies that addressed adolescents' breastfeeding knowledge, attitudes and intentions using variations of a cross-sectional descriptive study design and that implemented self-administered questionnaires were included. The participant populations in these studies ranged from grade school age to university and took place in several countries including Canada (Fairbrother & Stanger-Ross, 2010; Goulet et al., 2003), United States (Kornides & Kitsantas, 2013; Forrester, Wheelock, & Warren, 1997; Kavanagh, Lou, Nicklas, Habibi, & Murphy, 2012; Leffler, 2000; Spear, 2007), Scotland (Swanson, Power, Kaur, Carter, & Shepherd, 2006; Russel, Richards, Jones, & Hoddinott, 2004), Ireland (Greene, Stewart-Knox, & Wright, 2003; Giles, et al., 2007), Ethiopia (Hadley, Lindstrom, Belachew, Tessema, 2008), China (Tarrant & Dodgson, 2007), Korea (Kang & Song, 2005), Kuwait (Ebrahim, et al., 2011), India (Thulasingham, Padmanabhan, & Chinnakalai, 2016), Taiwan (Ho & Yu, 2014), Nigeria (Spurles & Babineau, 2011), England (Gale & Davies, 2013), and Egypt (Ahmed & El Guindy, 2011).

Breastfeeding Knowledge. Researchers have found breastfeeding knowledge to be an important predictor of future infant feeding practices (Kornides & Kitsantas, 2013; Tarrant & Dodgson, 2007). Some studies evaluating breastfeeding knowledge indicate that adolescent students had an overall good knowledge and understanding of the benefits of breastfeeding (Fairbrother & Stanger-Ross, 2010; Goulet et al., 2003; Tarrant & Dodgson, 2007). Most students recognized the superiority of breastfeeding to formula feeding (Ebrahim et al., 2011), perceived breastfeeding as a healthier feeding practice than formula feeding (Forrester et al., 1997; Gale & Davies, 2013) and could differentiate between the beneficial value of breastmilk in comparison to infant formula (Kavanagh, Lou, Nicklas, Habibi, & Murphy, 2012). Additionally, the health protective benefits of breastfeeding for infants were generally well understood by students (Ebrahim et al., 2011; Kornides & Kitsantas, 2013).

Breastfeeding Knowledge Deficits. Some researchers have identified contradictory results regarding the breastfeeding knowledge of adolescents in five main areas, which include: (1) the benefits to the mother (Fairbrother & Stanger-Ross, 2010; Kavanagh et al., 2012; Swanson, et al., 2006); (2) technical knowledge of how breastfeeding works (Kang & Song, 2005); (3) breastfeeding recommendations (Ebrahim et al., 2011; Tarrant & Dodgson, 2007; Thulasingam et al., 2016); (4) risk of formula feeding (Fairbrother & Stanger-Ross, 2010; Kavanagh et al., 2012; Swanson et al, 2006); and (5) misconceptions of breastfeeding (Ebrahim et al., 2011; Tarrant & Dodgson, 2007). Each area will be described separately.

Benefits to the mother. Swanson et al. (2006) found that adolescents had poor knowledge of the benefits of breastfeeding for the health of breastfeeding mothers. Similar results have been noted in other studies with adolescent students having poor awareness of the benefits to breastfeeding mothers, particularly with how it pertains to the reduced risk of ovarian and breast cancer (Fairbrother & Stanger-Ross, 2010; Kavanagh et al., 2012). Leffler (2000) found that 86% of adolescent females were unsure of any benefits of breastfeeding for mothers, and another 7% did not believe there to be any health benefits for mothers. Leffler's (2000) findings were consistent with findings by Fairbrother & Stanger-Ross 2010, Kavanagh et al. (2012) and Gale & Davies (2013). Thus, the importance of breastfeeding to maternal health may not be adequately realized among this population.

Technical knowledge of breastfeeding. Kang & Song (2005) found that most university students in their study could correctly answer knowledge questions pertaining to the benefits of breastfeeding (61% and 57%, males and females, respectively). However, few of the students could correctly answer questions pertaining to technical knowledge of breastfeeding related to the physiological production of milk (10%) and the biological process (23.2%, males, 26.5%, females). Ahmed & El Guindy (2011) also found baccalaureate students in Egypt had less

knowledge of the physiology of breastfeeding and breastfeeding management when compared with the benefits of breastfeeding. These were the only two studies included in this literature review that contained questions related to the technical aspects of milk production and physiology of lactation in their definition and measure of breastfeeding knowledge. Other studies have mainly defined breastfeeding knowledge as being related to the benefits and importance of breastfeeding (Kavanagh et al, 2012; Bottaro & Giugliani, 2009; Seidel et al., 2013; Tarrant & Dodgson, 2007).

Breastfeeding recommendations. Recommendations regarding breastfeeding exclusivity and duration were additional topic areas where adolescent breastfeeding knowledge could be improved. Tarrant & Dodgson (2007) identified that adolescent students agreed that mothers should initiate breastfeeding soon after childbirth, which is consistent with the recommendation for initiation. However, additional studies have indicated that adolescent students were not well-informed of the standard breastfeeding recommendations for exclusive breastfeeding and breastfeeding continuation, 6 months and 2 years, respectively (Ebrahim et al., 2011; Thulasingham, Padmanabhan, & Chinnakalai, 2016; Hadley et al., 2008; Ahmed & El Guindy, 2011).

Risks of formula feeding. The literature suggests that adolescent knowledge of the risks of formula feeding is not well understood. Fairbrother & Stranger-Ross (2010) indicated that many adolescents were unaware of the adverse health conditions associated with infant-formula feeding. Participants in a study by Kavanagh et al. (2012) were unaware of the increased incidence of viruses and illness found in formula fed infants when compared to breastfed infants. Additionally, Swanson, et al. (2006) found adolescents had poor knowledge of the overall benefits of breastmilk compared to formula.

Misconceptions of breastfeeding. Misconceptions of breastfeeding were common findings among adolescents. Ebrahim et al. (2011) identified that breastfeeding misconceptions held by adolescents included thoughts that mothers should temporarily interrupt breastfeeding practices for several reasons, such as if mothers were ill with a fever, sore throat, rash or were on antibiotics and if the infant was ill with fever, diarrhea, rash, vomiting or was refusing to eat. Further misconceptions regarding breastfeeding practices also included dietary restrictions to specific foods when breastfeeding (Ebrahim et al., 2011, Tarrant & Dodgson, 2007).

The findings related to adolescents' knowledge deficits and misconceptions about breastfeeding are concerning as they may impact intentions to breastfeed in the future. These findings suggest that some individuals may not be well-informed regarding breastfeeding and this may be the result of a historically formula feeding dominant culture that did not value breastfeeding as an important infant feeding practice. Cultural beliefs that support bottle-feeding may impact society's knowledge and attitudes towards breastfeeding (Goulet et al., 2003). Additionally, the gaps in breastfeeding knowledge may reflect the impact of continued mass marketing of infant formula companies that attempt to portray infant formulas as nutritional equivalents to breastmilk. Consideration of these societal influences should be reviewed when designing breastfeeding education content within the school settings.

Breastfeeding attitudes & beliefs. Attitudes held about breastfeeding are important predictors of infant feeding behaviour. Breastfeeding attitudes may be directly related to infant feeding practices and have been found to largely influence breastfeeding intentions (Bai, Middlestadt, Peng, & Fly, 2010; Nanishi & Jimba, 2014). Jessri, Farmer, Maximova, Willows & Bell (2013) found that women with more positive attitudes towards breastfeeding were 4.29 times more likely to breastfeed their infants exclusively to 6 months, compared to women with lower breastfeeding attitude scores. Studies which have evaluated adolescents' attitudes and

beliefs towards breastfeeding have found them to be both positive (Goulet et al., 2003; Tarrant & Dodgson, 2007) and negative (Green et al., 2003; Giles et al., 2010). Many of the negative behavioural beliefs are misconceptions which may be amenable to change through educational interventions.

Adolescents' positive beliefs include: enhanced mother-child bonding, health benefits to child and mother, the convenience of breastfeeding and the economic cost benefits of breastfeeding compared to formula-feeding (Kavanagh et al., 2012; Goulet et al., 2003; Tarrant & Dodgson, 2007; Forrester et al., 1997). Negative breastfeeding beliefs held by adolescents include: the inconvenience of breastfeeding (Green et al., 2003); restricted freedom of breastfeeding mothers compared to mothers that bottle-feed (Tarrant & Dodgson, 2007); embarrassment of breastfeeding (Giles et al, 2010; Tarrant & Dodgson, 2007; Gale & Davies, 2013); the lack of societal acceptance for public breastfeeding (Kavanagh et al., 2013); the perceived pain or discomfort associated with breastfeeding (Kavanagh et al., 2013; Gale & Davies, 2013); the belief that breastfeeding is unattractive (Forrester et al., 1997); and the belief that breastfeeding practices exclude father involvement and decreased father-infant attachment (Ebrahim et al., 2011; Goulet et al., 2003).

Breastfeeding intention. Studies have found that adolescent intentions to breastfeed relate to more positive attitudes held about breastfeeding (Tarrant & Dodgson, 2007). Breastfeeding intentions of adolescents have been documented in several studies with a wide range of findings, where 29% (Swanson et al. 2006), 31.8% (Ho & Yu, 2014), 47% (Gale & Davies, 2013) 52% (Leffler 2000), 63% (Tarrant & Dodgson, 2007) and 100% (Spurles & Babineau, 2011) of students indicated that they intended to breastfeed in the future. These results suggest that infant feeding decisions may be formed early on in life and that educational interventions may help shape these intentions. Cultures that were supportive of breastfeeding

enhanced adolescents' positive attitudes of breastfeeding, which translated into an increased intention to breastfeed in the future (Giles et al., 2010). These results suggest a need to cultivate a culture with less social barriers to breastfeeding that supports breastfeeding as a cultural norm (Swanson et al., 2006) and ultimately allowing for adolescents to foster more positive attitudes that encourage future breastfeeding intentions (Ho & Yu, 2014).

Factors found to impact adolescents' breastfeeding intention included: (1) having been breastfed as an infant, (2) having been exposed to breastfeeding, (3) breastfeeding attitudes of family and friends, (4) having prior knowledge about breastfeeding or having received breastfeeding education. Each of these will be discussed separately.

Breastfed as an infant. Several studies identified a positive correlation between an adolescent's personal experience of being breastfed and their future intent to breastfeed; those who were breastfed were more likely to intend to breastfeed (Kavanagh et al., 2012; Leffler, 2000). Adolescents who were breastfed as infants also held more positive attitudes towards breastfeeding in public and advocated for the encouragement of breastfeeding (Forrester et al., 1997; Giles et al., 2010; Green et al., 2003). Additionally, individuals who were breastfed as infants were observed to have better knowledge of breastfeeding and perceptions of infant feeding practices that influenced their personal breastfeeding attitudes (Kavanagh et al., 2012).

Exposure to breastfeeding. Previous exposure to breastfeeding was another influential predictor of breastfeeding intention among adolescents (Ebrahim et al., 2011). Adolescents who had seen a mother breastfeed her child were more likely to intend on breastfeeding their own child compared to individuals who were never exposed to breastfeeding (Leffler, 2000; Tarrant & Dodgson, 2007; Ho & Yu, 2014). Goulet et al. (2003) found that individuals previously exposed to breastfeeding were more convinced of the advantages of breastfeeding. Adolescents exposed to family, friends or relatives who had breastfed saw breastfeeding as more natural and

normal (Spurles & Babineau, 2011). As such, increasing exposure to breastfeeding may help to normalize infant feeding practices that may contribute to enhanced positive attitudes towards this infant feeding practice and essentially influence future breastfeeding initiation rates (Fairbrother & Stanger-Ross, 2010) relationship between breastfeeding exposure, increased knowledge, and positive attitudes of adolescents towards breastfeeding (Tarrant & Dodgson, 2007).

Breastfeeding attitudes of family and friends. The attitudes and support of family and friends play an important role in the breastfeeding intention of adolescents (Giles et al., 2010). Kornides & Kitsantas (2013) indicated that peer perceptions of breastfeeding influenced adolescents' attitudes and beliefs towards breastfeeding. Parental norms towards breastfeeding were also found to be more influential than peer norms (Swanson et al., 2006). Women with families that were supportive of breastfeeding had significantly higher odds of breastfeeding initiation and continuation (Goulet et al., 2003).

Breastfeeding education. Research supports the use of health educational campaigns as a strategy for improving positive breastfeeding norms, perceptions and increasing knowledge that may influence future infant feeding attitudes and intentions (Fairbrother & Stanger-Ross, 2010). When asked, many adolescent students indicated that they had not received instruction related to the importance of breastfeeding within their reproductive school curriculum (Spear, 2007; Walsh et al., 2008; Green et al., 2003). However, non-pregnant adolescents who had previously received educational material on breastfeeding supported the inclusion of breastfeeding content within the school curriculum (Greene et al., 2003; Spear, 2007; Forrester et al., 1997; Gale & Davies, 2013; Ho & Yu, 2014). Forrester et al. (1997) found that students believed health education regarding breastfeeding promotion could change negative attitudes, such as embarrassment associated with breastfeeding. Providing this information to both male and female adolescent students may increase future breastfeeding intentions as well as male support of their partner's decision to

breastfeed (Forrester et al.,1997). Breastfeeding education is an important component of supporting accurate knowledge and fostering positive breastfeeding attitudes. Adolescence may be an appropriate time to introduce concepts related to the importance of breastfeeding as many adolescents may be in the early stages of developing their attitudes and perceptions towards breastfeeding. This identifies an opportunity to positively influence breastfeeding knowledge and attitudes by targeting adolescent students before they reach reproductive stages in life or have internalized a discouraging breastfeeding misconception.

Educational Interventions

Since 2001, eleven school-based breastfeeding interventions studies have been published (See Appendix A). Additionally, Glaser, Roberts, Grosskopf, & Basch (2016) published a systematic review of school-based breastfeeding interventions which included 6 of these studies. These studies have been conducted in several countries including Brazil, Canada, England, Ireland, Taiwan and the United States.

All eleven studies evaluated an educational breastfeeding intervention with young non-pregnant adolescents to determine the impact on breastfeeding knowledge, attitudes and future intentions. Males were included in eight of these studies (Bottaro & Giugliani, 2009; Costa et al., 2006; Fujimori, Morais, Franca, de Toledo & Honori-Franca, 2008; Marten, 2001; November, 2013; Seidel et al., 2013; Walsh et al., 2008; Zeller, 2016). Three of the studies recruited only female students (Giles et al., 2014; Bailey & Shepherd, 2007; Ho & McGrath, 2016). Participant ages ranged from 9-19 years. Six studies took place in secondary schools (Giles et al., 2014; Ho & McGrath, 2016; November, 2013; Seidel et al., 2013; Walsh et al., 2008; Bailey & Shepherd, 2007), while five were conducted with primary school-aged children

in grades 5-8 (Bottaro & Giugliani, 2009; Fujimori et al., 2008; Marten, 2001; Zeller, 2016; Costa et al., 2006).

Educational breastfeeding sessions were delivered in a group format in each of the studies. To measure the impact of the educational intervention on outcomes related to breastfeeding, such as attitude, knowledge, beliefs or intentions, nine of the studies used a cluster randomized design, while two studies used quasi-experimental one group pre-test-post-test design (Seidel et al., 2013; Zeller, 2016). Most of the interventions consisted of a single session, ranging in length from 30 - 90 minutes. One study by Giles and colleagues (2014) included two 35-minute sessions. Another study by Bottaro & Giugliani (2009) included 3 sessions that were 45-90 minutes in length. All educational sessions were facilitated by the researchers in this study. In two studies, professionals with qualifications (e.g. a lactation consultant, a registered nurse and a nurse practitioner) presented the material. The presentations included lectures with additional teaching aids in all cases.

Glaser, Robers, Grosskopf & Basch (2016) conducted a systematic review, assessing the impacts of various educational breastfeeding interventions being taught in schools. Six studies were included in the systematic review (Bottaro & Giugliani, 2009; Giles et al., 2014; Marten, 2001; Seidel et al., 2013; Walsh et al., 2008; Fujimori et al., 2008). Due to the heterogeneity of these studies and the variances in study design, population, format and data collection tools, a meta-analysis was not conducted. Instead, a qualitative analysis of the included studies was presented. Overall, breastfeeding interventions conducted in schools had positive impacts on the attitudes and knowledge of adolescents and children. These findings remained consistent with the five additional studies not included in this review, which were conducted by November (2013), Zeller (2016), Bailey & Shepherd (2007), Ho & McGrath (2016) and Costa et al. (2006).

Limitations to Research. Based on this review, there is a growing body of literature related to the impacts of school-based breastfeeding interventions. The main limitations found among these 11 studies were related to: (1) the lack of a consistent measure of main outcomes – breastfeeding attitude and knowledge, (2) the design of interventions which varied by the number of sessions, duration and content and (3) that population samples varied in age. Each of these limitations had a significant impact on the ability to draw conclusions about the most effective manner of delivering the educational breastfeeding content to those in the adolescent age group. Nevertheless, these previously conducted school-based interventions could be used to inform and design interventions that could be used in schools to positively influence breastfeeding knowledge, attitudes and intentions.

Theoretical Framework

The Theory of Planned Behaviour (TPB) has been used in breastfeeding-related studies to describe predictors of breastfeeding (Swanson & Power, 2005; Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012). This theoretical model identifies breastfeeding intentions as a direct antecedent of actual behaviours related to breastfeeding initiation, duration, exclusivity and continuation (Bai et al., 2010; Swanson et al., 2006). The TPB identifies an individual's attitudes, subjective norms and perceived behavioural control as antecedents of intention and as such, it has been used to understand the factors that influence individuals' decisions to breastfeed. Studies have consistently shown that a person's intention to breastfeed is a key predictor of breastfeeding behaviours and practices (McMillian et al., 2009; Lawton et al., 2012; Guo, Wang, Liao, & Huang, 2016). The TPB may provide useful insight for understanding the factors that influence breastfeeding intentions and behaviours that are essential for increasing breastfeeding rates.

Knowledge gained through the application of the TPB theory may aid in the development and evaluation of educational breastfeeding interventions designed for adolescent populations, with the intention of increasing their awareness and motivation to breastfeed (Giles et al., 2007; Giles et al., 2014). A good way to modify a targeted behaviour, which in this study is future breastfeeding intentions, is to measure the behavioural intentions. The current study pilot study sought to design a behaviour change intervention. A modified version of TPB was used to reflect the inclusion of knowledge and education as factors influencing behaviours that could impact future intentions to breastfeed (Figure 1). The use of a strong theoretical framework to guide this study helped to situate this research within the larger body of health promotion research that has sought to understand and test the use of interventions that influence behavioural change. Similarly, Bailey & Shepherd (2007), Seidel et al. (2013) and Giles et al. (2014) have used TPB as a primary theory in the development and implementation of their breastfeeding interventions with school-aged children and adolescents.

Theory of Planned Behavior. The Theory of Planned Behavior (TPB), developed by Ajzen & Fishbein (1991), is an ideal framework to use when discussing the role of adolescents' breastfeeding attitudes, beliefs and future infant feeding intentions. This theory states that intention is a strong predictor of behaviour, by which intention is influenced by three components: (1) behavioural beliefs that inform attitudes towards a behaviour, (2) normative beliefs that inform subjective norms and (3) perceived control (Giles, et al., 2007; Armitage & Conner, 2001). Each of these components and the ways in which they relate to adolescents' breastfeeding beliefs and intentions will be described further.

Behavioural beliefs. Behavioural beliefs can be defined as the attitudes related to an individual's knowledge of the importance and benefits of breastfeeding (Zhu, Zhang, Ling, & Wan, 2016). An individual's attitude towards breastfeeding can be influenced by behavioural

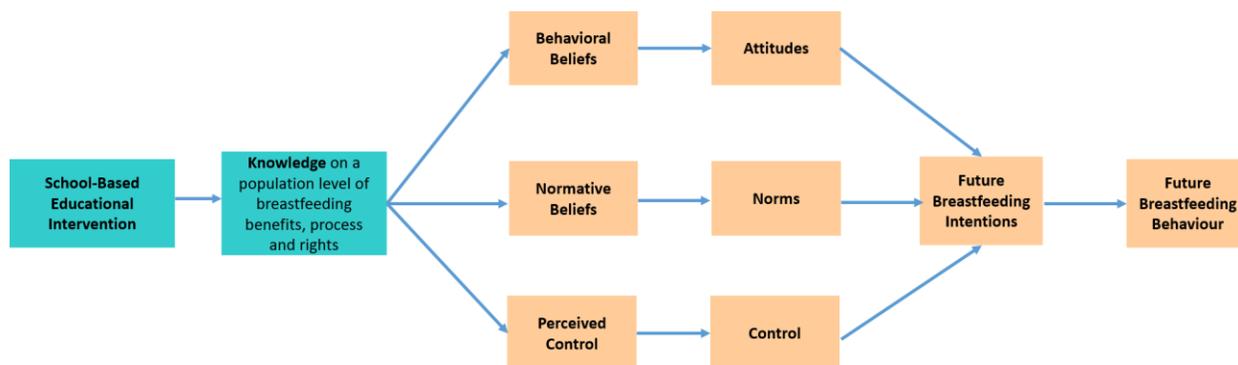
beliefs and the evaluation of outcomes as they assess the consequences of performing the behaviour (Bai, Middlestadt, Peng, & Fly, 2010). Attitudes towards breastfeeding are influenced by the perceived consequence of engaging in the behaviour (Sutton et al., 2003). An individual's perceptions of positive consequences of the behaviour positively influences their intentions to perform the behaviour. An educational intervention can provide necessary evidence-based information that identifies the beneficial health consequences of breastfeeding and debunking negative misconceptions, all of which may increase future breastfeeding intentions among young adolescents.

Normative beliefs. Scott et al. (2003) described normative beliefs as the social pressures and expectations an individual may feel from those close to them that can impact their choice to perform a behaviour. For adolescents for whom breastfeeding is not the cultural norm, formal breastfeeding education may be advantageous as they may not receive peer or family support in favour of breastfeeding and may lack adequate information regarding the importance of breastfeeding. They may then be able to provide this important information to their families and peers. Providing breastfeeding education on a population level as part of the reproductive curriculum in secondary school may also address the disparities in breastfeeding knowledge among some segments of society, increase peer support and increase normative breastfeeding attitudes.

Perceived control beliefs. Perceived control beliefs refer to an individual's confidence in his/her ability to achieve a target behaviour. Factors such as acquiring the necessary knowledge, availability of adequate resources and opportunities, and having fewer perceived obstacles are important to individuals' perceived control beliefs (Armitage & Conner, 2001; Hagger & Chatzisarantis, 2009). A barrier often identified by adolescents is breastfeeding in public, where it is perceived as embarrassing, unacceptable in public and that they will lack public support

(Tarrant & Dodgson, 2007; Goulet et al., 2003; Spurles & Babineau, 2011; Spear, 2007). The provision of breastfeeding education and awareness at the population level may normalize breastfeeding and may allow adolescents to feel that breastfeeding is supported in public spaces. If the behaviour of breastfeeding in public can be regarded as a norm rather than a barrier, then it becomes possible for a breastfeeding-friendly culture to foster (Forrester et al., 1997). Increased awareness of breastfeeding as a protected human right and the rights of women to breastfeed anywhere and anytime (Ontario Human Rights Commission, 2014) should be included in school-based breastfeeding education interventions to decrease perceived conflicts and increase perceived control. An additional area in which this school-based intervention may increase control is in providing knowledge of the lactation process and the appropriate way to latch a baby to the breast. Thus, providing the tools for success and eliminating barriers through breastfeeding education, may increase perceived control beliefs.

Figure 1. Modified Theory of Planned Behavior



Conclusion

This literature review acknowledges and supports the need for continued research to determine the effectiveness of school-based breastfeeding educational interventions designed to strengthen adolescents' knowledge and attitudes of breastfeeding that may positively influence

future breastfeeding intentions. Breastfeeding is the gold standard for infant feeding due to the many known short-term and long-term health benefits for both infants and mothers (Binns, Lee, & Low, 2016; Groer et al., 2013), and the economic benefits to public health care systems (Mahon, Claxton, & Wood, 2016; Walters, 2016). Several studies investigating factors that influence breastfeeding practices and choices support the notion that knowledge and attitude greatly influence breastfeeding intention (Tarrant et al., 2007; Costa et al., 2006; Marten, 2001; Zeller, 2016).

Most breastfeeding interventions and educational resources are available for pregnant and childbearing families; however, this review supports the understanding that attitudes and knowledge of breastfeeding can be developed during adolescence and preconception, that is, prior to imminent thoughts of becoming pregnant (Tarrant & Dodgson, 2007). Non-pregnant adolescents have many considerations about breastfeeding and infant feeding practices long before they decide to have a child (Tarrant & Dodgson, 2007; Leffler, 2000). As such, gearing health educational resources regarding breastfeeding solely towards pregnant or childrearing families may not significantly improve breastfeeding rates (Goulet et al., 2010; Walsh et al., 2008). This suggests that adolescence is an appropriate age to assist in the development of positive breastfeeding attitudes while also challenging internalized misconceptions ultimately allowing them to make informed infant feeding decisions in the future (Leffler, 2000).

Previous studies assessing the effectiveness of school-based breastfeeding education have consistently shown to be effective and successful in positively influencing breastfeeding knowledge, attitudes and future intentions of adolescents (Bottaro & Giugliani, 2007; Ho & McGrath, 2016; Walsh et al., 2008; Zeller, 2016). Similar interventions could be implemented locally in the Ontario educational curriculum; however, a uniform education session has yet to be designed. The current study seeks to pilot a school-based breastfeeding intervention as part of the

Ontario secondary school reproductive curriculum. The intervention design incorporated elements of similar previously published studies that were found to be effective, some of which also utilized the Theory of Planned Behavior (TPB).

Although the data to date provides preliminary evidence regarding the effectiveness of educational modules in schools, more research is warranted. Educational modules need to be tested within schools to identify their usefulness in improving knowledge and attitudes of students and students' perceptions of such interventions. This research is required to identify the need to amend school policies to be more inclusive of breastfeeding content in current health education curriculum. The findings of this study support the need for including breastfeeding content within the reproductive curriculum and may be of interest to policy makers.

Chapter 3: Methodology

Design

This study was conducted to evaluate the impact of a single session school-based educational breastfeeding intervention on adolescent female participants' breastfeeding knowledge, attitudes and future infant feeding intentions. To gather the necessary data for this study a pre-test/post-test one-group quasi-experimental study research design was used. Quasi-experimental designs are studies that lacked controlled groups and randomizations (Bärnighausen et al., 2017; Rockers et al., 2015), which was appropriate for this study. At the request of the school board randomization was not used and all participants were provided with an equal opportunity to benefit from the educational breastfeeding intervention. The study was conducted over the duration of three days. A pre-test questionnaire was completed by participants on day one of the study, the educational session was delivered on day two and a post-test questionnaire was completed on the third day of the study. The pre-test and post-test questionnaires used in this study were compiled from a modified version of the Iowa Infant Feeding Attitude Scale (de la Mora, Russell, Dungy, Losch, & Dusdieker, 1999) and a modified Breastfeeding Knowledge Scale (Abbass-Dick et al., 2017). All questionnaires were self-administered by the participants within their health education classrooms. Data related to students' perception regarding having the inclusion of breastfeeding content in the reproductive health curriculum was also collected.

Table 1. Time Points and Data Collection Measures

Measures	Day 1	Day 2	Day 3
	Pre-test	Intervention	Post-test
Demographics	X		
Intentions	X		X
Breastfeeding Knowledge (BKS)	X		X
Infant feeding Attitude (IIFAS)	X		X
Satisfaction with intervention		X	
Question regarding inclusion of breastfeeding content in curriculum			X

Ethical Considerations

Approval to conduct this research study was granted by both the University of Ontario Institute of Technology (UOIT) Research Ethics Board (Appendix B) and the participating School Board Ethics Committee prior to the commencement of the study.

Sample

A convenience sample of 79 adolescent female students in grades 9 and 10 participated in this study. The population sample in this study was made accessible due to the interests of the health educators at the school where this study was conducted. These educators expressed an interest in having an educational breastfeeding lecture taught to their health education classes. This method of sampling (purposive, non-random) was selected because of its feasibility, high degree of accessibility to the target population, low cost of recruitment and its timeliness (Salkind, 2010).

Inclusion criteria for this study required that participants be female students enrolled in a health education course at the participating school. Male student cohorts were not included in this study as the reproductive content was taught in all-female health education classes.

Recruitment. Participants were recruited for this study from four all-female health education classes at a secondary school in the Greater Toronto Area in June 2015. All students from these classes were invited to participate in the research study. Each student was provided with a recruitment package by their health educators one week prior to the commencement of the study. The researchers for this study were not present during the recruitment process. Recruitment packages were prepared by the primary researcher (CR) and reviewed by the supervising researcher (JAD). The recruitment packages included a recruitment poster, an assent form and a parental consent form if students were under 18 years of age. All students interested in participating in the study were asked by their health educators to complete and sign the assent and/or parental forms and return them prior to the first day of the research study. The primary researcher (CR) returned five days after the recruitment packages were given to the students to collect all completed consent and assent forms. Only those students who provided informed assent and/or parental consent were eligible to participate in the study.

Research Questions

This study was designed to address the following questions:

1. Is there a significant change in breastfeeding attitude and knowledge scores following a school-based educational intervention on breastfeeding?
2. Is there a significant difference in the pre-test and post-test future breastfeeding intentions of adolescent female students?
3. What are students' perceptions of the breastfeeding educational intervention and inclusion of breastfeeding content within their health education course?

Instruments

The pre-test and post-test questionnaires used in this research study were compiled by both the primary researcher (CR) and supervising researcher (JAD). The questionnaires consisted of three sections. The first section of the pre-test survey included questions related to demographics and breastfeeding exposure. A single question on breastfeeding intention was also included in section one of both the pre-test and post-test questionnaire. The second section of both the pre-test and post-test questionnaires included questions related to breastfeeding attitudes. The final section of both the pre-test and post-test questionnaires consisted of questions related to breastfeeding knowledge. To acquire data relating to students' perceptions, an additional dichotomous (yes/no) question evaluating students' opinions regarding the inclusion of breastfeeding education within the taught curriculum was included at the end of the post-test questionnaire. Directly following the intervention, anecdotal feedback was collected from participants regarding their perceptions and satisfaction with the educational session.

Baseline data. Baseline data pertaining to demographics and breastfeeding related information was collected during the pre-test questionnaire. Participants were asked four personal demographic questions pertaining to their age, place of birth, and ethnicity. Four additional baseline questions related to prior breastfeeding exposure and education were included in the pre-test questionnaire.

Breastfeeding attitudes is defined as the perspective and understanding held by female adolescent students regarding infant feeding methods. The Iowa Infant Feeding Attitude Scale (IIFAS) was selected to measure participants' attitudes towards breastfeeding. This attitude scale has been used in various studies to evaluate individuals' attitudes towards infant feeding practices (Chen et al., 2013; Shaker, Scott, & Reig, 2004; Sittlington, Stewart-Knox, Wright, Bradbury, & Scott, 2007; de la Mora, Russell, Dungy, Losch, & Dusdieker, 1999). The IIFAS

tool consists of 17 items measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Approximately half of the statements are worded to promote breastfeeding and the other half are worded to promote formula feeding. Negatively worded items or items that favoured formula feeding were reverse scored after data was collected. Total possible scores range from 17 to 85, with higher scores indicating a preference for breastfeeding and lower scores indicating a preference for formula feeding. The last question of the IIFAS tool was modified to suitably reflect the age of participants in this study. The question was originally structured to assess attitudes towards breastfeeding and alcohol consumption, but was altered as a negatively worded item to assess attitudes of breastfeeding during maternal sickness.

Although the IIFAS tool has not been psychometrically tested for validity among non-pregnant adolescent females, it has been used and psychometrically tested for reliability. In two studies assessing adolescent attitudes of breastfeeding the IFAS tool has shown a good reliability, with Cronbach's alpha of 0.78 (Bailey & Shepherd, 2007) and 0.67 (Ho & Yu, 2014). This breastfeeding attitude tool has also been used and psychometrically tested among culturally and ethnically diverse populations of Canadian mothers (Twells et al., 2016) and among mothers postpartum, with a strong reliability score and a strong validity in its ability to predict infant feeding methods (de la Mora, Russell, Dungy, Losch, & Dusdieker, 1999).

Breastfeeding knowledge is defined as an individual's basic understanding of the importance, physiology and mechanics of breastfeeding as a biological human process. This study used a modified breastfeeding knowledge tool, originally developed by Abbass-Dick et al. (2017), to measure the breastfeeding knowledge of the adolescent female participants. The breastfeeding knowledge tool consists of 32 items measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Subcategories included: (1) breastmilk production, (2) benefits of breastfeeding, (3) common problems, (4) baby latching, (5) feeding

frequency and (6) signs of getting enough milk. Items were recoded into 2 categories: correct = 0 or incorrect = 1. Once scores were recoded, the total sum of the scores were calculated and used for statistical analyses. Total scores ranged from 0 – 32. Higher scores indicated greater breastfeeding knowledge while lower scores indicated less breastfeeding knowledge.

Breastfeeding intention is defined in this study as a participant’s desire or consideration of exclusive breastfeeding or any breastfeeding in the future. Breastfeeding intention was measured in both the pre-test and post-test questionnaires. Participants were asked, “In the future, if you decide to have children, what method of infant feeding might you consider?” They were provided with four choices: (1) formula, (2) formula and breastmilk, (3) breastmilk only or (4) unsure.

Student perception of the educational session. Feedback was collected and used to assess how students felt the educational intervention impacted their personal learning. Students were asked to provide anecdotal feedback regarding what they liked and did not like about the educational sessions. Cue cards were provided to students at the end of the intervention and collected by the health education teachers. Additionally, student perceptions regarding the inclusion of breastfeeding content within the reproductive curriculum was determined with a single question, “Do you think breastfeeding content should be added in the reproductive curriculum?”

Intervention

The study intervention was piloted in January of 2015 with four all-girl health education classes to determine if the delivery methods and content were well received by grade 9 and 10 students. Student feedback was collected at the end of the pilot intervention session and was used to support the delivery method and to refine the intervention used in this study. The modified

Iowa Infant Feeding Scale (IIFAS) and breastfeeding knowledge scale used in this study were informally piloted among peers of the primary researcher (CR), which included two adolescent females ages 15 and 19.

Participants in the study took part in a 70-minute educational session on infant feeding practices, specifically related to breastfeeding. The session took place during regularly scheduled health education classes. The intervention consisted of a 60-minute PowerPoint presentation that included short videos and True or False activities. The presentation was followed by a 10-minute open-discussion. The PowerPoint presentation covered subcategories related to: (1) importance and benefits of breastfeeding, (2) contents of breastmilk, (3) physiology of breastmilk production, (4) baby latching, (5) how to know baby is getting enough, (6) common problems and (7) feeding cues/frequency/ skin-to-skin. True or False slides were included throughout the PowerPoint presentation to reiterate information that was discussed and provide opportunities for student involvement. All material included in the PowerPoint presentation, videos and True-False content were prepared by the supervising researcher, Dr. Abbass-Dick.

Props provided by the University of Ontario Institute of Technology Nursing Department and Dr. Abbass-Dick were used to demonstrate and aid the content. Props included items such as infant puppets, breast models, a doll, models of the different types of breastmilk and artificial diapers to show different stages of infant stooling correlated with breastmilk consumption. The props were used as a means of further explaining and elaborating on content discussed and for added visual appeal.

An open discussion session followed the PowerPoint presentation. The discussion session was included so that participants could request clarification of topics related to breastfeeding and infant feeding practices. The open-discussion lasted approximately 10 minutes. Additionally, all lecture content and materials included in the intervention were designed to reflect the learning

style of the target population as well as to adhere to the time-limitations of covering content within a single class period.

Data Collection Process

Data was collected from all participants who provided assent and/or parental consent forms to participate in this study. Collection of data occurred over three days in June 2015. Data was collected using self-administered pre-test and post-test survey questionnaires. To ensure that the pre-test and post-test data were accurately paired with one another, participant questionnaires and worksheets were given a matching code to link scores. Breastfeeding knowledge and attitudes were the primary outcomes measured and future intention to breastfeed was the secondary outcome measured. All aspects of the intervention were administered within the regularly scheduled 75-minute health education classes. The procedure used to collect data for this study is outlined below. See Table 1 for the time points and data collection measures used.

The pre-test (day 1) and post-test (day 3) questionnaires were distributed at the end of the regularly scheduled health education classes to all adolescent female students who provided consent to participate. Students who did not return consent forms were given a supplementary worksheet with activities related to infant feeding practices. The worksheets were created by the primary investigator (CR). Content from the supplementary worksheet was not included in the data collection. Participants were given 15 to 20 minutes to complete the questionnaires and were instructed to submit their respective questionnaires or worksheet into a sealed drop box provided by the study researchers. The researchers in this study were not present during the completion of pre-test or post-test questionnaires.

The intervention took place a day after the pre-test questionnaires were administered. All female adolescent students enrolled in the health education class participated in the intervention

session on infant feeding practices, breastfeeding and human lactation facilitated by Dr. Abbass-Dick. This content was presented to all students as part of the reproductive health content. Participants were provided with cue cards at the end of the intervention and discussion to provide feedback and comments about different aspects of the presentation that they liked or disliked. All comments were anonymous without any identifiers to link participants. The primary researcher (CR) and supervising researcher (JAD) were present when students completed their cue-card comments; however, cue cards were collected by the health educators at the end of the class and then given to the primary researcher at the end of the study (See Table 1).

All questionnaires, worksheets and student feedback were collected in the sealed drop boxes a day after the post-test questionnaires were completed. The primary researcher provided a thank-you letter to all the health education teachers that allowed their classes to participate in the study. The letter was provided for the teachers to read to their students and to post in their classrooms for students to view.

Plan for Data Management

Data confidentiality. The school board required that all research conducted within their facilities be kept confidential. To uphold confidentiality, the information collected from research participants was only accessed by the primary investigator, the supervising researcher and the research committee members. The health educators had access to a student master list for the duration of the study to ensure that the pre-test and post-test questionnaires were accurately matched. Upon completion of the study the student master list was returned to the primary researcher without any identifying information. All data collected will continue to be adequately safeguarded and not made available to the public.

Plan for data storage. To ensure confidentiality and security of participants' personal information, all data collected containing personal information, such as assent and consent forms, were placed in envelopes and stored in a locked filing cabinet. Data collected from the pre-test and post-test questionnaires were stored separately in a locked filing cabinet. All data collected in questionnaires were coded with randomized codes to ensure participants could not be identified.

Data was collected and entered as computerized records into a SPSS database to be stored and statistically analyzed. All SPSS documents were encrypted and stored in three locations, including two encrypted external hard drives to account for the potential risk of loss of data.

Data management. All data was manually entered in an SPSS © database to be analyzed. The primary researcher (CR) conducted a double entry of the data and random logic checks of input data to ensure the quality of the data. This ensured that any data that appeared to be ambiguous or out of range was detected and cross-referenced with the original surveys collected.

Data analysis. Data collected from this study was statistically analyzed using a SPSS © Statistics software (v.23). All statistical tests were conducted with an alpha level of 0.5. A descriptive analysis was conducted to calculate the mean, median, mode, standard deviation, kurtosis and skewness of the dependent variables: breastfeeding knowledge and breastfeeding attitude. Descriptive analysis of the data allowed for the identification of data errors that may have existed due to errors in data input.

An inferential analysis of the data collected was conducted to examine associations between variables. Since the sample size was greater than 50 normal distribution was assumed (Ghasemi & Zahediasl, 2012) and all statistical testing of dependent variables was conducted using parametric tests. The mean breastfeeding knowledge scores and breastfeeding attitude

scores were analyzed using a paired t-test. A paired t-test was chosen to reflect the design of the study, a single-group pre-test/post-test intervention. As such, the same participants were included at both time points and their pre-intervention and post-intervention survey scores were evaluated for significant changes.

The association between exposure to the breastfeeding intervention and future breastfeeding intention was assessed using a chi-square statistic. Chi-square tests were conducted to determine changes in participants' intentions to *any* and *exclusively* breastfeed from pre-intervention to post-intervention exposure. The Odds Ratio (OR) and 95% confidence intervals were calculated for future breastfeeding intentions.

Chapter 4: Results

The main objective of this study was to evaluate the impact of an educational breastfeeding intervention on the breastfeeding knowledge and breastfeeding attitudes of adolescent female students. This chapter summarizes the results of a one-group pre-test-post-test study.

Demographic Characteristics

Of the 99 eligible participants, 83 (84%) consented to participate. Four participants were absent from the pre-test and two participants were absent from the presentation. The data from the absent participants were excluded from the collective data analysis. Complete pre-test and post-test data from a total of 77 participants were collected and analyzed, resulting in a 7% attrition rate. The study sample consisted of all females with a mean age of 14 ($M = 14.59$, $SD = 0.653$, age range 14-16). Eighty-five percent ($n = 67$) were in the 9th grade and the remaining 15% ($n=12$) were in the 10th grade. Demographic characteristics of the participants can be found in Table 2.

Most participants reported having seen a woman breastfeed in public (64.6%), with a smaller proportion reporting having never seen a woman breastfeed in public (35.4%). Only 38.0% of students indicated that in their cultures babies were fed exclusively breastmilk, while 40.5% of students reported infants were fed with a combination of breastfeeding and formula feeding in their cultures (Table 3).

	N	%
Gender		
Female	79	100
Age		
14	39	49.4
15	32	40.5
16	7	8.7
No Response	1	1.3
Grade		
9	67	84.8
10	12	15.2
Were you born in Canada?		
Yes	50	63.3
No	29	36.7
If you answered no, what country were you born in? (n=30)		
Australia	1	3.4
China	13	44.8
Egypt	3	10.3
Hong Kong	1	3.4
India	1	3.4
Iran	4	13.8
Philippians	1	3.4
South Korea	4	13.8
United States	1	3.4

Characteristics	N	%
Have you received education on breastfeeding or infant feeding practices in the past?		
Yes	10	12.7
No	63	79.7
Unsure	6	7.6
If you answered yes, from where? Check all that apply		
Home		
Yes	8	10.1
No	71	89.8
School		
Yes	3	3.8
No	76	96.2
Media		
Yes	4	5.1
No	75	94.9
Peers		
Yes	0	0.0
No	79	100
Health Care Professional		
Yes	0	0.0
No	79	100
Other (specify):		
Yes		
Articles	1	1.3
No	78	98.7
In your culture, how are babies most often fed?		
Breastfed	30	38.0
Bottle fed Formula	2	2.5
Bottle fed Breastmilk	2	2.5
Combination	32	40.5
Unsure	13	16.5
Have you ever seen a woman breastfeed in public?		
Yes	51	64.5
No	28	35.4

Knowledge and Attitude Scores

A paired t-test was conducted to assess the impact of an educational breastfeeding intervention on the breastfeeding knowledge of adolescent female participants. The results of the paired t-test indicated a statistically significant increase in breastfeeding knowledge of adolescent female participants from pre-test (M=11.43, SD = 4.78) to post-test (M= 24.14,

SD=4.08), $t(64) = -20.16, p < 0.0001$ (2-tailed). Participant knowledge scores increased by approximately 12 points following a single educational intervention.

A paired t-test was also used to assess changes in breastfeeding attitude. The results of this test indicated a significant change in the breastfeeding attitudes of adolescent female participants. Breastfeeding attitude scores indicated a statistically significant increase from pre-test exposure to intervention ($M = 56.4, SD = 5.6$) to post-test exposure to intervention ($M = 68.9, SD = 7.0$), $t(70) = -16.96, p < 0.001$ (two-tailed). The mean increase in breastfeeding attitude scores was 12.5 (95% CI = -13.96, -11.02). List wise deletion was used to account for all missing data. However, replacing values with calculated expectation maximization analysis did not impact the results of the paired t-test.

Table 4. Difference in pre-test to post-test breastfeeding attitude and breastfeeding knowledge scores.

Outcome	Measure	N	Pre-test Scores Mean (SD)	Post-test Scores Mean (SD)	$t(df)$	Test Mean (SD)	p
Breastfeeding Knowledge	BFKS	*n= 65	11.43 (4.78)	24.14(4.08)	-20.16(64)	-12.71(5.08)	.000^a
Breastfeeding Attitude	IIFAS	*n=71	56.37 (5.57)	68.86(6.98)	-16.96 (70)	-12.49 (6.21)	.000^a

* based on paired t-test excluding missing data pairwise

^a Paired T-Test (n=71)

Future Breastfeeding Intention

Breastfeeding intention of adolescent participants was assessed on both the pre-test and post-test questionnaire. Students were asked, “In the future, if you decide to have children, what method of infant feeding might you consider?” Participants could select one of four answers: (1) Breastmilk Only, (2) Formula Only, (3) Breastmilk and Formula or (4) Unknown. Two chi-square analyses were conducted to statistically evaluate the association between exposure to the educational breastfeeding intervention and adolescent female participants’ future intentions to either ‘exclusively’ breastfeed or practice ‘any’ breastfeeding.

Future intention to exclusively breastfeed. Intentions to exclusive breastfeeding in the future was determined if participants chose “Breastmilk only”. Future intention to not exclusively breastfeed was a collapsed category consisting of participants choosing either: “Breastmilk and Formula”, “Formula only”, or “Unsure”. Exposure to intervention was identified as either ‘Pre’, which refers to responses collected during the pre-test questionnaire that was administered prior to participants receiving the intervention, or “Post”, which refers to responses collected during the post-test questionnaire that followed the breastfeeding intervention.

Test hypothesis:

H₀: Exposure to educational breastfeeding intervention and future exclusive breastfeeding intentions are independent

H₁: Exposure to educational breastfeeding intervention and future exclusive breastfeeding intentions are not independent

Table 5. Chi-square: Exclusive Breastfeeding

Exposure to Intervention	Exclusive Breastfeeding Intention			<i>p</i>	OR
	No	Yes	Total		
Pre-Intervention	64	13	77		
Post-Intervention	43	26	69		
Total	107	39	146	0.005	2.9

* Results based on pair-wise deletion of missing data.

**Yates Continuity Correction = 0.008

Table 5 presents the results of the chi-square test. Analysis indicates a significant association between exposure to an educational breastfeeding intervention and future intention to exclusively breastfeed ($p < 0.05$), this remained consistent when Yates continuity correction was conducted. Similarly, statistically significant results were yielded when missing data was accounted for using Expectation Maximization ($\chi^2 = 5.80$, $p < 0.05$). Odds Ratio (OR) statistics indicated an OR

= 2.9 (CI = 95%, 1.4-6.4), indicating that the odds of adolescent female students having the intention to exclusively breastfeed increased 2.9 times with exposure to a single breastfeeding education session.

Future intention to practice ‘any’ breastfeed. Another chi-square test was conducted to assess if there was a significant association between exposure to the educational breastfeeding intervention and adolescent female participants’ future intention to practice ‘any’ breastfeeding. Future intention to ‘any’ breastfed was determined if participants chose “Breastmilk only” or “Breastmilk and Formula”. Future intention to not practice ‘any’ breastfeeding was a collapsed category consisting of participants that chose “Formula only” or “Unsure”.

Test hypothesis were:

H₀: Exposure to educational breastfeeding intervention and future intentions to practice ‘any’ breastfeeding is independent

H₁: Exposure to educational breastfeeding intervention and future intentions to practice ‘any’ breastfeeding is not independent

Table 6. Chi-square: Any Breastfeeding

n = 77*	Future Any Breastfeeding Intention			p
	No	Yes	Total	
Exposure to Intervention				
Pre-Intervention	14	63	77	
Post-Intervention	10	59	69	
Total	24	122	146	0.548

* Results based on pair-wise deletion of missing data.

**Yates Continuity Correction = 0.706

The statistical analysis for this chi-square test (Table 6) indicated no statistically significant association between exposure to the breastfeeding educational session and future intention to practice ‘any’ breastfeeding (p>0.05).

Additionally, changes in infant feeding intentions were found between the exclusive breastfeeding and combined feeding groups from pre-test to post-test showing that participants choosing combined feeding (n=50, 64.9% to n= 34, 44.2%) dropped while exclusive breastfeeding increased (n= 13, 17% to n= 26, 34%).

Participant Feedback

All student feedback was anonymously given to the researcher(s). Feedback was collected upon completion of the study and after both the pre-test and post-test questionnaires and worksheets were administered. A question to assess students’ perception on whether breastfeeding content should be included in their curriculum was included within their post-test questionnaire. Eighty-six percent of participants (n=66) indicated that breastfeeding education content should be included in secondary school health education courses. Additionally, open-ended feedback collected from students was categorized into two main themes: (1) Impact and (2) Design & Content (Table 7).

Table 7. Participant Feedback Categories

Impact	Better Informed
	Utility
	Desire to Learn More
	Impact on Perspective
Design & Content	Visual Aesthetics
	Criticism of Content

Impact. Impact refers to the influence of the breastfeeding intervention on students’ understanding or ideas about breastfeeding. Impact of the study intervention was further defined through four main subcategories: (1) better informed, (2) utility, (3) desire to learn more and (4) impact on perspective.

Better informed. It was noted that many of the girls (n=54) commented on being better informed on content related to breastfeeding, following the educational intervention.

'The presentation was very informative and cleared up a lot of misconceptions about breastfeeding'

"I learned many things about breastfeeding that I did not know before."

Utility. Some of the participants acknowledged that the information provided in the presentation could be useful to either themselves or others.

'I thought all the information was useful for us. It's important to know as much as we can about breastfeeding and keeping babies healthy.'

'I really learned a lot and I know this will be helpful in the future.'

'This class was very helpful for me and my family'

Desire to learn more. Comments made by students also reflected an appreciation for or a desire to attain more education related to breastfeeding.

'...[W]ish to learn more about the advantages of breastfeeding.'

'I wish the presentation was longer so that I could ask more and learn more'

'We don't really get a chance to learn about these things, so this was extremely helpful'

'I didn't like that we only had an hour, I wish we had more time to learn about breast feeding.'

'Definitely [a] topic worth implementing in [the] school health program. (very important)'

Impact on perspective. A few comments indicated that student perspectives of breastfeeding had positively changed following the intervention.

'Interesting & changed/solidified my outlook on breastfeeding.'

There was only one student's feedback which expressed a lack of interest in learning about breastfeeding at the secondary school age.

'Pretty okay... im still not interested in breastfeeding but thank you for this info, [I've] learned a bit more. I just don't feel like I need to be informed on this at age 15, but if I was older I probably would have enjoyed it more.'

Design and content. Some of the feedback provided related to the aesthetic design, content and delivery of the presentation.

Visual aesthetics. Most students provided positive feedback on the visual aesthetics of the presentation, relating to the inclusion of videos, pictures, props and demonstrations using props.

'I liked the diagrams, because they helped me understand'

'I liked the videos (very helpful!).'

'Visually seeing how it works was a good way to understand'

'Models (helped visualize). Videos very detailed'

However, there were a few students who did not like the visual elements of the presentation or props used.

'I disliked the video of the women breastfeeding.'

'I didn't like the videos, I wish they were in a documentary form instead of a computer'

Criticism of content. Several comments provided constructive criticism for improving future presentations. Most comments suggested including more interactive activities and games throughout the presentation. One student suggested including handouts for the presentation.

Summary of Findings

To evaluate the effectiveness of an educational breastfeeding intervention, a paired t-test was conducted to assess changes in adolescent females' breastfeeding attitude and breastfeeding knowledge. The results indicated that scores for both the Infant Feeding Iowa Scale (IIFAS) and the Breastfeeding Knowledge Scale (BFKS) had statistically significantly improved following participation in the breastfeeding intervention.

Chi-square analyses were used to assess the association between exposure to a breastfeeding intervention and participants' future infant feeding intentions to either exclusively breastfeed or practice 'any' breastfeeding. The results of this test indicated a statistically significant positive association between exposure to a breastfeeding intervention and future intention to exclusively breastfeed. However, no statistically significant association was found between exposure to intervention and future intention to provide any breastfeeding in adolescent female students. Overall, students provided positive and encouraging feedback regarding the impact of the educational session on their personal understanding of breastfeeding. Students also provided valuable feedback on the visual aesthetics of the presentation as well as ways to improve the intervention for future presentations.

Chapter 5: Discussion & Conclusion

This research study sought to evaluate the impact of an educational intervention on breastfeeding attitudes, knowledge and future infant feeding intentions of adolescent females in one secondary school within the Greater Toronto Area, in Ontario. The results of the present study showed that breastfeeding attitudes and knowledge scores significantly increased from pre-test to post-test following a single breastfeeding education session. Additionally, a statistically significant increase in participants' intentions to exclusively breastfeed was found at post-test. These findings suggest that adolescent female students in grades 9 and 10 are receptive and willing to learn about breastfeeding as an important reproductive activity. Breastfeeding education may increase their knowledge and improve attitudes towards breastfeeding, thus addressing two factors that are known to impact breastfeeding rates (Chezem, Friesen, & Boettcher, 2003; Persad & Mensinger, 2008). These results are encouraging and support the need to initiate a discourse on the opportunity and importance of including breastfeeding education into the Ministry of Education Ontario Health Education Curriculum Documents for Secondary Schools (Ministry of Education, 2015) in the reproductive health curriculum.

This study found an increase in breastfeeding knowledge scores of adolescents consistent with other studies conducted (Bottaro & Giugliani, 2009; Seidel et al., 2013; Zeller, 2016). It was also found that adolescent female participants in this secondary school had poor breastfeeding knowledge at pre-test, with a mean knowledge score of 11.40 out of a possible 32 points. Contrary to findings from previous studies with varying study samples, in middle school, high school and young adolescent university students found that young adult and adolescent participants had good overall knowledge of breastfeeding (Parks, Bayer, Hritz, Stambough, & Robbins, 2015; Kavanagh, Lou, Nicklas, Habibi, & Murphy, 2012; Tarrant & Dodgson, 2007;

Bottaro & Giugliani, 2009). This discrepancy may have resulted from the different ways in which breastfeeding knowledge was measured in each study. Many of the other measures used in other studies focused on the benefits of breastfeeding and did not include topics such as milk compositions, production or management and signs that breastfeeding is going well (Bottaro & Giugliani, 2009; Leffler, 2000; Tarrant & Dodgson, 2007; Seidel et al., 2013). In the present study, participants scored high on the subscale 'breastfeeding benefits' which is consistent with previous studies. However, the lowest scores were attained in subtopics related to 'how breastmilk is produced', 'infant latching' and 'mom and baby coming together to feed' and 'infant feeding cues'. These findings are similar to those of Kang & Song (2005) who evaluated Korean university students' breastfeeding knowledge and attitudes and found technical knowledge of breastfeeding to be poor.

The heterogeneity of the knowledge measure used in these studies is concerning. Breastfeeding knowledge scales used in other studies focus on knowledge related to the importance of breastfeeding, health of mothers and infants, social benefits such as mother-infant bonding (Tarrant & Dodgson, 2007; Umesh, 1990) and the practicality of breastfeeding (Fujimori et al., 2008). A few studies measured additional topics related to optimal infant nutrition (Fairbrother & Stanger-Ross, 2010), infant feeding cues (Kang & Song, 2005), breastfeeding recommendations (Fujimori et al., 2008), common breastfeeding concerns and myths and misconceptions (Bottaro & Giugliani, 2009; Ebrahim et al., 2011). The heterogeneity in the definition of breastfeeding knowledge and the variation in subtopics within the different measures of breastfeeding knowledge identifies the need for the creation of a knowledge scale that has been tested for psychometric validity, as this would provide consistency in the measure of this outcome across varying studies. In this study, several articles that outlined school-based

breastfeeding interventions were reviewed, as shown in Appendix A. There was, however, no measure of adolescent breastfeeding knowledge consistently used among these studies.

In the present study, breastfeeding attitudes of adolescent female participants showed a statistically significant increase following the educational intervention. These results are encouraging as research has identified attitudes towards breastfeeding as an important predictor of breastfeeding intention and initiation (Swanson et al., 2006; Earle, 2002). Similar results have been documented in other studies with school-aged children (Bottaro & Giugliani, 2009; Fujimori et al., 2008; Giles et al., 2014; Marten, 2001; Seidel et al., 2013). The increases in positive breastfeeding attitudes found in these studies are important because they suggest that education related to the benefits, recommendations, physiology and mechanisms of human lactation provided in schools may positively impact attitudes towards breastfeeding of adolescents prior to conception, when ideas regarding future infant feeding practices are being formed (Earle, 2000).

Tools used to measure infant feeding attitudes of adolescents varied among studies, with many studies using survey measures created by the study researchers (Bottaro & Giugliani, 2009; Seidel et al., 2013; Walsh et al., 2008). The Iowa Infant Feeding Attitude Scale (IIFAS) tool used in the current study, created by de la Mora et al. (1999), has also been used in three similar studies by Bailey & Shepherd (2006), November (2013) and Ho & McGrath (2016). No other breastfeeding attitude scales have been consistently used and tested among the adolescent population. This tool has been validated for reliability in the adolescent populations by Ho & Yu (2014) and Bailey & Shepherd (2007), with Cronbach's alpha of 0.71 and 0.67, respectively. The IIFAS was used in the current study as it is a widely used breastfeeding attitude scale and has been psychometrically validated, to ensure that the items included in this attitude scale are measuring attitudes about infant feeding. The IIFAS has also been used in a variety of adult

populations including both mothers (Twells et al., 2014; Lau, Htun, Lim, Ho-Lim, & Klainin-Yobas, 2015; Holbrook, White, Heyman, & Wojciki, 2013) and fathers (Abbass-Dick, Stern, Nelson, Watson, & Dennis, 2015). The consistency of which this tool has been used across studies is encouraging, and it is hoped that researchers will continue to choose it for measuring infant feeding attitudes to provide more opportunities for comparing this outcome among studies.

Valuable information related to future infant feeding intentions was also collected in the present study. At baseline, 83% (n=64) of participants had an idea of how they might feed their infants, with only 17% (n=13) of students unsure of how they would like to feed their infants. Similarly, Zeller (2016) found that 77% of participants had an idea of their infant feeding preferences while 13% were unsure. This study found that participants' intention to 'exclusively' breastfeed increased post intervention, whereas the intention to practice 'any' breastfeeding did not change. This resulted from the number of students who originally planned to 'combine feed' (feeding both breastmilk and formula) dropping (n=50, 64.9% to n= 34, 44.2%) and the number who planned to 'exclusively' feed increased (n= 13, 17% to n= 26, 34%). This is an important finding as there is a dose response relationship between breastfeeding and the health protection it provides to mothers and their infants (Kramer& Kakuma, 2009). For this reason, 'exclusively' breastfeeding to 6 months is recommended by all leading health authorities (Health Canada, 2015; WHO, 2017). This finding suggests that the intervention may have adequately highlighted the importance of 'exclusive' breastfeeding compared to 'any' breastfeeding. Providing this information on a population-wide scale may prove to increase future exclusive breastfeeding rates which is a public health priority.

Although pregnancy may not be an imminent consideration for most students these results suggest that students are already forming ideas about their future infant feeding practices. This may provide an opportunity to influence youth that may be undecided about infant feeding

practices with positive information or endorsements that foster attitudes in favour of breastfeeding. The Ontario education curriculum encourages self-efficacy with regards to making decisions about healthy-living which may include developing positive attitudes about health-related behaviours such as breastfeeding (Ministry of Education, 2015). Therefore, providing breastfeeding education prior to child-rearing, may help young adolescents form long-standing attitudes and intentions about their future infant feeding decisions.

Feedback provided by the participants in this study suggest that the breastfeeding intervention was well received by female participants. Several factors may have influenced participants' positive receptiveness to the intervention such as: the novelty of having researchers as guests in the classrooms may have influenced participants to be very attentive; the use of props and presentation activities may have been both engaging and educational; and there may have been a large general interest regarding the topic. Eighty-seven percent of participants in this study (n = 67) indicated that they felt better informed, acquired new knowledge and found this information to be useful for themselves and/or their families. Additionally, participants were asked if they thought that breastfeeding topics should be included within their school curriculum. Over 85% of participants felt that breastfeeding education should be included in their curriculum. Spear (2007), who investigated the experiences and attitudes of college students towards the inclusion of breastfeeding education provided in middle schools and high schools, also found that 87.2% of participants thought breastfeeding should be included in secondary school. Zeller (2016) found that 76% of middle school students in their study expressed interest in having breastfeeding content included in schools. These results may reflect students' readiness and willingness to engage in meaningful discussions of breastfeeding at a relatively early age.

The inclusion of breastfeeding education is not currently mandated in the Ontario reproductive health curriculum. However, breastfeeding is an important physiologic component

of reproductive health for both mothers and their infants. Delivering breastfeeding education within the school system may ensure that both male and female students are provided with accurate and adequate information to assist them in making informed decisions about their families' health and carrying out future healthy reproductive behaviours. This research suggests that adding breastfeeding education to direct and related content in the reproductive health curriculum may lead to a significantly positive contribution to the curriculum as well as an alignment with public health priorities to ensure population wide health information is being distributed to the public. Quality breastfeeding education designed to increase adolescent students' breastfeeding knowledge and improve attitudes should focus on breastfeeding as a natural physiological reproductive process, with emphasis on how the human body produces breastmilk. It should also affirm the practice of breastfeeding as a necessary health behaviour as opposed to the notion that breastfeeding is merely an additional benefit to child and maternal health. Thus, it is necessary that breastfeeding be emphasized and taught as an essential reproductive process that the human body is naturally designed to perform. It is also important to educate individuals on the increased risk of illness for mothers and infants in the absence of breastfeeding. The discussion and emphasis of breastfeeding as a natural biological phenomenon can serve as a significant means for normalizing breastfeeding. This education may be appropriately situated in the Ontario Ministry of Education Health Education Curriculum documents (Ministry of Education, 2015), in subjects such as health education or biology when other content related to physiological processes such as childbirth and reproduction are being taught.

Strengths of the Study

A strength of this study was in the fact that one educational session was well received by the student participants while simultaneously contributing to the body of literature that suggests such interventions increase the breastfeeding knowledge and attitude scores of adolescent females. As schools and educators deal with already compact curriculum, being able to deliver breastfeeding content in one or two classes may fit well into the secondary school curricula. Previous studies have also conducted school-based breastfeeding interventions in one session and obtained similar results (Fujimori et al., 2008; Marten, 2001; November, 2013; Seidel et al., 2013; Walsh et al., 2008; Zeller, 2016). It is important to design breastfeeding interventions that can fit within time-restricted curriculum while incorporating the essential topics that students should be introduced to.

Additional strengths of this research included a high participation rate and low attrition rate. Of the 99 participants approached to participate in this study, 83 (83%) participants provided assent and parental consent to have their data collected in the pre-test and post-test. The attitude and knowledge data of four participants were not included due to absences during the pre-test, post-test or presentation. A total of 77 participants had both pre-test and post-test data collected and were available for analysis, resulting in a 7% attrition rate. Because this was a pilot study, the study sample was large and the findings, although not conclusive, are encouraging.

Feasibility Issues and Limitations

The sample size in this study was determined based on convenience and not calculated with adequate power. As this was a pilot study, concerns of feasibility related to the intervention, recruitment and data collection measures were assessed so that future, larger clustered, controlled

trials with more diverse populations could be better informed. A few of the feasibility issues and limitations identified in this pilot study were related to the sample and to methodology.

One limitation of this study was that the convenience sample only contained female participants. The inclusion of male participants was not an option because recruitment took place in all female classes. However, the inclusion of young males in breastfeeding education may be important for the normalization and promotion of breastfeeding as some studies have indicated that father support of breastfeeding increases breastfeeding initiation, duration and exclusivity (Datta, 2012; Abbass-Dick et al., 2015; Mitchell-box & Braun, 2013).

The generalizability of the sample was another identified limitation of this study. The study sample consisted of female participants enrolled from one secondary school located in a higher socioeconomic status neighbourhood. High socioeconomic status and education levels have been found to be associated with higher breastfeeding rates (Heck et al., 2006). Sixty-three percent of participants in this study indicated having seen a woman breastfed in public. Additionally, a large portion of the participants (78%) indicated that in their culture babies were fully or partially breastfed, (37.7% and 40.3% respectively). Exposure to breastfeeding is a factor that impacts breastfeeding (Tarrant & Dodgson, 2007) and should be considered as a potential influencer of the generalizability of the study. Nevertheless, eight other studies (Bottaro & Giugliani, 2009; Fujimori et al., 2008; Giles et al., 2014; Marten, 2001; November, 2013; Seidel et al., 2013; Walsh et al., 2008; Zeller, 2016) involving elementary and secondary school students were conducted using diverse samples that varied in age, geography and culture, and all obtained similar results. Interestingly, this study found that pre-test attitude, knowledge scores and future intentions to breastfeed were low, but increased at post-test following the intervention. This suggests that even among our subpopulation, there is still an opportunity to positively influence and increase both future breastfeeding intentions and rates. In the future, conducting a

clustered controlled trial with a variety of schools in different neighbourhoods would ensure a more diverse population is included within the study.

Limitations related to the methodology and data collections were also identified. Due to time restrictions, the short follow-up period did not allow for an evaluation of any sustained change in adolescent female breastfeeding knowledge, attitude, and future feeding intentions. The pre-test questionnaire was collected a day prior to the study intervention and the post-test questionnaire was conducted 1-2 days after the intervention. A follow-up retention test may have allowed an assessment of knowledge retention and overall long-term change in attitude and future intentions of participants.

The use of self-administered surveys was a limitation to data collection methods utilized. Pre-test and post-test surveys were used to collect data on breastfeeding knowledge and attitude. This may be a limitation to the research because of the difficulty in verifying the validity and reliability of the data being collected (Spector, 2004). Data collected from self-reporting is subject to recall-bias, self-report bias and exaggerated or embellished responses (Donaldson & Grant-Vallone, 2002). Despite these limitations, self-administered surveys remain a standard data collection tools utilized in many studies that measure similar outcomes (Fujimori et al., 2008; Giles et al., 2014; Bottaro & Giugliani, 2009; Marten, 2001; November, 2013; Seidel et al., 2013; Zeller, 2016; Bailey & Shepherd, 2007). As an extra measure to encourage truthful answers and prevent social desirability, a sentence indicating that there are no right or wrong answers was added at the top of the questionnaire.

Lastly, the lack of a validated breastfeeding knowledge tool and development of a breastfeeding attitude tool designed for adolescent populations posed a limitation to this study. Despite a thorough literature review, a common tested or validated knowledge tool that aligned with this study's objectives could not be identified. Most of the studies reviewed that used a

breastfeeding knowledge tool specifically sought to assess the breastfeeding knowledge of university students in health-related fields (Ahmed, Bantz, & Richardson, 2011; Bozette & Posner, 2013; Brondribb, Fallon, Jackson, & Hegney, 2008) or health care professionals (Vandewark, 2014; Alina, Ismail, & Sulaiman, 2010). For this study it was important to identify a knowledge tool that adequately reflected the content delivered through the intervention while simultaneously satisfying the need to address secondary school curriculum expectations (Bozette & Posner, 2013). This study assessed changes in participants' knowledge related to the following areas: (1) How Breastmilk is Made, (2) Benefits, (3) Common Problems, (4) Baby Latching, (5) Mom-Baby Coming Together (Frequency/Cues), and (6) Baby Getting Enough. The knowledge tool used in this study, was previously used (Abbass-Dick et al., 2017) and more accurately aligned with the content that was included in the presentation. Future studies should ensure that validated measurement tools are used.

A modified version of the Infant Feeding Iowa Scale (IIFAS) developed by de la Mora et al. (1999) was used to assess adolescent female knowledge in the current study. This tool has been psychometrically tested among populations of pregnant mothers and is commonly used among diverse populations to evaluate breastfeeding attitudes (de la Mora, Ruseel, Dungy, Losch, & Dusdieker, 1999). Although the IIFAS has not been psychometrically tested among adolescent populations, it is a commonly used tool to measure breastfeeding attitudes. Similarly, November (2013) utilized the IIFAS to assess the impact of an educational breastfeeding intervention on school aged participants' attitudes of breastfeeding. In our study, the last item of the IIFAS was modified to appropriately reflect the population group. The original item was structured to evaluate attitudes towards breastfeeding and alcohol consumption. Since our study population consisted of minors not yet of the legal age to consume alcohol, the question was altered to assess attitudes of breastfeeding during maternal sickness. Future studies should seek

to have the Iowa Infant Feeding Attitude Scale (IIFAS) psychometrically tested with the adolescent population and include the original item to determine if this adaptation has an impact on the mean scores.

Recommendations

Longitudinal studies. Future studies might consider the use of longitudinal design to gain an assessment of long-term knowledge retention. Other studies that conducted research similar to the current study have conducted longitudinal studies that used retention tests to evaluate sustained change in adolescent breastfeeding knowledge, attitudes and intentions (Giles et al., 2014; Walsh et al., 2008; Bottaro & Giugliani, 2009). These studies all found that following the educational interventions scores significantly increased at post-test and were sustained during retention tests that ranged from 10 weeks to 3 months later. Future research may look to conduct longitudinal studies by introducing educational interventions in grades 9 or 10, and then conducting retention tests towards the end of their secondary school education. A follow-up longitudinal study would be an effective means for determining the long-term effects of this intervention.

Inclusion of male participants. Future studies should seek to include both male and female adolescent students when assessing behavior change interventions related to breastfeeding knowledge, attitudes and intentions. A few studies that evaluated breastfeeding education within schools included males in their breastfeeding interventions and found positive results, with males being very receptive to breastfeeding education and indicating strong intention to support their partners in the future (Bottaro & Giugliani, 2009; Costa et al., 2006; Marten, 2001; November, 2013; Seidel et al., 2013; Fujimori et al., 2008; Walsh et al., 2008; Zeller 2016). It is important that breastfeeding intervention delivered in school target both male

and female adolescent students. The discourse surrounding breastfeeding education is relevant for all young adolescents so that they may be equipped with the appropriate knowledge to accurately assess and make informed decisions pertaining to future infant-feeding practices. This is important when considering the historically pervasive infant feeding propaganda put forth by infant formula companies (Pries et al., 2016). Studies have shown that marketing that promotes breastmilk substitutes is 61 times more prevalent than mass media marketing that promotes breastfeeding (Piwoz & Huffman, 2015; World Health Organization, 1981; Walls, 2012). To combat the invasive marketing, evidence-based information needs to be communicated so informed decisions can be made around health behaviours such as breastfeeding. To be more inclusive of both male and female adolescents and their future roles, educational content and material should include information on the roles of family members and partners in supporting breastfeeding. Thus, the inclusion of male students may be warranted in future studies to further refine the evaluation of these interventions.

Teachers' attitudes towards breastfeeding. It was observed that the health education teachers in the present study were very open and encouraging of adding breastfeeding content to their health education classes. This may have impacted the participants' perceptions or openness to learn about breastfeeding since they had health educators supporting this method of teaching about infant feeding. November (2013) found class educators in their study had a strong influence on students' receptiveness to the breastfeeding materials because teachers in the study were very supportive of the lesson. However, insufficient research has been conducted on the breastfeeding knowledge and attitudes of health educators within elementary and secondary schools and the influence they may have on study outcomes. It is not currently known if an educator's personal beliefs can impact teaching methods and pedagogical approaches to delivering breastfeeding education and thus the effectiveness of the intervention. Researchers

should be aware of these confounding variables and assess ways to control for them in future studies. Additionally, future studies could evaluate the attitudes and knowledge of educators who may be responsible for delivering breastfeeding content to assess the impact of this confounder on the study results.

In the current study, the breastfeeding intervention was delivered by the supervisory researcher (JAD), who has experience both as a lactation consultant and a researcher in the field of breastfeeding. Ten other studies that had interventions conducted with students and the content delivered by a health professional saw similar results with an increase in breastfeeding attitudes and knowledge (Bottaro & Giugliani, 2009; Giles et al., 2014; Ho & McGrath, 2016; Fujimori et al., 2008; Seidel et al., 2013; Marten, 2001; November, 2013; Walsh et al., 2008; Bailey & Sheperd, 2006; Costa et al., 2007). Incorporating a health professional may not always be a feasible alternative for schools and school boards and so research should focus on how teachers can be trained and prepared to deliver breastfeeding content to their students.

Intention and behaviour. The Theory of Planned Behavior suggests that attitudes, norms and perceived behaviours lead to intentions that are direct antecedents of behaviour. Within this theory, intentions to engage in a behaviour have been identified as superior predictors of behaviour. Although this theory has been widely used in research, with many studies showing a positive affinity of intentions that lead to desired behaviour, it does not explicitly outline how the highlighted intentions lead to the behaviour. Some researchers have indicated that a change in intentions may not guarantee a change in behaviour (Fife-Schow, Sheeran, & Norm, 2007). When developing health promotion interventions that are intended to increase the future breastfeeding rates of adolescent students it would be important to understand how intentions to breastfeed translate into actual breastfeeding actions. Understanding ways to improve how intentions translate into action is important for sustaining long-term goals to

breastfeed. Better knowledge and understanding of intention-behaviour gaps could be used to identify and include tools that are known to explicitly translate intentions into behaviour, thus leading to the development of more effective breastfeeding promotion interventions.

Cultural analysis. The present study used the Theory of Planned Behavior as a theoretical framework to assess breastfeeding as a human and social behaviour. However, a cultural analysis was not conducted to account for the cultural variances that exist within Ontario and Canada. Because current health-based recommendations for breastfeeding may change over time and within different cultures it is important to consider the impact of culture on breastfeeding behaviours and practices. Even though the Theory of Planned Behavior does not explicitly account for cultural differences it may be important to consider this factor in future studies. Looking at studies that have modified the Theory of Planned Behavior to include cultural lenses or analyses may help to provide a perspective on how to include a cultural analysis within a breastfeeding study. Lee, Ebesu Hubbard, O’Riordan & Kim (2007) investigated cultural aspects when using the Theory of Planned Behavior to predict smoking cessation intentions of college students. They believed that an construal influences can impact and individual’s perceptions of social norms towards performing a behaviour, which can in turn influence the different elements of the Theory of Planned Behavior. Future studies investigating adolescent breastfeeding attitudes, knowledge and intentions may look to conduct cultural analyses to assess the influence that culture has on students’ perceptions and understanding of breastfeeding.

Conclusion

The results of this pilot study highlight the significant impact that breastfeeding education can have on adolescent breastfeeding attitudes, knowledge and future intentions. Including school-based educational breastfeeding content within the secondary school reproductive health curriculum may provide students with the educational information that is necessary to make informed health decisions regarding future infant feeding practices. This study adds to the body of existing evidence suggesting that breastfeeding education in secondary schools can have an influential impact on the breastfeeding attitude, knowledge and future intentions of adolescent females. As such, it should be recommended that educational breastfeeding interventions, like the intervention developed for this study, be included in the secondary school reproduction curriculum as presented in the Ministry of Education Curriculum Document (2015). This study met various objectives including but not limited to designing and piloting a school-based intervention that students would be receptive to and contributing to the normalizing breastfeeding.

The investigation of school-based breastfeeding interventions is a growing field of research. When this study began, there were only nine other published studies, conducted internationally. Since the onset of data collection for this study in June of 2015, two additional studies have been published (Zeller, 2016; Ho & McGrath, 2016), including a systematic review of the effectiveness of school-based breastfeeding interventions (Glaser, Roberts, Grosskoph, & Basch, 2016). The growth in this body of literature identifies an increasing interest in the utilization of school-based breastfeeding education to target adolescents prior to conception and to support public health initiatives designed to increase future breastfeeding rates. Providing breastfeeding education to adolescents may allow them the opportunity to develop better informed ideas and attitudes of breastfeeding, which may influence their infant feeding decisions

in favour of breastfeeding in the future. Future evaluations of this intervention should be followed up with a more diverse population, with validated tools, and with a larger follow-up time using a randomized or clustered controlled design to test the effectiveness of the school-based breastfeeding intervention.

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Appendix A

School-based Educational Interventions

Study	Sample	Main Outcomes	Study Design	Intervention	Main Findings
Bailey & Shepherd, 2007	Phase 1 - 92 female students; Phase 2 - 80 female students; ages 14-15y in England	Attitudes Intentions	Longitudinal repeated measure Pre-test data was collected prior to intervention (Control = 46, Intervention = 46). Post-test collected 4 weeks post-intervention (Control = 40, Intervention = 40)	Intervention designed from the Breasts Benefits Pack (Lockey & Hart, 2003). One 45-minute lesson delivered by researcher. The use of a teacher's guide, photographs of breastfeeding, a quiz and post-card were used, and an interview video. Topics included: beliefs and attitudes, health benefits, and observations, knowledge and experience of breastfeeding.	Breastfeeding attitudes increased significantly from pre-test to post-test (M 54.5 (SD=7.5) to 60.3(SD=8.0), $p<0.0001$). All TPB variables significantly correlated with intentions at pre-test and post-test ($p<0.01$). Attitude scores and Perceived Behavioral Control scores were predictive of intentions ($p<0.05$).
Bottaro & Giugliani, 2009	564 male and female students; ages 9 -17 years in Brazil	Knowledge Perception Beliefs	Cluster randomized trial. (Control = 253, Intervention = 311). Pre-test (prior to intervention), post-test (1 day after intervention) and retention test (3 month after) were collected.	Delivered by researcher. No teacher participation. 3 sessions delivered a week apart. Session 1 (45 mins): 7 min video discussing the importance of breastfeeding, followed by a class discussion. Session 2 (90 min): role play activity and discussion. Session 3 (90 mins): Reinforce content, discussion on prior experience and/or exposure.	Knowledge, perception and belief scores of the intervention group increased significantly from pre-test to post-test (M 12.7(SD=3.5) to 18.3 (SD = 4.5), $p<0.001$). Scores were sustained at retest 3 months later (M 18.4 (SD = 4.6), $p<0.001$). There was a larger impact on girls ages 9 – 11. Among the intervention groups, the interventions promoted more favorable opinion of breastfeeding in public.
Costa et al., 2006	45 male and female students; ages 7 -12y in Brazil	Knowledge	Pre-test, Intervention, Post-test Design. (C = 13, Workshop 1 and 2 = 32) Pre-test was collected immediately before interventions and 15 days following intervention.	2 workshop interventions. Each workshop group participated in one session. Workshop 1: utilized open dialogue and image based educational material. Students were asked to model their breastfeeding beliefs through drawing. Workshop 2: like workshop 1. Children were also	Most students in both the control (87%) and intervention (100%) group were aware of the importance of breastfeeding infants. The intervention positively increased children's self-perception as mammals (34.3% to 96.5%). Knowledge of breastfeeding related to students' perception of being mammals (34.3% to 96.5%) and most important feeds for infants (31.2% - 53.1%) increased positively for the intervention group.

				able to see 3 women breastfeed their children. Topics included: humans as mammals, importance of breastfeeding, examples of mammals that breastfeed	Knowledge related to duration of breastfeeding remained unchanged.
Fujimori et al., 2008	5 schools. 503 students (male and female); Grades 4 to 8 in Brazil	Attitudes Knowledge	Cross-sectional quasi-experimental cluster. (Control = 215, Intervention = 288)	One 30-minute session, delivered by the researchers. Topics included: practicality and cost, initiation, duration, common myths and the importance of partner and family support	Intervention group attitudes scores increased significantly ($p < 0.05$) compared to control group. Breastfeeding attitudes and knowledge increased significantly from pre-test to post-test, for both males and females. 86.3% ($n = 434$) wanted to learn more about breastfeeding. 61% of students thought breastfeeding should be taught in school.
Giles et al., 2014	42 post primary schools (N=698); ages 13-15; female students in Northern Ireland	Attitudes Knowledge	Random Cluster. (Control = 26 schools, Intervention = 18 schools). Pre-test (taken at baseline, $n = 540$) and post-test (6 months post-intervention, $n = 434$) were collected.	Two 35-minute educational sessions, designed based on TPB. Delivered by researcher with teacher present. Included PowerPoint presentation designed by the Health Promotion Agency.	Significant effects for intervention on females' intention to breastfeed ($p < 0.007$), attitudes ($p < 0.001$), moral attitude ($p < 0.001$), subjective norms ($p = 0.012$), and knowledge ($p < 0.001$). No effects were found for self-efficacy or perceived control. Effects sustained at 6 months. Supports the use of the TPB to design interventions.
Ho & McGrath, 2016	204 female students in Taiwan	Knowledge Attitudes	Quasi-experimental pre-test/post-test. (Control = 103, Intervention = 101) 1 pre-test was collected just prior to the intervention; post-test was collected immediately after his intervention, and a retest was conducted 1 months following the intervention.	One 30-minute classroom activity was delivered by the researchers. Topics discussed included: the benefits and importance of breastfeeding, properties of breastmilk, recommendation, and had an open discussion on the topic.	Significant increase in intervention groups breastfeeding knowledge score, which was sustained at the 1-month retest ($p = 0.001$). Breastfeeding attitude scores increased significantly at post-test, and increased from post-test at one-month retest ($p = 0.001$).

			Students assigned by cohorts.		
Martens, 2001	45 male and female students; grade 7 to 8 in a Canada (Ojibwa Community of Sagkeeng)	Breastfeeding beliefs; Bottle-Feeding Beliefs	Randomized pre-test-post-test control group, and a retention test 10 day after educational session. (Control = 23, Intervention = 22). Post-test only control group.	One 50-minute session. Delivered by researcher as part of Native studies course. Topics includes: benefit of breastfeeding, overcoming cultural barriers, importance of peer support.	Breastfeeding belief score of intervention group increased significantly by roughly 5 points (12%) at post-test (p=0.005) and was retained at retention test. Breastfeeding attitudes of intervention remained consistent at retention test, and control group breastfeeding attitudes increased significantly at post-test and retention test after they received the intervention.
November, 2013	Phase 1 (n=642). 5 schools; Grades 9 – 11; 13 – 16 years old. Phase 2 (n=600). 4 schools; grades 9 -10; 13-14 years in England. Male and Female Students	Attitudes	Quasi experimental longitudinal pre-test post-test study	60-minute interactive sessions. Delivered by researcher. Session included a lecture, video and open discussion. Topics covered included names for breast (to deal with embarrassment), breastfeeding attitudes, film interview of breastfeeding couple, and benefits of breastfeeding, breastfeeding barriers and how to overcome them.	No differences were found in phase 1. Feedback from phase 1 was used to improve intervention session in phase. Mean attitude scores of female students increased significantly in all mixed and single-sex groups (p<0.05). Mean attitude scores of male students increased significantly (p<0.05) in most groups, except for one single-sex group in a co-educational school (p= 0.09) and one single-sex group in an all-boys school (p= 0.67).
Siedel et al, 2013	107 male and female students in occupational health sciences; grades 9 – 12; 14-19 years in United States	Knowledge Attitudes TPB Measures Intentions	Quasi experimental. Pre-test (same day as intervention) and post-test (2 weeks after intervention) were collected.	1 session (90 mins) delivered by researcher. Session include interactive activity, handouts and open discussions. Topics covered includes: Benefits of breastfeeding, barriers and solutions, myths, and “anything goes” (misc. category)	Perceived breastfeeding knowledge (Cohen D = 1.60), attitudes (Cohen d = 1.01) increased significantly from pre-test to post-test. Intention to breastfeed increased significant from pre-test to post-test (44.9% to 68.2%, p<0.001). However, perceived behavioral control did not increase significantly at post-test.
Walsh et al., 2008	121 male and female students; ages 15-19 in Nova Scotia, Canada	Knowledge Intention	Quasi-experimental (Control = 61, Intervention = 60). Convenience sample used. 1 pre-test, 2 post-tests (following	1 session (60 mins). Facilitated by a nurse educator. Included discussion on bottle-feeding culture, marketing of infant formula, advantages of human milk for humans, a 9-min video on importance of breastfeeding,	Intervention group’s knowledge significantly increased from pre-test to post-test (M 13.8 (SD = 2.44) – M 16.7 (SD = 1.12), p<0.001). Future intention to breastfeed increased significantly at the first post-test (75%) and was sustained at 10-week post-test (M 16.4, p<0.001).

			intervention and 10-weeks)	how to support breastfeeding. Q&A period following presentation.	
Zeller, 2016	39 students (5 girls, 34 boys); 12-13 years old in United States	Knowledge Attitudes	Quasi-experimental, one group, pre-and post-test. Convenience sample used. Pre-test and post-test were conducted immediately before and after intervention.	A single 45-minute session delivered by nurse practitioner. Delivered as part of male student health classes. Female students voluntarily participated in study. Discussed benefits, importance and social support for breastfeeding. The session consisted of a PowerPoint presentation, video, crossword puzzle and Q&A,	Breastfeeding beliefs and attitudes increased significantly from pre-test ($p < 0.001$). Bottle-feeding beliefs decreased significantly from pre-test.

TPB = Theory of Planned Behaviour

Appendix B

University of Ontario Institute of Technology REB Approval Letter



RESEARCH ETHICS BOARD
OFFICE OF RESEARCH SERVICES

Date: April 28th, 2015

To: Celina Reyes (Graduate Student) and Jennifer Abass Dick (Supervisor)

From: Bill Goodman, REB Chair

REB File #: 14-113

Project Title: Investigating the Effectiveness of Infant Feeding Education on the Breastfeeding Knowledge and Attitudes of Adolescent Females

DECISION: APPROVED

CURRENT EXPIRY: April 1st, 2016

NOTE: Notwithstanding this approval, you are required to obtain/submit, to UOIT's Research Ethics Board, any relevant approvals/permissions required, prior to commencement of this project.

The University of Ontario, Institute of Technology Research Ethics Board (REB) has reviewed and approved the above research proposal. This application has been reviewed to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2 (2014)) and the UOIT Research Ethics Policy and Procedures.

Please note that the (REB) requires that you adhere to the protocol as last reviewed and approved by the REB. Always quote your REB file number on all future correspondence.

CONTINUING REVIEW REQUIREMENTS:

- **Renewal Request Form:** All approved projects are subject to an annual renewal process. Projects must be renewed or closed by the expiry date indicated above ("Current Expiry"). Projects that are not renewed within 30 days of the expiry date will be automatically suspended by the REB; and projects that are not renewed within 60 days of the expiry date will be automatically closed by the REB. Once your file has been formally closed, a new submission will be required to open a new file.
- **Change Request Form:** any changes or modifications (i.e. adding a Co-PI or a change in methodology) must be approved by the REB through the completion of a change request form before implemented.
- **Adverse or unexpected Events Form:** events must be reported to the REB within 72 hours after the event occurred with an indication of how these events affect (in the view of the Principal Investigator) the safety of the participants and the continuation of the protocol. (I.e. un-anticipated or un-mitigated physical, social or psychological harm to a participant).
- **Research Project Completion Form:** must be completed when the research study has completed.

All Forms can be found at <http://research.uoit.ca/faculty/policies-procedures-forms.php>.

REB Chair Dr. Bill Goodman, FBIT bill.goodman@uoit.ca	Ethics and Compliance Officer compliance@uoit.ca
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