USING TEXT MESSAGING TO PREVENT EARLY PEDIATRIC OBESITY

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ABSTRACT

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USE OF TEXT MESSAGING IN PEDIATRIC OBESITY PREVENTION

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The purpose of this study was to determine whether parents of infants prefer gain-
or loss-framed text messages to promote healthy feeding behaviors and to determine the
preferred time of day, day of the week, and frequency of text messages. Thirty-four
parents of infants 3 months of age or younger completed an online survey. Parents rated
how helpful each message was and the likelihood they would change or continue the
feeding practice based on the message using a 5-point Likert scale. For messages related
to benefits and self-efficacy of breastfeeding, gain–framed messages were rated as more
helpful (mean = 2.32; P = .03; mean = 1.79; P = .041, respectively, mean difference =
0.53.) For overall helpfulness and likelihood, there were no differences between gain-
framed versus loss-framed messages. Thirty-eight percent of parents reported wanting to
receive text messages one time per week in the morning.

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CHAPTER I

INTRODUCTION

INTRODUCTION

Pediatric obesity is a worldwide epidemic affecting the lives of more than 43 million preschool-aged children.[1] Almost 18.5% of children are currently classified as obese.[2] In 2015-2016, there was a spike in obesity incidence in children aged two to five, increasing from 11.4 to 16 %.[3] The reason for this spike is not known. Pediatric obesity is a critical issue because it can result in many comorbid conditions. These include breathing problems, non-alcoholic fatty liver disease, musculoskeletal disorders, mood disturbances, metabolic syndrome, polycystic ovarian syndrome, glucose intolerance, diabetes, chronic kidney disease, atherosclerosis, and many cancers.[4] Early childhood obesity is a particular problem because of the increased risk of obesity as an adult and higher morbidity and mortality rates.[4]

In the U.S. risk factors for severe obesity in children include being a racial or ethnic minority, from single parent headed households with lower educational attainment, living in poverty, having never been breastfed, and engaging in higher amounts of screen times.[2] Sex and age group also affect the incidence of obesity, with higher rates of obesity among women than men (38% vs 34%).[5] However, rates of obesity for girls and boys are fairly even.[6] Obesity rates for African American girls and Hispanic boys continue to rise

above their peers.[6] White and Asian American children have lower rates of obesity.[3] Factors related to early rapid weight gain and early obesity include parental obesity, birth weight, lack of breastfeeding, early cessation of breastfeeding, lack of parental knowledge about child nutrition, and early introduction of solids.[2,7,8] Because some of these factors are not modifiable, adoption of obesity-protective parental feeding practices such as breastfeeding, avoiding sugar sweetened beverages (SSBs), appropriate introduction of first foods, and responsive feeding are especially important.[1] Healthy school lunch initiatives, physical activity programs, family-based treatment programs, and many other programs have tried to reduce pediatric obesity.[9] Some of these programs have been successful. Yet, despite years of obesity prevention, rates of childhood obesity are still increasing.[4] Thus, other methods are needed to reverse this trend.

Mobile health (mHealth) programs are among the most recent initiatives employed in several areas to promote health.[10] mHealth is the "innovative use of wireless and mobile technologies to address health priorities."[10] mHealth can include text messages, social media apps, emails, and calls from a health provider with health information.[11,12] The use of text messages and other mobile health initiatives has started to gain traction recently. Text messages, applications, social media, email, and other various means of communication have been tested for various groups.[10-12]

Research has highlighted the benefit of text messaging as a means of communication to remind patients about appointments, recalls in medications,

immunizations, facilitate disease management, and aid in smoking cessation.[13] Text

messaging reminders have been shown to increase clinic appointment attendance.[13] In one

study, general practitioners concluded that the use of text messaging was a way to

increase time management.[13] They were unanimously against sending messages to

children aged sixteen or under.[13] In another study, most patients who received text

messages from their healthcare provider were happy about receiving them.[14] Fast test

results and reminders were some of the benefits that patients appreciated.[13]

In addition, patients are interested in using social media and text messaging for

health information.[15] In a study done with obese adolescents, researchers found that

participants were willing to use social media for nutritious meal ideas and inspiration for

behavior change but found a lot of confusing information online.[15]. In a study exploring

experiences with online information regarding food, participants reported a sense of

support and belongingness when interacting online with others in the same state.[15] The

majority of participants in the previous study did not recognize a disadvantage to

receiving text messages.[15]

As mobile phone use has increased globally in recent years, this health promotion

strategy has become viable in many groups, including in low income patients. In a 2012

study, researchers found that approximately 88% of adults own a cell phone, including

95% between the ages of 18-29 years old.[16] Although years ago there was a digital divide

between lower and higher socioeconomic status (SES) adults, this gap is generally

closing.[16] The 2013 Hispanic Trends Project of the Pew Research Center found that

Hispanics owned mobile phones at the same rate, sometimes at a higher rate, than those of other cultures,[17] which is likely to continue to increase. mHealth has the opportunity to change health care delivery around the world as patients need convenient access to health resources. mHealth can be used to provide credible health information to patients at an affordable cost, which makes it potentially useful in preventing pediatric obesity.

There are many gaps in the mHealth and text messaging literature. Frequency of messaging refers to how many times a week a participant wants to receive text messages. No studies have identified the ideal frequency and timing that will influence the most change in feeding practices of parents with newborns. Too many text messages may be overwhelming and too few text messages may not be helpful. Limited research has investigated how many messages per week correlate with the greatest intention to change.[14,18] Timing of text messages is another factor. What time of day would parents like to receive these messages? Would first thing in the morning, at lunchtime, or after dinner be better? Only one study evaluated the time of day that participants would be more likely to read a message,[19] and this study involved problem drinking, which is a very different targeted health behavior compared to promoting positive feeding.[14,18] From preliminary, unpublished research involving focus groups of parents of infants, parents stated that they always have their phone with them and do not have a preferred time they would want to receive messages (Kathleen Davis, PhD, unpublished data, March 2018).

In addition, there is controversy about whether gain-framed or loss-framed messaging is generally more effective at promoting adoption of healthy behaviors.[20]

Gain-framed messaging can be described as a positive message showing the benefits of taking a certain action.[20] In contrast, loss-framed messaging is negative, and the emphasis is on the disadvantages that may result from a certain action. Gain-framed messaging may be better for health promotion messages,[21] while loss-framed messages have more of a fear appeal.[18] Researchers in an organ donation study revealed that gain-framed messaging resulted in a significantly better reaction toward the message and lower levels of psychological resistance compared to receiving a loss-framed message.[22] For young women with bleeding disorders, gain-framed messaging was discovered to influence these women to understand that effective treatment is available.[23] Most message audiences respond better to "prevention-oriented" messages.[20] Participants generally respond with more excitement to actions they can take to prevent health problems as compared to reacting to potentially negative consequences associated with certain behaviors. However, there is very limited literature that has explored the use of framing in text messaging.[24]

Problem Statement

Pediatric obesity is a rising health concern. Many interventions have been employed, but rates continue to be of concern. mHealth uses new technology in a variety of different ways to encourage healthy habits. Using mHealth in the fight against pediatric obesity may promote real change. However, there are many gaps in the literature about message framing and very limited information about framing in text messages.[24] Questions remain about whether gain-framed or loss-framed messages

contribute to the most behavior change. It is also important to examine when and how often participants would like to receive text messages concerning infant feeding practices.

The primary objective of this study was to survey parents of infants aged birth to three months to determine how they would like to receive text messages with feeding advice, including frequency, timing, and style of message.

Hypotheses

- o Research Hypothesis 1: Participants will prefer to receive messages one to two times per week.
- o Research Hypothesis 2: Participants will have no preference on timing for receiving text messages.
- o Research Hypothesis 3: Participants will prefer gain-framed messages over loss-framed messages.

Definitions

- o Gain-Framed Message: A message that is positive and emphasizes the benefits that could occur or the disadvantages that could be by prevented by taking certain actions.[22]
- o Loss-Framed Message: A message that is negative and emphasizes the disadvantages that could result in taking a certain action or the losses that could ensue by not taking other actions.[22]

- Psych Data: A secure online platform for conducting internet-based research.

- Likert Scale: A type of rating scale used to measure opinions or attitudes. Respondents are asked to rate items on a level of agreement.

- mHealth: The use of mobile and wireless devices in medical care and health outcomes.

Assumptions and Limitations

This study was developed to formatively design an intervention that would be customized to the desires of its participants. It assumed that participants would answer questions truthfully according to their actual opinions. It also assumed that most participants would have access to a mobile device, which research supports. In addition, it assumed that the majority of the clinic population was able to speak and read English.

This study relied on participant self-assessment of a text message. This study was limited by the possibility that participants do not accurately predict how a message would impact their behavior. Participants may also have felt pressured to answer questions the way they thought researchers wanted them to answer and not according to their actual opinions. Other limitations include a small convenience sample, the survey only being available in English, and the online format. Participants may also have felt rushed to finish the survey.

Significance

  Due to a lack of research on type, timing, and frequency of text message on pediatric obesity prevention, this study is important. Early childhood obesity causes an array of problems later in life, and mHealth may be a helpful strategy to address early obesity before it starts. Understanding whether gain-framed, or loss-framed messaging is more effective to promote healthy behaviors is important to producing best outcomes for mHealth interventions. This study may help inform the development and implementations of future mHealth interventions and give participants a greater chance of success.

CHAPTER II

REVIEW OF LITERATURE

Pediatric Obesity

Pediatric obesity is a worldwide epidemic affecting the lives of more than 43 million preschool-aged children.[1] Almost 18.5% of children are currently classified as obese.[2] In 2015-2016, there was a spike in obesity incidence in children aged two to five.[3] Pediatric obesity is a critical issue because it can result in many comorbid conditions. These include breathing problems, non-alcoholic fatty liver disease, musculoskeletal disorders, mood disturbances, metabolic syndrome, polycystic ovarian syndrome, glucose intolerance, diabetes, chronic kidney disease, atherosclerosis, and many cancers.[4]

Childhood obesity is complex and is associated with a variety of factors. Race, sex, and age group affect the incidence of obesity.[5] For children, sex is not a significant predictor of obesity. Children with severe obesity have higher odds of being African American or Hispanic[2] while White and Asian American children have lower rates of obesity.[3] Children with severe obesity have higher odds of being a racial or ethnic minority, from single parent headed households with lower educational attainment and in poverty, having never been breastfed, and engaging in higher amounts of screen times.[2]

Despite years of obesity prevention efforts, rates of childhood obesity are still concerning. Underlying issues need to be addressed to reduce childhood obesity.

Factors related to early rapid weight gain and early obesity include parental obesity, birth weight, lack of breastfeeding, early cessation of breastfeeding, lack of knowledge about child nutrition, and early introduction of solids.[2,7,8] Because some of these factors are not modifiable, adoption of obesity-protective parental feeding practices such as breastfeeding, avoiding SSBs, appropriate introduction of first foods, and responsive feeding is especially important. Healthy school lunch initiatives, physical activity programs, family-based treatment programs, and many others have been started to try to reduce pediatric obesity, though rates are still high. Thus, other preventative methods are needed to reverse this trend.

The Problem of Early Obesity

The first one thousand days of life are very important for a child. These days form the building blocks for the child's future. This represents the best time for obesity prevention and its adverse consequences.[1] During this period, parents want to be sure to optimize growth without increasing the risk for future disorders.

Maternal factors during pregnancy, mediators in growth during infancy, and other factors such as parental habits can all play a role in the development of early childhood obesity. Obesity during pregnancy is associated with rapid post-natal growth.[1] Thus, health care providers should emphasize the importance of reducing the body mass index

(BMI) of a woman preconception. Maternal diet, maternal obesity, microbiome, and environmental factors can lead to a higher risk of children acquiring a metabolic syndrome-related disease[1] These factors result in a neonate having more than normal adipose tissue.[2] This may often result in obesity later in life.[2] In addition, parents' habits play a prominent role in the development of a child's habits.[1]

In addition to maternal nutrition status and intake, another early predictor for childhood obesity is change in BMI from birth to three years of age.[25] Nakawaga reported that the change in BMI from birth to three years was higher in obese children.[25] Change in BMI and BMI at three years can predict obesity in later childhood. Birthweight can be a factor also.[2] Children of low birthweight have a lower BMI at three years old.[25] Those with high birthweights may also have a greater chance at developing insulin resistance.[2] Catch-up growth and catch-down growth is another trend that should be taken into account. Researchers have concluded that rapid growth following low birth weight can play a role in developing diseases later in adulthood.[25] It can be inferred that there are critical times in a child's life that influence the development of obesity, which may include gestation and early infancy in particular.[2] Birthweight and early rapid postnatal growth may predict pediatric obesity.[25]

Breastfeeding has been shown to have a consistent protective effect against pediatric obesity.[1] Children who were breastfed have a 13% reduction in overweight/obesity.[1] Children breastfed for shorter than four months have a higher chance of being overweight.[7] More positive attitudes, greater levels of social support, and

breastfeeding self-efficacy are associated with higher rates of exclusive breastfeeding for longer than six months.[26,27] These are modifiable factors that may result in lower rates of pediatric overweight/obesity.

In addition, it is important to introduce complementary feedings at an appropriate time when breastmilk is no longer able to fulfill the nutritional needs of the child.[1] There is also a potential link between early introduction of complementary foods and overweight.[7] Children who were introduced to complementary foods by four months of age have a higher chance of becoming overweight/obese than those children introduced to complementary foods after four months.[1] However, there are also contradictory findings. A study done in the United Kingdom concluded that early feeding was not associated with lean or fat mass at age fifteen.[27] Another study found that introduction of solid food at a late age was marginally associated with obesity at age five, but this association did not persist throughout life.[28]

Pediatric obesity significantly impacts the healthcare system. In a study done with hospitalized children, researchers studied the impact of obesity on use of mechanical ventilation, length of stay, comorbid blood stream infections, and mean healthcare cost.[29] The study showed obesity results in longer length of stay, higher hospital admission rates, and worse outcomes in patients with pneumonia or bronchitis.[29] Early obesity prevention may help prevent some of these problems.

Families of lower socio-economic status and vulnerable population groups, such as racial or ethnic minorities at higher risk of early obesity, should be given priority for

prevention resources and efforts.[26] The prevalence of obesity has been shown to decrease with increasing level of education of the head of household.[30] Also, obesity rates were lower in higher income groups.[30] Less educated mothers are more likely to have obese children. These mothers are inclined to feed their children more, which leads to rapid weight gain velocity. Thus, education and resources should be provided to families of lower income and lower education as it has shown they have higher levels of overweight and obesity.

Sociodemographic factors should also be taken into account.[30] Some children in certain parts of the world have higher obesity rates than their peers in other regions.[31] Regionally-specific maternal migrant backgrounds may affect mothers' perceptions of child eating behaviors.[31] Food approach and food avoidance behaviors are often associated with maternal migrant background. Eating behaviors influence the regulation of energy intake during infancy and childhood, and lack of regulation of these behaviors may result in childhood obesity.[26]

mHealth

The use of text messages and other mobile health initiatives has started to gain traction recently. Text messages, applications, social media, email, and other means of communication have been tested for various groups. Research has highlighted the benefit of text messaging as a means of communication to remind patients about appointments, recalls, immunizations, facilitate disease management, and aid in smoking cessation.[13] In one study, general practitioners (GPs) saw the use of text messaging as a way to increase

time management. Yet, GPs cite confidentiality as a major concern in using text messaging with patients. GPs unanimously decided against sending messages to children aged 16 or less.[13] In this same study, most patients who received text messages from their healthcare provider were happy about receiving them.[13] Participants also indicated they appreciated fast test results and reminders.[13] The majority of participants did not recognize a disadvantage to receiving text messages.[13] Although one pitfall of this new technology may be loss of confidentiality, patients were not worried about this in this particular study.

There have not been many studies evaluating the use of text messaging with pediatric obesity, but some comparisons can be drawn from health promotion research involving text messaging. In one study, patients with coronary heart disease received text messages from their providers.[12] Patients receiving texts showed an increase in medication adherence, decrease in smoking, increase in daily vegetable consumption, and increase in health care center visit frequency. In another study, parents of children receiving immunizations received text messages each night and were asked to report on the child's wheezing and fever. These parents found text messaging beneficial.[32] Most parents liked receiving text messaging over paper reporting. In a UK study, researchers found gain-framed messaging resulted in study participants having stronger intentions to avoid high calorie snacks and lower self-reported snack consumption compared to loss-framed messages.[24]

This raises another question: how often and at what time should text messages be sent? A mobile text messaging for patients with a drinking problem sent at least one text message every night at 6pm.[19] Participants in this study received 0-100 text messages per month. They received at least one a day, but some were tailored to the specific problem they had. All individuals participating in the study had a decrease in amount of drinks per week, possibly due to the text messaging.[19] This study clearly shows that at least one text message a day is beneficial for change. However, there is not clear evidence about the optimal frequency for text messages to promote behavior change. Does more than one per day bother participants? Will participants stop reading the text messages after receiving so many? It is key to find the best number of text messages per week to illicit change.

Message Framing

In health promotion literature involving pamphlets or other educational materials, framing of health messages has been shown to have an impact on outcomes.[13] Framing of messages refers to the fact that people can be persuaded to make particular decisions through different approaches that use the same logic to promote a position.[22] Gain-framed messaging can be described as positive messages that show the benefits of taking a certain action.[22] In contrast, loss-framed messaging involves messages with an emphasis on avoiding negative consequences.[22] Heuristic processing can be defined as a practical approach to solving problems to reach an immediate goal. Those with heuristic processing respond better to gain-framed messages.[21] Although there are not many

studies with pediatric populations regarding obesity and gain-framed vs. loss-framed messaging, there are parallels we can draw from other studies.

Researchers in an organ donation study revealed that gain-framed messaging resulted in a significantly better reaction toward the message and lower levels of psychological resistance compared to those receiving a loss-framed message.[22] Researchers also found that gain-framed messages increased the intention of women to donate oocytes. [22] However, these studies may not be representative of other populations.

In a study of young women with bleeding disorders, gain-framed messaging was discovered to influence these women and help them understand that effective treatment was available.[23] Gain-framed messages encouraged women with symptoms of a bleeding disorder to seek diagnosis and treatment.[23] The lessons learned in this study may be applied to preventing pediatric obesity in that gain-framed messages seem to promote action. The participants in this study usually responded better to "prevention-oriented" messages[20] and may respond with more excitement to messages about actions they can take to prevent the health problems rather than a warning of a negative consequence.

Race may play a part in what type of message results in the most intention to change. In a study promoting colorectal cancer screening, [21] white Americans were more likely to be screened for colorectal cancer with loss-framed messages,[21] while African Americans were more receptive to gain-framed messages.[21] Cultural differences should be taken into consideration when designing text messages for particular groups of people.[21]

Message Framing and Other Issues in Text Messaging

There have been few studies of framing in text messaging. However, in one study, 64 pregnant smokers were recruited for a study of different types of messaging to promote smoking cessation.[18] In this study, pregnant smoking women designed text messages to send to other pregnant smoking women. This group of women wrote messages with more fear and guilt appeals.[18] Also, the messages they created targeting the baby's health rather than their own. The women focused mainly on how smoking harms the baby.[18] They developed an equal number of gain-framed and loss-framed messages. This study did not evaluate the impact of gain- versus loss-framed messages on change. However, the study shows that who writes the messages may play a role in behavior change.

A text messaging-based obesity prevention program for parents of pre-adolescent African American girls focused on the parents' role in text message creation.[11] Parents of these girls participated in surveys about perceptions, expectations, and content for a text messaging-based program. The mothers of the adolescent girls were interested in receiving text messages about healthy eating and physical activity.[11] This study had multiple phases. In phase one, parents participated in telephone interviews to help build text messages.[11] Based on these findings, researchers built 107 text messages.[22] In the next phase, an expert panel reviewed the messages for cultural appropriateness and scientific accuracy.[11] Lastly, parents revised the text messages and assessed whether the

text messages were helpful, realistic, and culturally appropriate.[11] An example of the change in message after the three phases is described below.

Original message: "Make the choice to use healthy oils when preparing family meals. Check out the facts here."

Revision: "Want to help your family eat healthy? Use healthy oils when preparing meals. Check out the facts here."

These revised text messages are more culturally appropriate and were perceived as more likely to illicit change. Mothers were interested in receiving text messages on diet, physical activity, sedentary behavior, stress, and sleep, which all related to childhood obesity.[11] Mothers also appreciated links that were provided in text messages. They suggested weekly emails summarizing the text messages, so they could go back and easily review the information they received each week. Convenience and choice were important. Mothers also stated that whether they read all the information depended on the time of day they received the message. This study may help inform knowledge about the benefits of text messaging and how to create beneficial messages that will result in positive change.

Parents are also more receptive to interactive text messages. In a trial to reduce childhood obesity in six to twelve years old, text messages were sent to parents as a health communication tool to support behavior change.[14] Parents received one to two text messages per week regarding strategies to reduce childhood obesity. Self-monitoring was

a key part of these text messages.[14] Parents were asked to report their child's behaviors, which resulted in a high level of engagement and greater implementation of change.[14]

For participants to continue to interact with text messages, the message context should remain relevant.[33] Parents participating in a focus group suggested they would be open to two to three messages per week and would be responsive as long as the messages were relevant.[33] Although they thought that text messages could be problematic due to limited wording, links can be provided within the messages to support behavior change.[24] Parents indicated they also would like the messages to be personalized. Parents perceived messages from their health care professional as a voice of authority, and they were more likely to be responsive to the context.[33]

Patients are also interested in using social media and text messaging for health information.[15] In a study with obese adolescents, researchers found that participants were willing to use social media for nutritious meal ideas and inspiration for behavior change but found a lot of confusing information online.[15] Nevertheless, if text messaging is created with credible information, behavior change can result from mobile health platforms.[15] Health professionals need to capitalize on this to help patients make healthier choices and engage in healthier behaviors. For example, text messaging can be used for parents of newborns to prevent pediatric obesity. Information sent to them on when to feed their child, what to feed their child, and other pertinent health information may help prevent pediatric obesity.

Pediatric obesity affects almost 20% of U.S. children today.[2] There are many root causes of this epidemic, and many interventions have been employed but have been unsuccessful. Pediatric obesity increases mortality, morbidity, and health care costs.[4] mHealth is a new, interactive intervention that has been shown to be beneficial in other settings and has potential in preventing early pediatric obesity.[13] Text messages, social media, email, and phone calls can all be used to provide patients with health information from professionals.[13] Time of day, type of message (gain-framed vs. loss-framed), and message context need to be considered when developing mHealth interventions. Research on time of day a message should be sent is inconclusive. It may be fine to send messages at any time and sending weekly emails with extra links for more information may be beneficial. Gain-framed messages appear to be more beneficial for health prevention messages overall but have not been evaluated with regard to parental feeding practices.[33] It is also important to understand what types of messages and content participants want to receive. Due to the use of phones increasing globally in recent years, mHealth has potential to be used in preventing pediatric obesity by providing credible health information to patients at an affordable cost. This purpose of this study was to evaluate the importance of message framing in promoting healthy feeding practices among parents of infants as well as determining the preferred frequency and timing for receiving text messages.

CHAPTER III

METHODS

Participants

This cross-sectional study was conducted among parents of infants aged birth to 3 months who received care at the University of North Texas Health and Science Center (UNTHSC) Pediatric Clinic for the health of their newborn. Inclusion criteria were the following: parents, >18 years of age, of term infants establishing care with the healthcare provider between 3-30 days of life. Parents who were younger than 18 years of age, who established care with the healthcare provider after 30 days of life, and parents of pre-term infants (born <37 weeks) or infants with congenital anomalies or genetic disorders were excluded. Parents younger than 18 were excluded because it was suspected that their concerns regarding feeding and sources of feeding advice might be different compared to adult parents. Incentives for participants who completed the survey included feeding items such as sippy cups to help compensate for the participants' time. The research was approved by the Institutional Review Board (IRB) of UNTHSC and authorized by the IRB at Texas Woman's University. Parents of infants were provided a recruitment flyer for the study from the research study staff during one of their first few clinic visits. Interested parents were able to access the survey on their own mobile devices by typing in a shortened URL linking to the survey noted on the recruitment flyer.

Instruments

The survey used to assess parental preferences regarding text messaging was developed by the nutrition student with input from two qualified professionals, a registered dietitian, and a certified health education specialist. The Health Belief Model served as the theoretical framework for the development of this survey to evaluate gain- and loss-framed messaging. The Health Belief Model was chosen based on a review of literature (in which few studies identified any theoretical basis) and preliminary focus groups suggesting that constructs of the model were relevant to this population.[34] Each question set was based on a Health Belief Model construct and the behavioral change goals and psychosocial determinants for this study. These constructs included perceived benefits, perceived barriers, cues to action, self-efficacy, and perceived susceptibility.

A Simple Measure of Gobbledygook[35] (SMOG) readability index testing showed that the survey had a sixth-grade reading level, meeting current recommendations for educational materials aimed at the general public.[35] Due to time limitations, cognitive interviews and pilot testing were not completed before the survey was deployed. Instead, an additional nutrition professional and nutrition student reviewed the survey for readability and meaning.

Table 1. *Message Pairs and the Health Belief Model Constructs They Represent.*

Construct	Gain-Framed Version	Loss-Framed Version
Pair 1: Breastfeeding – Perceived Benefits	*"Babies who are breastfed are likely to have a higher IQ and do better in school."*	*"Babies who are not breastfed are more likely to have a lower IQ and not do as well in school."*
Pair 2: Breastfeeding Perceived Barriers	*"Breastfeeding may be difficult in the beginning, but you can save time by not having to wash and sanitize bottles and nipples."*	*"Parents who do not breastfeed spend a lot of time washing and sanitizing bottles and nipples."*
Pair 3: Complementary Feeding Cues to Action	*"Around 6 months, a baby is ready to start having solid foods, like pureed meats and baby cereals. When your baby is able to sit well with support, it's time to start!"*	*"To avoid food allergies, wait until about 6 months when your baby is able to sit up well with support to begin feeding soft foods like pureed meats and baby cereals."*
Pair 4: Breastfeeding Self-Efficacy	*"I know you can learn to breastfeed. Other women have, and you can too!"*	*"I know you can learn to breastfeed. Don't give up now, or you'll regret it later."*
Unpaired message: Perceived Susceptibility to Early Overweight	*"Did you know that feeding your baby solid foods too early or giving sweetened drinks can make your baby overweight?" (Neither gain- or loss-framed.)*	

Procedures

Parents entered the online, mobile survey and reached an entry page, which explained the purpose of the survey, provided a contact person for questions and problems, and notified the participant that clicking "proceed" served as their consent to participate in the survey. Surveys were administered using PsychData. Each participant reviewed two sets of sample text messages aimed at influencing one of the health behavior constructs identified as a target for a future early pediatric obesity prevention intervention. Each sample text message was written two ways: one gain-framed, one loss-framed. Messages were presented in sets (all gain-framed messages together and all loss-framed together) with questions regarding preferred frequency and time of day for receiving text messages presented in between the sets as a wash out. At the end of the survey, participants were asked to complete demographic Participant information such as languages spoken, parent age, number and ages of children, and participation in Supplemental Nutrition Assistance Program (SNAP) and Women, Infants, and Children (WIC) was recorded. Participation in either of these programs is of interest as an indicator of being of lower SES, and participants in these programs may be receiving nutrition information from them. Parents were also asked to report their own height and weight. The order in which participants received the messages was changed at random. Sixteen of the surveys had the gain-framed questions before the loss-framed questions, and eighteen of the surveys had the loss-framed questions before the gain-framed questions.

As each sample text message was presented, participants were asked to rate how much they agreed with the statement "This message is helpful to me" using a using a 1-5 Likert scale. On the scale, 1 was equal to "very likely". Each participant also rated how likely the message was to influence him/her to adopt a healthy feeding practice by using a 1-5 Likert scale. Then they were invited to provide open-ended feedback about the message. After parents evaluated one set of messages (gain- or loss-framed) and answered questions regarding preferred frequency and timing, participants evaluated another set of messages.

Design and Statistical Analysis

An *a priori* power analysis was conducted using G*Power 3.1.9 to determine the minimum sample size required to find significance with a desired level of power set at .80, an alpha (α) level at .05, and a moderate effect size of .60 (d).[36,37] Based on the analysis, it was determined that a minimum of 24 participants were required to ensure adequate power for the paired-samples *t*-test. However, up to forty participants were planned to be included to ensure the likelihood that a diverse population of parents took the survey in order to adequately assess and modify the text messages.

Descriptive and frequency analyses were applied to the demographic survey questions and questions over preferred time of day and days of the week to receive text messages. A matched pair *t*-test was used to compare helpfulness ratings and intention to change between gain-and loss-frame messages in order to identify the style of message preferred by most parents. Finally, open-ended questions asked parents to either edit

messages or provide their impressions of them and were evaluated using open coding and then placed codes into themed areas. The impact of order of presentation of messages was analyzed by comparing the means of the two groups with an independent samples *t*-test.

With the help of a statistician from the TWU's Center for Research Design and Analysis (CRDA), variables were computed to more easily compare each message pair. Variables that were computed included gain-framed messages helpfulness, gain-framed message likelihood, loss-framed message helpfulness, and loss-framed message likelihood. Then paired samples *t*-tests were run to compare each computed variable. BMI was also calculated to allow for analysis between BMI and type of message preferred.

CHAPTER IV

RESULTS

Thirty-one mothers and three fathers completed the survey. The average age of participants was 26 years old ± 5.5 (standard deviation). The youngest participant was 19 years old, and the oldest participant was 44 years old. The mean BMI of the participants was 28.39 ± 6.3. Ten (29.4%) participants reported that they received SNAP benefits, and 14 (41.2%) received WIC benefits. Fifteen of the participants had only one child at home. Seven participants had two children, five participants had three children, three participants had four children, and one participant had eight children. A race/ethnicity question was not a part of the survey; however, in answer to a question about languages spoken at home, two out of the 34 participants stated that Spanish was the primary language spoken at home. There were ten participants (30%) that spoke Spanish as either their first or second language. One participant recorded that Urdu was her primary language. See Table 2 for more information on demographics and other characteristics of the population. On average, it took each participant 13 minutes to complete the survey.

Table 2. *Demographic Data of Participants (n=34).*

DEMOGRAPHIC DATA

Gender

	Number (n)	Percentage
Male	3	9%
Female	31	91%

Age

19-24	15	44.1%
25-30	14	41.2%
31-44	5	14.6%

Primary Language Spoken at Home

English	31	91.2%
Spanish	2	5.9%
Urdu	1	2.9%

Children at Home

1 child	15	44.1%
2 children	7	20.6%
3 or more children	9	26.4%

WIC

Participant	14	41.2%
Non-Participant	20	58.8%

SNAP

Participant	10	29.4%
Non-Participant	24	70.9%

BMI

18.5-24.9	10	34.5%
25-29.9	8	26.1%
30-34.9	5	14.5%
35-39.9	5	14.5%
>40	1	2.9%

When all gain- versus loss-framed messages were compared, there was no overall difference in helpfulness scores (how much participants that the message was "helpful to me") or likelihood scores (how likely participants felt the message was to prompt them to adopt the feeding practice) for gain- versus loss-framed messages. The gain- versus loss-framed helpfulness means were 2.04 and 2.09, respectively. The gain- versus loss-framed likelihood means were 1.87 and 1.85, respectively. See Table 3. Message style did not affect perceived likelihood of adopting a feeding practice. However, when individual pairs addressing each construct of the Health Belief Model were compared, the message pairs relating to benefits and self-efficacy for breastfeeding were viewed differently with regard to helpfulness ratings. (See Table 1 in the Methods for the text of the messages.)

For message pair one (addressing breastfeeding benefits-see Table 1), participants were more receptive to the gain-framed version (mean difference = -0.44; P = .03). More participants disagreed that the loss-framed version was helpful. Three participants strongly disagreed with the loss-framed version compared to one who strongly disagreed with the gain-framed version. For pair number four, addressing breastfeeding self-efficacy (see Table 1), participants agreed much more with the gain-framed version of this message (mean difference = 0.41; P = 0.04). Refer to Tables 3 and 4 for more detail.

Table 3. *Comparison of Gain- and Loss-framed Messages for Perceived Helpfulness*

Paired Samples *T*-Test Helpfulness			
Pair	Mean Difference	Std. Deviation	Significance
Pair 1: "Babies who are breastfed are likely to have a higher IQ and do better in school" "Babies who are not breastfed are more likely to have a lower IQ and not do as well in school."	-.441	1.160	.034
Pair 2: "Breastfeeding may be difficult in the beginning, but you can save time by not having to wash and sanitize bottles and nipples." "Parents who do not breastfeed spend a lot of time washing and sanitizing bottles and nipples."	.441	1.521	.100
Pair 3: "Around 6 months, a baby is ready to start having solid foods, like pureed meats and baby cereals. When your baby is able to sit well with support, it's time to start!" "To avoid food allergies, wait until about 6 months when your baby is able to sit up well with support to begin feeding soft foods like pureed meats and baby cereals."	-.147	.925	.361
Pair 4: "I know you can learn to breastfeed. Other women have, and you can too!" "I know you can learn to breastfeed. Don't give up now, or you'll regret it later."	-.412	1.13	.041

Table 4. *Comparison of Gain-and Loss-framed Messages for Likelihood to Change*

Paired Samples *T*-Test (Likelihood)			
Pair	Mean	Std. Deviation	Significance
Pair 1: "Babies who are breastfed are likely to have a higher IQ and do better in school" "Babies who are not breastfed are more likely to have a lower IQ and not do as well in school."	-.441	1.60	.526
Pair 2: "Breastfeeding may be difficult in the beginning, but you can save time by not having to wash and sanitize bottles and nipples." "Parents who do not breastfeed spend a lot of time washing and sanitizing bottles and nipples."	.118	1.122	.545
Pair 3: "Around 6 months, a baby is ready to start having solid foods, like pureed meats and baby cereals. When your baby is able to sit well with support, it's time to start!" "To avoid food allergies, wait until about 6 months when your baby is able to sit up well with support to begin feeding soft foods like pureed meats and baby cereals."	.000	.739	1.00
Pair 4: "I know you can learn to breastfeed. Other women have, and you can too!" "I know you can learn to breastfeed. Don't give up now, or you'll regret it later."	-.147	.702	.231

The question relating to perceived risk for obesity did not have a pair. For this question, parents primarily "strongly agreed" or "agreed" the message was helpful to them. Parents were "somewhat likely" to begin or continue breastfeeding their child in response to this message (mean = 1.74 ± 0.9).

Overall, most participants "agreed" that the gain-framed messages were helpful (mean 2.03 ± 0.62). As for the gain-framed messages that asked participants how likely they were to continue or adopt a feeding practice based on a message, participants on average indicated they were "somewhat likely", or "very likely" (mean = 1.87 ± 0.78). For the loss-framed messages asking about helpfulness of the message, most participants "agreed" the messages were helpful, slightly leaning toward "neutral" (mean = 2.09 ± 0.77). The loss-framed messages that asked participants how likely they were to continue or adopt a feeding practice based on a message indicated that participants were "somewhat likely", leaning slightly toward "very likely" (mean = 1.85 ± 0.70). In general, participants of the survey did not have a clear preference between the gain-framed and loss-framed messaging. For both types of messages, participants responded that they were "somewhat likely" to "very likely" to change or continue to enforce positive feeding behaviors based on the message (mean = 1.87 ± 0.78, 1.85 ± 0.70, respectively).

Sixteen participants received the gain-framed messages first and eighteen participants received the loss-framed messages first. When participants were compared to see if order of presentation affected scores using an independent samples t-test, there was

no statistical significance in responses based on order of presentation. Participants who received the gain-framed messages first had scores indicating slightly more agreement with the gain-framed messages (2.00 vs. 2.07, $P = 986$.) Those participants also indicated a slightly higher likelihood of adopting the behavior (1.79 vs. 1.94, $P = .124$.) For those participants who received the loss-framed messages first, they agreed more with the loss-framed messages (1.95 vs. 2.26, $P = .327$) and had a higher likelihood to adopt the behavior (1.81 vs. 1.91, $P = .687$.) Overall, there is no significant difference in helpfulness or likelihood scores compared to order of message. Refer to Table 5 for more detail.

Table 5. *Effect of Message Order on Framing Preference. (Independent t-test)*

Order of Message	Gain-Framed Helpfulness Mean	Gain-Framed Likelihood Mean	Loss-Framed Helpfulness Mean	Loss- Framed Likelihood Mean
Gain- Framed First $N = 16$	2.00	1.79	2.26	1.91
Loss-Framed First $N = 18$	2.07	1.94	1.95	1.81
P Value	.986	.124	.327	.687

In answer to questions asking about preferred timing for receiving text messages, the majority of participants would like to receive text messages once during the week (38%). Twenty-nine percent of participants chose to receive text messages one time per month. Five participants, 14.7% would like to receive messages one to two times per week. Only 2.9% of participants would like to receive text messages three to four times per week. Five participants did not have a preference on how many messages are sent. Fifty percent of participants preferred morning messages. The majority of participants would like to receive text messages in the early morning (26.5%). Twenty four percent of participants would like the message late morning. Night-time messages were the least well received with only 2.9% of participants choosing this option. Eighteen percent of participants did not have a preference in the time of day to receive a text message. Refer to Table 6 for more detail on messaging preferences.

Table 6. *Preferred timing of message.*

Preferred Message Frequency		
Early Morning	9	26.5%
Late Morning	8	23.5%
Any Morning	17	50%
Early Afternoon	7	20.6%
Late Afternoon	3	8.8%
Any Afternoon	10	29.4%
Night	1	2.9%
No preference	6	17.6%

Correlations between BMI and WIC/SNAP benefits were compared using a paired samples *t*-test. The BMI of those receiving WIC benefits was almost three points higher than those not receiving WIC benefits (29.9, 27.0, $P = .231$), but this was not statistically significant. Similar to participants receiving WIC, those receiving SNAP benefits had a higher BMI than those not receiving SNAP (31.7, 26.9 $P = .058$). In general, those receiving SNAP benefits chose "strongly agree/agree" and "very likely/likely" with all message types (gain- and loss-framed). There was no significant correlation between BMI and preference in message framing.

While participants that were younger than 25 years old had more positive scores for gain-framed messages (mean = $2.02 \pm .64$) compared to participants older than 25 years old,

who responded more positively to loss-framed messages (mean = 2.05 ±.69), there were

no significant differences by age. The same was true for likelihood of changing behavior

based on framing. See Table 7 for more detail.

Table 7. *Responses to questions based on age range.*

Age Related Responses			
Question Type	<25 years old	>25 years old	P-Value
Gain-Framed Helpfulness	2.02	2.05	.594
Gain-Framed Likelihood	1.71	2.08	.147
Loss-Framed Helpfulness	2.12	2.05	.673
Loss-Framed Likelihood	1.84	1.86	.548

Five participants had comments on how to revise the statements. For pair 1

regarding breastfeeding self-efficacy, one participant wanted a daily reminder and

thought it "would be taken offense by a non-breastfeeding mom." This participant

included a comment that linking a study on the topic would be beneficial. Another

participant added that having a message that "starts with breastfeeding has positive

effects" would be better. The last comment stated that "breastfeeding is best source for

baby's nutrition and health." In the gain-framed statement regarding barriers to

breastfeeding, one participant thought the message was very disrespectful "to the moms

who can't." In the statement encouraging breastfeeding, one participant thought that the

message was comparing all women and not understanding the fact that everyone is

different. On the loss-framed version of encouraging breastfeeding, one participant

believed that the message sounded harsh.

CHAPTER V

DISCUSSION

In this cross-sectional survey, parents of infants had no strong preferences between gain- or loss-framed text messages. For most question pairs, helpfulness scores did not differ. Parents also did not perceive gain-framed messages as more likely to cause them to adopt a feeding practice compared to loss-framed messages. However, gain-framed messages relating to the Health Belief Model constructs of perceived benefits and self-efficacy for breastfeeding were viewed more positively. Thirty-eight percent preferred receiving messages once per week, and 50% preferred morning messages. Parents seemed receptive to receiving messages from their child's care provider related to feeding. Results suggest text messaging is a promising practice in primary care.

The first research hypothesis that participants would prefer receiving messages one to two times per week cannot be rejected. Parents preferred to receive one message per week. The second hypothesis that participants would have no preference on time of day for receiving text messages is rejected. Half of the parents (the majority) preferred to receive messages in the morning. The third hypothesis that parents would prefer gain-framed messages is rejected. Parents did not significantly prefer gain-framed over loss-framed messages.

For the most part, the findings did not agree with expectations. While parents were receptive to receiving messages one time per week, they did not show broad preferences for gain-framed text messages. Only the gain-framed versions of messages related to breastfeeding benefits and breastfeeding self-efficacy were regarded as more helpful (see Table 1). Participants viewed the gain-framed message regarding benefits of breastfeeding for IQ more positively (mean = 2.31; p=.034). This may indicate that when a statement is encouraging, the reader responds better than when the message is perceived as attacking them for what they might regret later. For this message, participants were more receptive to encouragement than fear. Participants also viewed the gain-framed question regarding self-efficacy for breastfeeding more positively (mean 1.79; p = .041). It appears that parents are more receptive to gain-framed messages that are linked to perceived benefits of taking a particular action. However, some research in the literature suggests that this is not always the case. In one study, pregnant smokers seemed to prefer messages that included some components of guilt and fear regarding the impact on their baby due to smoking.[18] It is also possible that for this sensitive topic (breastfeeding), parents prefer an approach that is encouraging without invoking feelings of guilt. Two of the three messages regarding breastfeeding showed preferences for the gain framed message. Only the message relating to saving time did not show a significant difference for helpfulness scores. It is unclear whether it is the subject matter (breastfeeding), the construct addressed by the message (benefits and self-efficacy) or some other factor that makes parents react more strongly to loss-framed vs. gain- framed messaging. More

research is needed to examine the impact of gain- versus loss-framed text messaging on parental infant feeding attitudes and behaviors.

Brian Wansink tried to reconcile inconsistencies in the health promotion literature in preferences and effectiveness for gain- versus loss-framed messages by suggesting in a review of literature that individual characteristics drive these preferences.[20] Wansink based this assessment on four characteristics – level of involvement in the issue, certainty of outcome, preference of risk, and need for cognition (preference style).[20] Understanding audiences' views on these four characteristics may resolve inconsistencies in the research and better explain what type of message is best for a specific audience. He suggested that participants with low levels of involvement in an issue (such as when providing nutrition information for the general public) or participants who showed risk averse behavior would prefer and respond to gain-framed messages. He stated that gain-framed messages are most successful for encouraging compliance and adherence[20] due to the fact that a higher level of education and understanding may be more important in those who agree more with loss-framed messages. However, in this study, parents (who might be thought to be very interested in feeding, thus preferring loss-framed messages but who also might be very risk averse, thus preferring gain-framed messaging) preferred neither greatly.[20]

In addition, it is important to consider how cultural background impacts perception and agreeing with a certain type of message. It has been shown that White Americans are more receptive to change a behavior when a message is loss-framed,[21] while African Americans may be more receptive to taking specific action when a message is gain-

framed. Because race/ethnicity data was not collected as a part of demographic information, this effect was not testable in this study. When participants were compared according to language spoken, there were no differences in preferences in framing. More research is recommended to explore the relationship between culture and message preference.

Regarding preferences for timing and frequency of messages, participants preferred messages sent in the early or late morning once per week. This study evaluated text messages with reminders and tips, which is different from another study of the effects of text messaging for problem drinking, in which messages were sent every day to hold participants accountable.[19] Participants were also sent the text messages at night and asked to respond back. This is not realistic for busy parents of infants. For healthy behavior encouragement, weekly text messages with reminders and tips appear to be sufficient. Participants liked the message first thing in the morning to ensure that they would see the message or that they would have the whole day to look at the message.

In addition, age did not significantly influence preference of gain- or loss-framed messages, although participants under 25 years old had slightly more positive scores for gain-framed messages compared to participants over 25 years old, who had slightly more positive scores for loss-framed messages. No significance was expected regarding age and message framing because of the fairly narrow age span of participants. Age does not always significantly affect a person's views on a variety of issues. When message preferences were analyzed between WIC and SNAP recipients and non-recipients, there

was no significant difference in preferences. Participants in WIC and/or SNAP are likely to have lower incomes compared to non-participants. However, due to the small sample size and homogeneity of participants, it is not surprising that there was no significant difference. Further studies with more participants with wider diversity should be examined. BMI and message preference were also analyzed with no significance identified. The average BMI of participants in this study was 28 and the average BMI in the United States is 26.[38] These values are fairly close, thus perceptions of message framing in this study could be similar to BMI and message framing in the United States. No significant difference was expected because weight has not been noted to significantly affect a person's preference on message framing or likelihood to change.

A few participants provided open-ended comments. Many of the comments were regarding the tone of the message and how others might take offense to the message based on tone. Other participants provided ideas that they would like in a message, including links to research and daily reminders for breastfeeding. Some participants did not leave any open-ended feedback. This could have been due to lack of time, rushing to finish, and simply not having anything to add.

A larger sample size would be helpful to examine more question sets comparing particular perceptions about gain-framed vs loss-framed messages, especially to evaluate whether certain characteristics, such as SES, race/ethnicity, or BMI status, affects preferred question framing. It would have been beneficial to ask participants their race in the demographic questions. Doing this would have helped determine if there was a

correlation between race and message framing, timing, and frequency. More question sets could have resulted in a better understanding of preferred message framing among parents of infants.

Conclusions and Recommendations

Overall, two of the three research hypotheses were not correct, however participants agreed they would prefer to receive text messages one time per week. Participants preferred early morning/late mornings for receiving them. Overall, participants did not prefer the gain-framed over loss-framed messages. For two question pairs, parents significantly agreed that the gain-framed version was more helpful to them. Based on this study, it does not appear that all health promotion messages related to feeding need to be gain-framed messages.

Thus, when developing a text message-based intervention program for parents with infants, it may be beneficial to have a variety of gain and loss-framed messages. Based on feedback from this survey, providing messages that are not aggressive or that might cause offense are best. It would also be helpful to send 1-2 messages per week and primarily in the morning. Based on this study, it is best to not overwhelm parents with too many messages. Some parents were receptive to receiving text messages with links to more information.

The Health Belief Model and its constructs were used to help create this survey. This study focused on the attitudes and beliefs of the participants regarding infant feeding practices. Five constructs – perceived benefits, perceived barriers, cues to action, self-

efficacy, and perceived susceptibility – shaped the questions for the survey. Two of the constructs were significant regarding message framing. For both breastfeeding perceived benefits and breastfeeding self-efficacy, parents preferred the gain-framed version of the text message.

In Texas, the Hispanic population accounts for about 39% of the total population.[39] Approximately 30% of the study participants spoke Spanish in their home as either their primary or secondary language, indicating these results may be applicable to the diverse population in Texas. However, in the United States, the Hispanic population only accounts for 18.1%. [40] Although there was no significance when analyzing message preference and primary language spoken, culture could play a role in perception of messages. Further research is necessary to better understand this element. A text message-based intervention in Texas may need to be different from other states.

In health literature, there is mixed results regarding which type of message framing may be most beneficial. From this study, there is still inconclusive evidence to be able to recommend one type of message framing in health promotion. Overall, in this study, parents did not prefer one style of message, but for two specific messages constructs, parents did prefer gain framed messages. In studies relating to stopping an undesirable behavior or addiction, loss-framed has been slightly viewed as more beneficial.[18] Though, in other studies, gain-framed and loss-framed were viewed equally. Message preference may be influenced by health behavior being targeted, in addition to culture, ethnicity, age and a variety of other factors.

This study gave insight into parent's preferences on receiving text messages from their child's healthcare provider. This study did not indicate that message framing was important to parents of infants except possibly with regard to breastfeeding. This study helped to provide information on mHealth, the use of text messaging to prevent early pediatric obesity, and parents' preferences regarding message framing, and frequency and timing of message. From this study, it can be concluded that parents do find text messaging and mHealth beneficial for themselves and their children. Mobile phone/text messaging intervention is bound to continue to become more common. Phone use is extremely common in adults in the United States and is beginning to become more common adults with lower SES status and those in other third-world countries. This new technology is expanding and has shown to be able to reach those that may have been forgotten. Text messaging is a viable mHealth option in preventing early pediatric obesity.

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Appendix A

Survey

Study Title:

Timing, frequency, and style of text messages associated with likelihood of adopting healthy feeding practices in parents of infants

Statement of purpose:

We want to hear from you because you are a parent of a young infant. The purpose of this survey is to find out how often, when, and what type of text messages with feeding advice you would like to get from your baby's healthcare provider. We also want to find out which style of text message with feeding advice best helps you feed your baby in healthy ways. We hope to use what you tell us to create a text-messaging program to be used by healthcare providers to give important feeding advice to the parents of young infants.

This study is conducted by Nusrath Habiba, MD, and Paul Bowman, MD, of the University of North Texas Health Science Center, and Cassandra Brown, BS, Kathleen Davis, PhD, RDN, LD, and Marilyn Massey-Stokes, EdD, CHES, CHWC of Texas Woman's University.

You do not have to participate in this research. You are a volunteer. If you decide not to be part of this research study, you may withdraw at any time. If you decide not to be part of this study, or if you withdraw from the study at any time, it will not affect your baby's care. Your baby's healthcare provider will provide the same care to your baby even if you do not answer all questions or withdraw from the survey. Your answers will be confidential. We do not collect identifying information such as your name, email address or IP address. The results of this study will be used for research purposes only. When you press "next" to begin the survey, you consent to be part of this research.

The survey will take about 15 minutes to complete.

Screening Survey Questions:

(Conditional to proceed)

Is your baby younger than 3 months old? (If yes, will proceed. If no, will thank participant, and exit survey).

Was your baby born premature? (If yes, will proceed. If no, will thank participant, and exit survey).

Does your baby have any special medical problems? (If yes, will proceed. If no, will thank participant, and exit survey).

Survey Questions:

For the following questions, pretend that you get a text message from your baby's healthcare provider. Please rate how you feel about the following sample text messages:

Gain-Framed Messages/Questions:

"Babies who are breastfed are likely to have a higher IQ and do better in school."

> a. This message is helpful to me:
> Strongly agree
>
> Agree
>
> Neutral
>
> Disagree
>
> Strongly disagree
>
> b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
> Very Likely
>
> Somewhat Likely
>
> Neither Likely nor Unlikely
>
> Somewhat Unlikely
>
> Very Unlikely
>
> c. Is there a better way to word the text message? If so, please write the better message below.

"Breastfeeding may be difficult in the beginning, but you can save time by not having to wash and sanitize bottles and nipples."

> a. This message is helpful to me:
> Strongly agree
>
> Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

"Around 6 months, a baby is ready to start having solid foods, like pureed meats and baby cereals. When your baby is able to sit well with support, it's time to start!"

a. This message is helpful to me:
Strongly agree

Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to wait until 6 months to feed your baby food other than breastmilk or formula based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

"I know you can learn to breastfeed. Other women have, and you can too!"

a. This message is helpful to me:
Strongly agree

Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

For the following two questions, tell us what works best for you in terms of text messages with feeding advice from your baby's healthcare provider.

What time of day would you like to receive a text message?

Early Morning

Late Morning

Early Afternoon

Late Afternoon

Night

It doesn't matter to me. Any time is fine.

How often would you like to get text messages?

Once per month

Once during the week

Once during the weekend

1-2 messages per week

3-4 messages per week

4-6 per week

7 or more per week

It doesn't matter to me. Any time is fine.

Loss-Framed Messages

"Did you know that feeding your baby solid foods too early or giving sweetened drinks can make your baby overweight?"

   a. This message is helpful to me:
        Strongly agree

        Agree

        Neutral

        Disagree

        Strongly disagree

   b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
        Very Likely

        Somewhat Likely

        Neither Likely nor Unlikely

        Somewhat Unlikely

        Very Unlikely

   c. Is there a better way to word the text message? If so, please write the better message below.

"Babies who are not breastfed are more likely to have a lower IQ and not do as well in school."

   a. This message is helpful to me:
        Strongly agree

        Agree

        Neutral

        Disagree

        Strongly disagree

b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

"Parents who do not breastfeed spend a lot of time washing and sanitizing bottles and nipples."

a. This message is helpful to me:
Strongly agree

Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

"To avoid food allergies, wait until about 6 months when your baby is able to sit up well with support to begin feeding soft foods like pureed meats and baby cereals."

a. This message is helpful to me:
Strongly agree

Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to wait until 6 months to feed your baby food other than breastmilk or formula based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

"I know you can learn to breastfeed. Don't give up now, or you'll regret it later."

a. This message is helpful to me:
Strongly agree

Agree

Neutral

Disagree

Strongly disagree

b. How likely would you be to begin or continue breastfeeding your baby based on this text message?
Very Likely

Somewhat Likely

Neither Likely nor Unlikely

Somewhat Unlikely

Very Unlikely

c. Is there a better way to word the text message? If so, please write the better message below.

We want to know more about the parents answering these questions. Please answer the following questions about yourself:

How old are you? (whole numbers 18 to 55)

What is your sex?

       Male

       Female

Are you? (or)

       Single

       Married

How many children do you have? (whole numbers 1+)

What age are your children? (open-ended)

What language is spoken most often in your home?

What other languages are spoken in your home?

Do you receive SNAP or WIC benefits?

How much do you weigh? (whole number in pounds)

How tall are you? (whole numbers: feet, inches)

Appendix B

TWU Intra Agency Authorization

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378
email: IRB@twu.edu
https://www.twu.edu/institutional-review-board-irb/

DATE: July 18, 2018

TO: Ms. Kathleen Davis
           Nutrition & Food Sciences

FROM: Ms. Tracy Lindsay, Director of Operations
           Office of Research & Sponsored Programs

Re: *Institutional Authorization Agreement (IAA) Processed for Timing, Frequency, and Style of Text
      Messages Associated with Likelihood of Adopting Healthy Feeding Practices in Parents and
      Infants (Protocol #: 20192)*

An IAA for the above referenced study between Texas Woman's University and UNTHSC - North Texas
Regional has been processed as an expedited study. The UNTHSC - North Texas Regional IRB is the
designated IRB providing the review for this study. According to our records, this protocol was most
recently approved by the UNTHSC - North Texas Regional IRB on 6/26/2018.

A current protocol file with all correspondence between the researcher and the UNTHSC - North
Texas Regional IRB must be maintained at TWU. Therefore, you are required to place on file any
documentation regarding this study including modifications, extensions, notifications of adverse
events, etc.

If you have any questions, please contact the TWU IRB.

cc. Dr. Shane Broughton, Nutrition & Food Sciences