THE FEASIBILITY OF PROVIDING NUTRITION EDUCATION THROUGH A WIC

APP TO AUGMENT HEALTHY EATING, BREASTFEEDING, AND PHYSICAL

ACTIVITY BEHAVIORS AMOUNG WIC PARTICIPANTS

by

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LIST OF ABBREVIATIONS

Abbreviation	Description
WIC	Supplemental Nutrition Program for Women, Infants, and Children
App	Smartphone Application
DSHS	Texas Department of State Health Services
UCD	User-Centered Design
SCT	Social Cognitive Theory
UTAUT	Unified Theory of Acceptance and Use of Technology
CITI	Collaborative Institutional Training Initiative

I. INTRODUCTION
Background

As one of the leading public health nutrition in the nation, the United States

Department of Agriculture Supplemental Nutrition Program for Women, Infants, and

Children (WIC) provides food assistance and nutrition education for pregnant women,

infants, and children up to the age five.[1] The WIC program plays an important role in

improving the overall health status for low-income families that are enrolled in its

program.[2] Most clients have a household income within 185% of the federal poverty

level, which enables the program to address health risks associated with lower

socioeconomic status as well as food insecurity.[3,4] Among the most urgent priorities is the

promotion of healthy behaviors that negate health disparities associated with race, level

of English proficiency, and residency (urban versus rural).[5,6] Poor diet quality as a

consequence of food insecurity has been associated with increased nutrition risk

associated with lower household income.[7] Nutrition classes, like the ones developed by

WIC, have successfully increased nutrition knowledge for low-income women.[8]

Primary focuses of WIC's nutrition education include the provide nutrition

education and promote physical activity, healthy eating, and breastfeeding behaviors

through online and in-person classes. Nutrition education classes cover a variety of topics

such as food groups, fruit and vegetable preparation, and basic nutrition knowledge.[1]

Despite the positive outcomes of WIC's nutrition education, the efforts to increase the

accessibility of nutrition education has not made any technological advances beyond the

transition to online classes, which limits its efficacy to reach WIC clients.

Nationally, the WIC program has observed a gradual decrease of 13% in

participation since 2010, approximately 1.5 million individuals, despite the growing need

in eligible clientele.[1] The Texas WIC program has also experienced a steady decline in its participation, from 993,498 in 2011 to 862,431 total clients in 2016.[9] Dissatisfaction with the delivery of nutrition education strategies have been reported as one of the reasons for lack of participation.[10,11] An additional assessment of WIC's current approach to nutrition education revealed inadequacies of the in-class approach to nutrition education as an effective method for motivating behavior change for the targeted health behaviors. In interviews, WIC clients expressed the desire for nutrition education that was relevant to their lives and involved other family members. Additionally, WIC nutrition educators and clients emphasized the need for culturally appropriate educational tools to meet the needs of this diverse region.[12]

The national WIC program also acknowledges the limitations of its nutrition education strategy. Recent reports cite several areas of improvement.[11] Among them, limited time and resources were major concerns, which can effect both the number of employed nutrition educators and the quality of nutrition classes. Moreover, resources vary from state to stae which creates inconsistency of methods of nutrition education. There is also the need to expand physical activity education as an effort to address the obesity epidemic. Ideally, improvements would include providing physical activity classes as well as equipment; however, a relocation of resources would compromise other health behavior initiatives. Recognizing its inefficiencies, the national WIC program suggests new methods of nutrition education be designed to meet the needs of each client, which may warrant utilizing multiple teaching modalities.[11]

Initiative for WIC App Development

        The Texas WIC program is responding to the decline in participating clients by investing in the modernization of its nutrition education to meet the diverse needs of participants that it serves. It is importance to reach all eligible clients since the Texas WIC program serves a diverse population, in which the deficit in healthy behaviors, race, and food environment have increased the risk for health disparities.[5,6] For example, Hispanic children in Texas are less likely to eat healthy food when compared to white children.[5] Moreover, the food environment in less affluent rural areas is shaped by convenience stores, which offer fewer produce items and limited access to healthy food.[6] Further regional analysis of health disparities in Texas identify Texas Public Health Region 8 as an area of focus for its diverse, vast, and growing population. This region is composed of 14 counties, including the metropolitan area of San Antonio and four counties on the Texas-Mexico border.[13] Moreover, many of the counties along the Texas-Mexico border, experience higher rates of underinsurance and poverty as monitored by the Texas Office of Border Health.[14] Most national public health approaches are not designed for a unique population such as the Texas Public Health Region 8.

        As a feasible multi-cultural solution, the Texas WIC program initiated the development of a WIC app as a strategy to modernize its nutrition education to meet the evolving needs of its participants. Smartphone apps are a low-cost, effective intervention for women of multiple socioeconomic strata and geographic regions.[15,16] Recent studies also support the potential of a smartphone app as a modality for nutrition education within the WIC targeted health behaviors.[17–19] Moreover, the drive to revive nutrition education coincides with a surge of pregnant women and mothers who are looking for

information and peer-support groups electronically.[20–23] A recent international survey of 613 women from 12 countries suggests many women are making decisions related to their healthy based on information accessed online during pregnancy.[20] Other studies reported postnatal mothers sought electronic resources for supplemental information on topics covered by their health care professional as well as support when facing challenges related to motherhood.[20–23] Similarly, social networks have become a source of emotional support and a forum to discuss conflicting advice, particularly for breastfeeding.[18,23,24] Other studies demonstrate how the observed phenomena is not limited to women of a certain race or socioeconomic status.[25,26]

The potential for a WIC app to deliver nutrition education is further established by the increase use and desire for technology among Texas WIC clients. Per the Texas WIC Statewide Nutrition Education 2014 Survey, 68.1% of the 3,405 WIC respondents owned smartphones, of which 55.4% spoke predominantly Spanish.[25] The report also revealed more WIC clients favored texting questions to WIC staff as opposed to emailing questions, which implies a preference for smartphone technology to the internet as modes of communication.[25] Additionally, a recent national survey shows, of the 8,144 women surveyed, 59% would video chat with a breastfeeding educator and 76% thought it would be helpful to video chat with a nutritionist.[26] The findings also revealed 31% used their smartphones to access parent or health related information.[26] Perhaps a WIC app would encourage more inquiries by making it easier to access reliable information. Currently, there is little research for developing apps that are appealing and useful for perinatal women, despite the number of apps developed for mothers.

Scope of Project

A WIC app may provide an education outreach tool that reaches across the diverse populations that Texas WIC serves. In 2014, the Texas WIC Program, under the supervision of the Texas Department of State Health Services (DSHS), initiated the investigation into the feasibility of providing nutrition education through a smartphone app. To assure that an app is appropriate for WIC, Texas DSHS acknowledged the necessity evaluate cultural factors related to potential use of a nutrition education app. Two grants were awarded to Texas State University to conducted research that would assist in the WIC app development: Investigation of mobile technology to provide nutrition and breastfeeding support to Texas WIC participants Texas Department of State Health Services WIC ($249,974) and Application of mobile technology study to develop recommendations for TXWIC.org ($35,000). Texas State University Institute of Research Board (IRB) granted approval to the project in July 2014, approval number 2014N4259. Figure 1 summaries the timeline of the main project.

April 2014
•Developed app presentation and focus group discussion guide for formative phase focus group discussions
•Hired staff

May 2014
•Contact WIC Clinics to recruit participants for formative phase focus group discussions
•Developed a prelimenary WIC app prototype

June 2014
•Recruited particpants for formative phase focus group discussions
•User feedback informed the improvements to the WIC app prototype

July 2014
•Texas State IRB approval granted
•Conducted formative phase focus group discussions
•Trascribed focus group discussions and analyzed descriptive data

August 2014
•Conducted more formative phase focus group discussions
•Survey development based on descriptive data obtained from the formative phase
•Userr feedback informed the improvements to the WIC app prototype

September 2014
•Finalized the WIC app prototype
•Developed focus group discussion guide for usability phase focus group discussions
•Conducted usability phase focus group discussions
•Admiistered survey to Texas WIC particpants
•Analyzed all data and submit report to Texas DSHS

October 2014 to December 2015
•Continoul analysis of descriptive data from usability stage with a focus on cultural differences

Figure 1. Timeline for the WIC app development project.

II. PROJECT PHASES
WIC Prototype Development

The main project utilized a multi-phase User-Centered Design (UCD) to increase the efficacy of an app by incorporating trials of potential app user assessments, while simultaneously applying the feedback to improve the WIC app.[27] This method has been shown to identify 80% of potential problems before the final product is launched.[27,28] Within the UCD model, qualitative and quantitative methods can be used to ascertain WIC participants' needs for nutritional education and assess the feasibility of meeting their needs with a WIC app. The process is intended to be ongoing to the point of final prototype revisions due to using user feedback to inform the development of the WIC app prototype. The UCD model has three phases: formative, developmental, and usability. Figure 2 illustrates the progression of the main project.
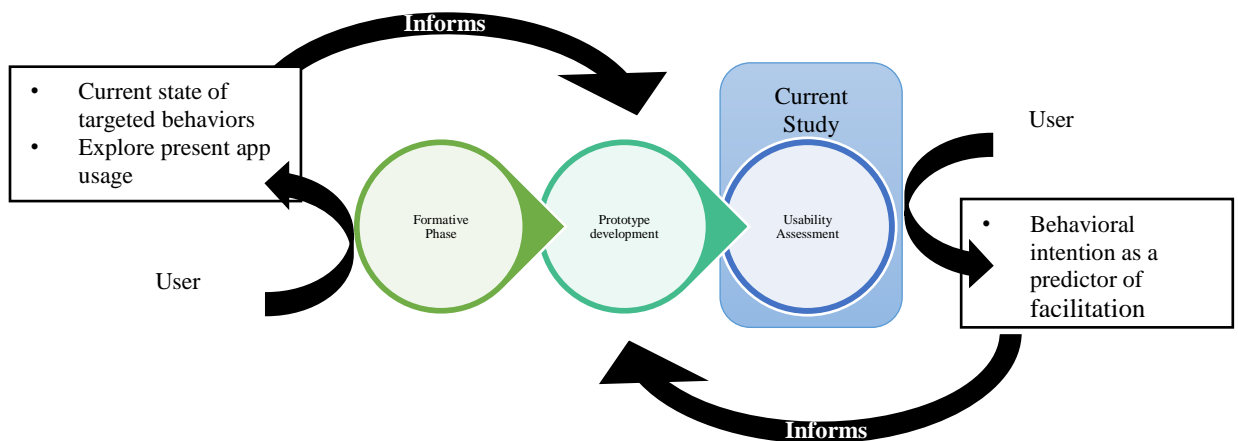
Figure 2. The progression of the UCD model. User feedback is collected at formative and usability phases and used to improve the app prototype.

The formative phase had two objectives: 1) to investigate the present state of the targeted behaviors, such as facilitators and barriers and 2) explore attitudes about current app usage. Concepts from the well-studied Social Cognitive Theory (SCT) and Transtheoretical Model of Change were used to define facilitators for targeted behaviors.[29] The incorporation of SCT into the conceptual framework will be discussed in more detail in later sections. Qualitative analysis collected descriptive data from seven focus groups, four English speaking groups and three Spanish speaking groups.[28] Results from the formative phase identified three facilitators for maintenance of targeted behaviors: information to increase knowledge and self-efficacy, support from family members and health care professionals, and strategies to improve self-efficacy and get others involved with the healthy behavior. Cited barriers included lack of motivation, time, and strategies. Focus group participants also mentioned smartphone apps and features that helped them maintained healthy behaviors and negate barriers.[28] Feedback from the formative phase focus group discussions were used to create improvements to the WIC app prototype design.

The WIC App Prototype

In accordance with UCD, the results obtained from the formative phase served as the basis for the product development phase of preliminary prototype features (figure 3).[28] The WIC app prototype was not fully operational, which permitted a participatory assessment that encouraged feedback for WIC clients' preferences regarding functionality. Features included a homepage that allowed access to other features within breastfeeding, physical activity, and healthy eating targeted behaviors. Also, located on the homepage, a library tab centralized all resource materials into one location and a

share tab exhibited how WIC clients could quickly share their concerns and/or experiences through their favorite social media sites. Within the breastfeeding section of the WIC app, the live-chat feature provided WIC clients with a method to communicate with a WIC staff member about any problems or concerns. Additionally, a growth chart feature and a timer feature modeled the ability for the WIC app to track infants' growth and feeding, respectively. The WIC app prototype also demonstrated how physical activities could be tracked, planned, and shared on social media sites. Comparable to the physical activity features, healthy eating features that facilitate planning meals, assessing new recipes and creating shopping lists were also displayed in the WIC app prototype.[28] In the next phase of UCD, the final version of the prototype was used to assess the usability of a WIC app among WIC participants.

Figure 3 Screenshots of wireframe prototype (both English and Spanish).[30] A. Screenshot of the home screen for the WIC app prototype. B. Within the breastfeeding section of the WIC App, a growth chart tracks the infant's development. C. Screenshot of the home page for the physical activity section of the WIC App. A user can click on any one of the rectangles to be directed to the corresponding feature. D. Screenshot of the healthy eating section within the WIC App. Like the physical activity home page, a user can be directed to desired feature on the subsequent page.

Current Study

The current study is the usability phase of UCD, which evaluated the app user's expectation and predicted future use of the WIC app. Two theories informed the study's methodology for the usability assessment: SCT and Unified Theory of Acceptance and Use of Technology (UTAUT). Within the SCT, Bandura et al.[31] established the phenomenon of self-efficacy as means to potentiate behavioral change through various facilitators. As a facilitator, a WIC app has planning and tracking features that can encourage self-monitoring, which directly promotes and measures self-efficacy.[31] A recent systematic review substantiates the efficacy of smartphone apps developed with

concepts derived from the SCT to improve physical activity and healthy eating behaviors.[32] The review included studies that compared smartphone apps designed to deliver individualized feedback and promote self-efficacy with traditional nutrition education methods. Among the 29 physical activity intervention studies reviewed, 69% showed that apps grounded in SCT improved physical activity behaviors when compared to other education modalities. Additionally, in 15:18 healthy eating studies, smartphone apps created with SCT constructs were more effective in increasing fruit and vegetable consumption than traditional nutrition education.[32] To determine if the WIC app could be successful as facilitator for behavioral change, the participants of the present study were asked questions to assess their expectations for the WIC app to augment targeted health behaviors through features designed to promote self-efficacy.

The evaluation for the WIC app's ability to potentiate targeted health behaviors included collecting data on the predicted app usage behavior. The study explored the predicted future use of the WIC app because a fully operational WIC app was not available to determine actual usage. To assess predicted use of the WIC app, the UTAUT model was chosen as a validated usability test.[33–35] A major construct of the UTAUT model is behavioral intention, which is considered the strongest indicator of predicted future use.[36] Behavioral intention refers to the user's incentive to utilize new technology, like an app. Influences that affect a user's behavioral intention are multifactorial, and studies suggest are variable.[33,36] Among the most studied constructs of UTAUT, performance expectancy and effort expectancy are predictors of behavioral intention. Performance expectancy is defined as the expectation of how the app will function and meet the needs of the app user whereas effort expectancy is the expected effort to learn

and/or use the app.[36] The review of current literature will discuss studies that examine these constructs and potential confounding variables for behavioral intention.

Habit is a recent addition to the UTAUT theoretical model. In reference to the adaptation of new technology, habit is the automatic response to using a new electronic device based on the accumulation of previous experiences with comparable technology.[36] It is still unclear if habit is directly predicative of future use or a variable influencing behavioral intention.[36] Additionally, individual differences such as age, gender, and experience can impact the effect of habit on future use of new technology therefore the construct was not incorporated into the conceptual framework of this study.[36] Rather, if a predictive construct for future usage within this population, habit will reveal itself as a prominent factor through descriptive data analysis. Presently, there are limited studies that investigate the usability of smartphone technology within this population: the Hispanic population, low-income families, women, mothers, or pregnant women. The next section will review available studies on user acceptability for similar technologies and interventions.

III. REVIEW OF PREVIOUS RESEARCH
Technology Acceptability

WIC clients have smartphones, use apps, and desire more access to knowledge through text messaging, live chat, and online videos.[25,26,28] Yet, research on technology acceptance is limited for perinatal women and mothers of lower socioeconomic status. Recently, a WIC study investigated current app use as a modifier to targeted health behaviors. Additionally, the desire for alternative approaches to nutrition education and communication within the WIC program in the western region have been documented.[26] Other current studies mentioned in this review of previous research used constructs of the UTAUT as a way to predict behavioral intention for comparable modes of technology in various populations. Although studies are heterogeneous in design and sampled populations, findings suggest that behavioral intention is multifactorial. In the following paragraphs, similarities and relevant findings in current literature will be discussed further.

Biediger-Friedman et al.[28] identified emergent themes for app usage among Texas WIC participants during the formative phase of the main project. To inform the developmental stage of the WIC app design, the sample for this study was recruited from Texas Public Health, Region 8. Eligibility for participation of the study included enrollment or eligible to enroll in the Texas WIC Program and ownership of a smartphone. Three of the seven focus groups were conducted in Spanish. Moreover, 82% of the sampled population consisted of Hispanic women. Descriptive analysis revealed WIC participants used their smartphones to: 1) access information; 2) text message and engage in chat rooms; 3) track behaviors and locate resources; 4) plan and schedule behaviors; 5) share milestones and ideas on social media sites; and 6) for entertainment,

such as playing games. Many of the current app usage practices were used to negate

barriers to targeted health behaviors, specifically accessing information as well as

tracking and planning behaviors. Functions comparable to frequently used apps were

incorporated into the WIC app design.[28]

Other WIC studies investigated the desire for more modern nutrition education

and communication. Bensley et al.[26] surveyed 8,144 WIC participants and found the

majority thought text messaging (82%) and emailing (87%) were "very useful" ways to

receive nutrition education. Additionally, an observed discrepancy between clients that

use one-on-one education (75%) and those that were interested in continuing one-on-one

education in the future (59%) infers the desire for another method of nutrition

education.[26] This implication for desired electronic education and communication can be

carried forward to the willingness to use a WIC app. The 2014 study reiterates the

necessity to evaluate behavioral intention to use a WIC app as well as yield data on

influential factors such as culture.

Other studies evaluated behavioral intention using constructs of the UTAUT, of

which the most representative of the current study's population was investigated

continual usage of health apps among college students in the Midwest.[33] Seventy eight

percent of the 317 students were female and 73% identified as white. Most participants

had 30 to 40 smartphone apps, of which up to 15 were used weekly. Within this

population, gender, age, and experience did not moderate behavioral intention for the

new health app.[33] The sample from the study by Pullen and Swabey[35] also included

mostly women (74%) who currently own a smartphone. Performance and effort

expectancy were among the top factors for technology acceptance of smartphone apps

within a higher learning setting. Other constructs of the UTAUT model that influenced technology acceptability were social influence, attitude toward using technology, and self-efficacy.[35] Performance and effort expectancy was predictive of app behavior within a predominately male sample as well. A study by Afshan and Sharif analyzed the on the predicted use of a banking app and identified performance and effort expectancy as influential factors for behavioral intention and user's perceptions for the app's ability to fit the task. [34] Other external determinants of behavioral intention were trust, structural assurance, and familiarity for comparable technology. Unlike the study that derived its sample form college students, the sample from the mentioned study was composed primarily of Pakistani males, and thus was not representative of WIC participants; yet, findings further informed the UTAUT model.

Smartphone Technology Modifying Behavior

Research is limited for the efficacy of smartphone technology for modifying healthy behaviors in mothers and pregnant women, especially in low-income households. For this literature review, four studies were identified based on similar app functions (one-way or two-way text messaging), targeted behavior change, and population (mothers and pregnant women). However, heterogeneity exists among these studies due to variance in demographics, stage in motherhood, method of analysis (qualitative versus quantitative), and number of targeted behaviors investigated. For instance, only one study was conducted in the United States and only two out of the four studies used behavioral change strategies based on theory. Despite the differences, each study provides some understanding about the usage potential and efficacy of a WIC app.

Comparable to the WIC app, the inventions implemented in two recent studies

were grounded in established theories for behavioral change.[19,37] Of the two studies, Fjeldsoe et al.[37] exclusively recruited mothers from underserved communities and analyzed the effectiveness of imperative cognitive and behavioral strategies using text messaging as means to augment physical activity behavior. Measurements of frequency and duration of physical activity were compared between an intervention and non-intervention, control group. The intervention group received 42 text messages over 11 weeks, consisting of tips for increasing physical activity and goal checks soliciting a status update. Like WIC clients, participants of this study were coached on the healthy behavior changes as well as supplemental education.[37] Results indicated a positive trend for receiving text messages and increase in frequency as well as duration of physical activity.[37] Other results revealed participants that responded to the goal checks met their goals more frequently than those that did not respond. Additionally, qualitative observations suggested most participants felt that the text messages were "extremely useful" to "useful".[37] Overall, Fjeldsoe et al. demonstrated favorable outcomes regarding text messages as a means to communicate and motivate behavior change electronically as well as an effective tool for holding participants accountable to exercise on a bad day.

In a separate study grounded in the SCT, the results of Lombard et al.[19] also supports the notion that electronic communication can be an effective tool. Researchers in the 2010 study recruited mothers from 12 schools located in mid-range social advantage, urban communities in Australia. The control group attended 1 half-hour informational session on how to lose weight through diet and exercise whereas the intervention group participated in 4 additional 1-hour interactive group sessions and received a weekly text message from week four to week 52. One-way text messages were

designed to facilitate goal setting, self-monitoring, and prevent relapse in physical activity and healthy eating behavior. Findings showed text messaging could increase dietary intake of healthier foods and confidence in weight control. The intervention group had significantly higher healthy diet and physical activity scores in self-assessment tests as well as used more self-management strategies. Additionally, the intervention group had lower cholesterol levels and lost weight, whereas the control group gained weight.[37] Results from Lombard et al. exemplify how technology can improve self-efficacy, which can lead to positive results.

Another recent study investigated whether perceived knowledge in pregnancy-related topics in low-income pregnant women could be augmented through easily accessible information.[15] Song et al.[15] assessed the effect a two-way text messaging system had on the perceived level of knowledge for pregnancy related topics among the participants. The two-way text messaging system was controlled by computer software that matched words within the received text and replied with a pre-generated answer. If the software was unsuccessful at matching a question with an answer, a generic response was provided, suggesting that the participant ask a health care provider. Results from Song et al. revealed that electronic communication, although not individualized, could reduce stress and increase perceived knowledge of pregnancy related topics. Women also reported feeling more prepared to meet with their health care providers and sought pregnancy information from other sources such as family and friends. Moreover, the study showed that pregnant women search for information about breastfeeding and healthy foods, which were among the top 10 themes for asked questions.[15] Overall, data suggest that the live-chat feature could be a beneficial tool in increase health knowledge

and self-efficacy in breastfeeding behaviors for WIC clients.

A study by Jiang et al investigated the effect of electronic education on the duration of exclusive breastfeeding and on the delay of introduction of solid foods to infants born to first time mothers in China. Women under 20 years old who did not own a smartphone, and had less than a junior high school education were excluded. There was no mention of the socioeconomic status in the description of the sample or theory was mentioned in the design or strategy for intervention.[38] In the study, one-way text messages provided information that addressed common barriers to breastfeeding, such as problems initiating breastfeeding and adapting to a work schedule. Findings suggested text messages regarding breastfeeding related topics prolonged the duration of exclusive breastfeeding (odds ratio 2.67) and delayed the introduction of solid foods at four months (odds ratio 0.27).[38] Thus, further establishing that electronic education can be a successful intervention for breastfeeding behaviors and the acceptability of a WIC app is worth investigating.

Research Aims

As an investigation of WIC clients' technology acceptability, the purpose of this study is to obtain descriptive observations through convened focus groups of WIC mothers and assess behavioral intentions for a WIC app prototype designed to promote targeted health behaviors. Due to limited research in this topic, it is important to explore the probability of WIC app usage in this population. Moreover, this study builds upon previous research that exemplifies the desire and necessity for other forms of nutrition education for WIC clients.[25,26]

The primary aim of this study is to assess behavioral intention of WIC participants to use a WIC app to improve targeted health behaviors of their families.

Secondarily, to describe the capacity of the WIC app prototype for the facilitation of health behaviors and sustainable use as well as emerging themes will be explored. Subsequently, factors that influence the impact of smartphone app usage will be evaluated and further analysis will be done to investigate cultural differences that may emerge from secondary analysis.

III. METHODS
Project Design

To precede with the current study, all research personnel completed Collaborative Institutional Training Initiative (CITI) certification before recruiting and interacting with focus group participants in accordance with Texas State IRB approval. As the usability phase of the UCD, descriptive data for behavioral intention for the WIC app among WIC participants was collected through a series of six focus group discussions. Convened focus group discussions included three English speaking groups (Del Rio, San Antonio, and San Marcos) and three Spanish speaking groups (Hondo, Pleasanton, and Seguin). Each focus group included a lead and assistant moderator(s). The Spanish focus groups were led by native Spanish speakers. We structured the discussions based on the focus group discussion guide. Wireframe prototypes were provided on a Samsung tablet in English or Spanish and participants were allowed to interact with the WIC app as an exploratory exercise. The prototype had no branding, specific color theme, or final development (figure 4). Not all features were fully operational; however, available functions allowed users to perform tasks to some degree so they could assess how they might interact with the final version of the WIC app.

Participants and Recruitment

We recruited participants in conjunction with local Texas WIC clinic staff, to obtain a purposive sample that represented key demographic groups of Texas Public Health Region 8. This region represents a diverse area including Hispanic Americans (55%), Non-Hispanic Caucasian Americans (36%), and Non-Hispanic Black Americans (6%) living in urban and rural areas.[39] We utilized two approaches to recruit WIC participants: calling participants who completed screening forms distributed by WIC staff

members and recruiting potential participants from local WIC agencies. English-Spanish recruitment phone scripts can be found in Appendix A and B. Bilingual English-Spanish speakers were used to recruit.

To incentivize participation, a meal was provided during the focus group discussion and a $100 grocery gift card given out upon completion of the study. Recruitment materials included flyers, posters, and verbal invitation. Selection criteria included: mothers or pregnant for the first time, currently enrolled in WIC and receiving benefits, and having a smartphone. Cessation of recruitment was the result of redundancy and saturation in data analysis. The demographic table for the focus groups is in Appendix C. Most participants were between 21 and 28 years of age (42%), and the majority had two or more children (88%), and at least a high school education (91%). Seventy-nine percent identified as Hispanic women, 19% were non-Hispanic white women, and less than 1% identified as Native American. Table 1 shows the participant distribution based on focus group discussion location.

Table 1. Location and Dominant Language of Focus Group		
Location	Language spoken	Number of participants (n = 48)
Hondo	Spanish	6
Sequin	Spanish	8
Pleasanton	Spanish	7
San Antonio	English	3
Del Rio	English	10
San Marcos	English	14

Listed are the locations for each focus group site. The language spoken during the discussion and number of participants are also shown.

Focus Group Discussion Guide

The focus group guide was derived from the constructs of the UTAUT and SCT (figure 4). Using concepts of the SCT, questions were designed to assess the WIC app prototype features as facilitators to behavior change and promoters for self-efficacy. Questions were also developed from concepts of UTAUT, performance, and effort expectancy. The objectives of this study are led by the UTAUT construct behavioral intention through the perceptions of functionality and usefulness. Additionally, WIC clients were directly asked questions pertaining to the behavioral intention of the WIC app. The full focus group guide can be accessed in Appendix D.

The focus group guide was derived from the constructs of the UTAUT and SCT (figure 4). Using concepts of the SCT, questions were designed to assess the WIC app prototype features as facilitators to behavior change and promoters for self-efficacy. Questions were also developed from concepts of UTAUT, performance and effort expectancy, to evaluate behavioral intention through the perceptions of functionality and usefulness. Additionally, WIC clients were directly asked questions pertaining to the behavioral intention of the WIC app.
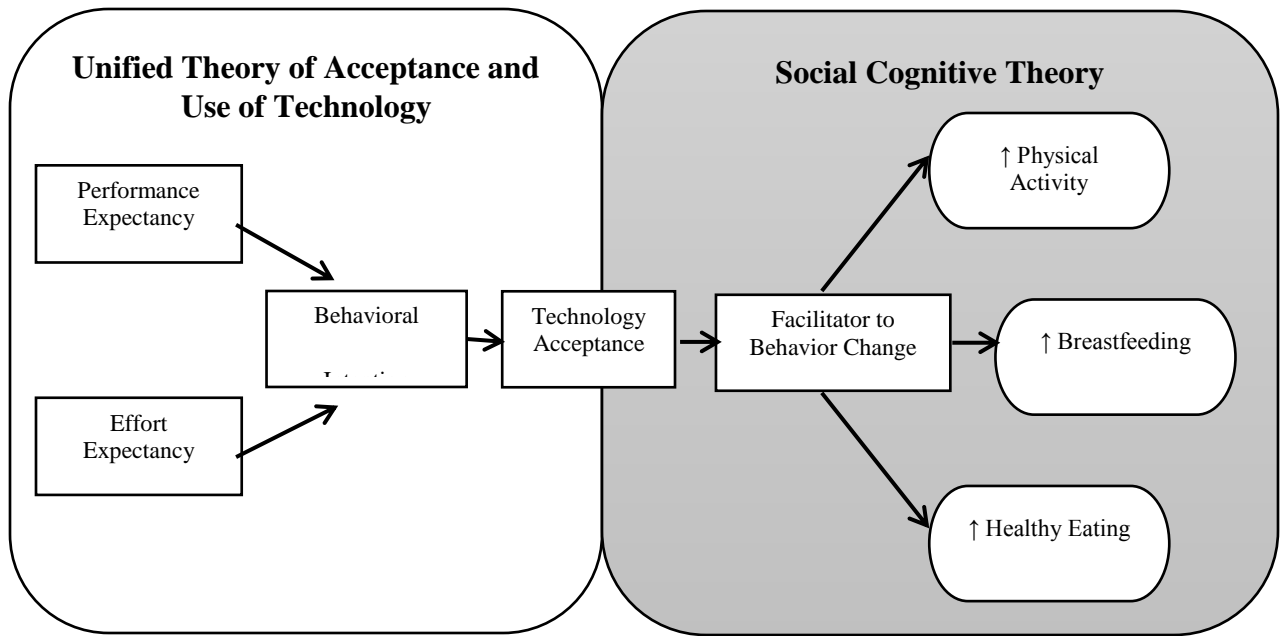
Figure 4. Theoretical model for basis of focus group discussion and node schematics. Questions for the focus group guide were derived from the constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) and Social Cognitive Theory (SCT). Performance expectancy and effort expectancy are strong predictors of behavior intention.[36] Within the SCT, technology acceptance is a precursor for technology use as a facilitator to improve targeted behaviors.[40]

A focus group discussion guide was created to evaluate performance expectancy, effort expectancy, and the potential use of the WIC app prototype as a facilitator to improve targeted health behaviors. The guide is composed of two parts: Part A was designed to assess general opinion for the app and design whereas Part B made inquiries on individual features. In Part A, the discussion opened with 4 questions regarding ways the app would be used, likes, dislikes, and design acceptability. The next questions identified overall perceptions for features. Part B categorically asked questions regarding the likes, dislikes, effort expectancy, performance expectancy, and behavioral intention to use each feature.

Data Collection and Analysis

Data collection was conducted through 6 semi-structured focus group discussions (three in English and three in Spanish), attended by a lead moderator and assistant moderator. The focus group discussions were audio recorded. Demographic data was obtained from each participant through an online survey at the end of the focus group discussions. After each focus group, the lead and assistant moderator compared notes as a first step to identify behavioral intention themes. Recorded observations were professionally transcribed and checked for accuracy by the research team. Spanish transcripts were translated to English, then data was analyzed by English speaking researchers.

Qualitative analysis was organized using QSR NVivo 10 Software 2014 to assess initial themes for behavioral intention and explore emerging themes for app prototype acceptability. Analysis was conducted in three phases; the first phase was an open coding analysis followed by the axial coding phase and a comparative analysis.[41] Two coding teams were used to code transcripts; one performed the open coding analysis and axial coding phase while the other performed the comparative analysis. For all phases, a three coder model was used in which the lead analyst and two team members independently analyzed one transcript at a time.

In the open coding phase, the initial coding structure with eight themes was based on the constructs of behavioral intention and emerging themes identified in moderator notes: mentioned apps, mentioned features, modifiers to technology, behavioral intention, effort expectancy, performance expectancy, frequency of app use, and characteristics of desired app. Throughout the coding process, the first coding team met periodically to

discuss progress and to identify new emergent themes. While no new themes were identified, lists were extended for mentioned apps, mentioned features, and characteristics of desired apps. No themes were collapsed. Reconciliation was performed for inter-rater reliability. Any value below Cohen's Kappa of 0.80 was considered a disagreement.[42] To reconcile differences, team members met to discuss discrepancies and came to an agreement.

As the initiation of the axial coding phase, themes for behavioral intention were examined more closely to identify emerging themes within user acceptability. Multiple coding passes occurred until saturation was achieved. Thus, acceptability of smartphones, app genres, future use and habit were added as new themes and transcripts were recoded. Additionally, a list of WIC app features was added to the mentioned features theme to help organize behavioral intention per feature. No themes were collapsed and inter-rater reliability was calculated as before.

In the comparative analysis, a new coding team was established to explore cultural influences on behavior intention by comparing reports from all English groups to all Spanish groups. Team members carefully reviewed each report, discussing differences in observations while taking detailed notes. Consensus on accuracy of interpretation and meaning had to be met by all team members, including the lead analyst, before a difference would be validated and confirmed.

IV. RESULTS
Behavioral Intention

Overall, the WIC app prototype received predominantly positive feedback in all focus groups. Participants reported that their predicted WIC app usage would be frequent, ranging from a few times a week to multiple times a day. Notably, there were differences in behavioral intention based on language. English speaking participants were more vocal about liking the app and using it in their spare time. This difference can be illustrated by comparing the following statements from English and Spanish speaking participants. An English speaking participant, when asked how likely she was to use the app, stated: *"I'm ready for it to come out now!"* In contrast, most Spanish speaking participants answered *"yes"* to the same question without expressing as much enthusiasm. which is further exemplified by one participant's response when asked about the usefulness of the WIC app: *"How to have a better quality of life. How to be healthier."*

Regarding the constructs of behavioral intention, effort expectancy of the WIC app was described by participants as self-explanatory and simple to use. Observations for performance expectancy were positive and suggested a preference toward the WIC app over other nutritional/ physical activity apps because of its *"all-in-one"* nature. Negative observations for performance expectancy were rare and referred to the impractical nature of any app meeting the needs of the participant at this overwhelming stage of parenthood. As one participant reported: *"When I'm shopping I usually have kids with me. And you're really doing a lot of different things. To be trying to go with this app and do all that . . . it's just too much."* Moreover, there were mixed impressions of perceived usefulness of the app due to vast amounts of information needed by new mothers and their rate of adjusting to parenthood. For example, while reviewing breastfeeding features, most

participants discussed how the WIC app would be a useful tool for new breastfeeding mothers; a small number thought that a new mother would progressively need less support and information as she gained experience. Additionally, participants often offered suggestions to improve the app that would increase their behavioral intention. More often in English speaking focus groups, these suggestions pertained to customizations to organize and prioritize information. Participants also expressed a preference for images and videos over text, especially among Spanish speaking participants. As one Spanish-speaking participant described her frustration with synonyms of Spanish translations in recipes found on the internet: *"I didn't know that pineapple was called – in other countries. It's called "ananá". . .and there was a recipe that I liked a lot and it says "ananá." And I never made it because I didn't know that pineapple was called "ananá."*

Emerging Themes

A variety of emerging themes were identified to describe behavioral intention. These new themes, which were described across most focus groups, included accessing information, soliciting support, and strategizing for maintenance of targeted behaviors (Table 2). Spanish speakers and English speakers expressed behavioral intention differently, particularly in the way the app was predicted to be used. The ability to share milestones, achievements, and challenges were observed as tools for soliciting support; however, participants described some reservation about who would be allowed access to shared content. As one participant articulated the need to control sharing features due to the sensitivity of some challenges of motherhood: *"Because I don't think I'd want to be on Facebook asking moms, "What do I do. . . how do I deal with post-partum depression?" That's not something I want to put out there."*

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The library for all targeted behaviors and live assistant features were perceived as most useful by participants. The concept of trustworthiness was often brought up as a primary consideration for information accessed. Other emergent themes, identified within the context of accessing information through the WIC app features, alluded to the immediate nature of having information on a smartphone and the relevance of information to their current life stage: *"If I'm having problems and I need to know something, I need to know it right now. I don't need to call the doctor and wait. But if I can get help from somebody else right now on the [app], that would keep me motivated;"* *"Look, this is what's happening. And they're seeing you through the camera."*

Additionally, participants discussed the planning and tracking features in the WIC app prototype as tools that would facilitate targeted health behaviors. Participants expressed using these features as a means to log progress in order to achieve goals and stay motivated. For example, the accuracy of tracking breastfeeding duration was described as both necessary and instrumental in developing a routine: *"I don't know how long she was on this side and then this, so that's what I would use it for. That's something, I think, would help me;"* *"The growth chart is really good because like when you're a breastfeeding mom, you have to keep track of like how much they're gaining, you know, so you can make sure they're getting good intake.*"

Table 2. Behavioral Intention and Emergent Themes for WIC App Features				
	Number of Focus Groups Mentioning Emergent Theme (n=6)			
Features (function bulleted)	Behavioral Intention	Seeking Information	Soliciting Support	Strategizing
Healthy Eating Library • Lists of healthy recipes	6	5	2	2
Physical Activity Library • Lists of exercises: making gym simple, exercises with the kids, and exercising at home	6	4	0	3
Breastfeeding Library • Information on breastfeeding techniques	4	3	1	0
Share • Links to social media	4	3	2	2
Healthy Eating Calendar • Meal planning	5	1	0	3
Physical Activity Calendar • Logging physical activity	5	3	0	5
Farmer's Market Locator • Locates and driving instructions for farmer's markets	3	0	0	0
Shopping List • Creates and manages shopping list	6	0	0	4
Physical Activity Tracker • Routes and tracks physical activity	6	3	0	6
Live Assistant • Live feed to a lactation consultant or other WIC mothers	5	5	1	1
Breastfeeding Timer • Tracks duration of breastfeeding per breast side • Links to the Growth Chart feature	5	0	0	3
Growth Chart • Logs and charts breastfeeding duration	5	3	0	4

Features of the WIC app are listed in the first column. Numbers listed in the 2nd to 5th column represent the number of focus groups (n = 6), in which the emergent theme for behavioral intention was mentioned. Behavioral intention is indicative of the app user's predictive app usage. Seeking information, soliciting support, and strategizing are derivatives of behavioral intention and exemplifies the key themes within behavioral intention.

Current Habits

Habitual behaviors that helped participants maintain healthy behaviors were described as essential for behavioral change; mainly utilization of social media and other apps related to the targeted behaviors. Social media was perceived as key source for emotional support, a way to share success stories, and accessing information on targeted behaviors. Focus group observations revealed how participants, through shared success stories and information, kept each other motivated among a fellowship of peers. Participants expressed the need for the WIC app to have a similar method to connect and identify with other moms, share personal hardships and milestones, and receive feedback. Therefore, participants preferred that the final WIC app have functions like social media forums. Moreover, there was a perceived need for controlling content that was shared across all focus groups. Participants wanted reassurance that social media would not disclose private information, which could also be a product of past experiences with reaching out to peers for support. One participant explained: *"I like to keep myself a little personal."*

Participants' smartphone habits were frequently used to describe how participants expected a WIC app would fit into their life, which also served as a foundation for behavioral intention. Across most focus groups, expectations for the WIC app was influenced by current habits for soliciting support, gaining more knowledge about a subject, and developing strategies for behavior. As mentioned, habitual behaviors that were dominant in participants' lives included engaging in social media, such as Facebook and chat rooms. Social media was perceived as an effortless tool to access support and information quickly. For nursing mothers, the ability to obtain support immediately through social media, when a problem presented itself, was paramount to the perception

of support.

Participants frequently mentioned seeking out information to gain more knowledge of a targeted behavior. Developed information seeking habits were dependent on the accuracy and delivery of information. Although social media and chat rooms were often mentioned as a useful when seeking information, some participants expressed not always trusting the accuracy. Blogs and Google searches were noted as more reliable resources, yet participants had to search through several sites before finding specific, relevant information. Moreover, as an extension of perceived accuracy, participants communicated the need for a resource for information to be updated frequently. While discussing the strengths and weakness of other apps and resources, participants expressed the desire for information obtained from the WIC app to be accurate, fast, and relevant, which was perceived as important and predictors for behavioral intention.

Finding accurate information was important to participants because it was used to strategize as means of self-motivation. Most participants expressed that at one point they engaged in self-monitoring routines like using tracking apps, such as pedometers and calorie counters. While comparing the WIC app to other health wellness apps, participants suggested that receiving pings, reminders, celebratory signals, or prompts would result in frequent WIC app usage. Moreover, the WIC app tracking features like the physical activity tracker and calendar were also perceived as useful tools to facilitate targeted behaviors by enabling them to log progress and stay motivated. As one participant expressed: *"seeing your progress would make you determined to keep pushing forward."*

Language Differences

Language differences were also observed within current habits. For example, English speakers, unlike Spanish speakers, used smartphones in their spare time, which included waiting for an appointment or while breastfeeding. Also, participants in English speaking focus groups described the ease of incorporating the WIC app into their current routine: *"I kind of see my schedule in this a little bit. You know, I wake up in the morning, I breastfeed the baby, then after that, you know, it's breakfast time, get on here, look up breakfast recipes."* Additionally, English speakers expressed a tendency to observe chat rooms without participating whereas Spanish speakers showed a lack of interest in even observing chat room.

Another noted difference in observations was the concepts of using the WIC app to serve the family. English speakers wanted to be able to track each family member individually and suggested different user logins or color codes indicative of a family member, whereas individualism of WIC features did not come up in Spanish speaking focus groups. Moreover, English speakers anticipated their children would be engaged in using the app as entertainment or an educational tool as described by participants: *"I think this is going to be great for not just myself, but with my kids;" "And if I had something that I could give to my kid and she could go exercise too, that would be so cool."* In contrast, Spanish speakers did not mention their child handling their smartphone. Instead, observations described app usage as more of a tool for their own daily lives.

Observations that implied using apps as tools included the frequency of the WhatsApp, an international app use for calls and text messages, being reported as the favorite app on participant's smartphone in Spanish speaking focus groups. Additionally,

Spanish speaking participants expressed using the GPS feature when they were lost and not to look up locations for places. Moreover, Spanish speakers did not describe habitually using Google or other web browsers, which coincides with Spanish speakers using the WIC app's library feature to obtain information when needed and not casually research a topic. Results suggest the need for future studies to elucidate differences within each language group.

VI. DISCUSSION

The findings of this study strongly support the strategy of a WIC app to be an effective tool for supplementing nutrition education. Smartphones may be able to bridge various socioeconomic gaps to facilitate targeted health behaviors. Observations made in the context of this research also establish the perceived ability for WIC app features to address cited barriers such as lack of information, support, and strategies for altering health related behaviors.[28] Recent studies also suggest similar usage of technology can improve health behavior maintenance by increasing confidence level and enhancing patient to provider communication within this population.[10,15,20] Additionally, participants perceive WIC as a trusted, reliable source. According to Leak et al.,[43] trust may be the key factor in the perception of reliable, creditable sources for information among low-income populations. Further exemplifying how a WIC app may be uniquely equipped to meet the needs of this population. Additionally, due to the discrepancies among current routines and behavioral intention, results confirm that cultural differences based on language exist in current routines for promoting targeted behaviors and app usage.

Cultural differences based on language reflected in emergent themes for predicted usage of the WIC app included desired customization and performance expectancy. Moreover, in the present study, there was a noted difference in how the WIC app would be used to serve the family. For instance, English speakers had a more individualistic approach demonstrated by desiring separate logins for each member of the family, whereas individualism was not discussed in Spanish speaking focus groups. These observations support a phenomenon described in other recent studies. Gordo, Contreras, and Cassidy[46] explain how an increased acceptance of technology may result in the increase of individualism within families. In an earlier study, Gordo, Parra, and

D'antonio[47] suggests that Spanish speakers minimize the use of technology in efforts to maintain traditional family values. This discrepancy seen in behavioral intention based on language differences can be used to inform future developments of smartphone apps as well as designing culturally acceptable nutrition education.

Descriptive analysis also suggests that smartphones and apps were an integral part of participants' daily routine, making the WIC app a potentially effortless tool for promoting behavioral change. The WIC app can provide immediate and easy access to support, information, and strategies to plan and prioritize behaviors, which were perceived as important factors for facilitation of targeted behaviors. As evidence by other studies, easier access to nutrition education through modern technology was cited as more successful than onsite education in the advancement of stages for behavioral change.[10] Moreover, easily accessible two-way support has been shown to enhance patient and provider communication as well as increasing perceived knowledge in pregnant women, which could further increase the maintenance of health behaviors.[15] Moreover, as a component of the SCT, participants describe the WIC app's ability to promote self-efficacy by potentiating current routines for targeted behaviors. Recent studies also support that the habitual behaviors similar to participants' reported current routines for seeking information have been shown to increase confidence levels with respect to decision making and maintenance of health behaviors.[20,44]

Theoretical Evaluation

In addition to positive feedback for behavioral intention, the feasibility of WIC apps to reinforce and maintain healthy behaviors is supported by the SCT, which defines identification, modeling, self-efficacy, and outcome expectations as constructs for

influencing behavior. [29,40] In focus group discussions, participants describe how the WIC app's share feature would be used in ways indicative of these constructs of SCT. Performance expectancy the share feature included enabling participants to: 1) identify with each other; 2) model and encourage one another; 3) increase self-efficacy by sharing strategies and information; and 4) influence perceived outcome expectation by providing a platform to showcase achievements and share challenges. Additionally, the importance of the share feature as means to access information and support within a group was further emphasized by the frequency to which it was mentioned, thus showing the potential for the WIC app to promote targeted health behaviors.

Another significant factor for behavioral intention was habit, which was established as current routines in the present study. Venkatesh et al.[48] defined habit as a facilitator to behavioral intention that is influenced by previous experiences. As described by UTAUT, habit is limited to the experience of using similar technologies and was seen as an outside construct with an elusive role on performance and effort expectancy.[48] The present study shows that habit can be the driving force for behavioral intention by developing the expectations for new app technology. Additionally, habit for current support and information seeking routines were not limited to app use, which was exemplified by how trustworthiness for the WIC program reflected in trust for the WIC app. It is not clear if habit's strong and direct role on performance expectancy and behavioral intention is unique to this population; however, findings can be used to further inform the UTAUT model and future studies.

Other researchers have explored the complexities of habit on behavioral intention and came to similar conclusion. Oulasvirta et al.[49] linked the necessity for entertainment

to a reward value, which identifies it as motivators for habit and a predictors to behavioral intention among WIC participants. In the present study, the entertainment of smartphone usage closely related to the motivation to pass time during boring periods of time. Moreover, social media was mentioned as ways that participants escaped boredom while being entertained as the same time, which explains the popularity of the share feature across most focus group discussions.[49] Additionally, Limayem, Hirt, and Cheung[50] demonstrated the habitual behavior for connecting with overs through the internet positively influenced participants' behavioral intention to use the internet as an informational resource. These data suggest that predicted future use of the WIC app could be potentiated if the habit for social media was established among clients.

As a strength of this study, results are novel and provide insight to existing predictive technology usage studies. Most behavioral intention studies include a sample of mainly white, college educated males. The current study's sample was Hispanic women, which is representative of a growing ethnic group in the United States. Additionally, the data analysis involved a rigorous methodology, which included multiple phases and coders. By utilizing more than one phase, researchers were able to investigate emergent themes in depth. Descriptive analysis of the usability phase allows for more of insight into participants' motivations for behavioral intention, in which culture emerged as a theme. As result, findings facilitated the implementation of a cultural approach to app development.

Descriptive data varied and allowed for emergent examination of a targeted group of women participating in WIC, however, a few limitations are worth disclosing. First, significant population groups, female WIC participants who did not own a smartphone

and males, were excluded from the sample. Furthermore, this study continued with the UCD model of app development, however, it was necessary to recruit a different sample of women, then sampled in the first phase. Additionally, as the nature of qualitative analysis, results cannot be generalizable comparison of habit and culture. since the study lacks a large sample. Finally, the Spanish transcripts were translated to English without the use of back- translation

Conclusion

Findings of the current study suggest that WIC participants would use a WIC app to augment healthy eating, physical activity, and breastfeeding. Moreover, capitalizing on current self-monitoring routines through a trusted medium could potentiate behavior change and facilitate maintenance of healthy behaviors. Descriptive analysis also gives insight to the limited knowledge for smartphone app acceptability within this population as well as the comparative analysis between language differences reveal cultural discrepancies among attitudes toward technology. It is important to take in account cultural differences as well as habitual app as a preliminary phase of designing effective nutrition education.

Implications of this study that will benefit Texas WIC Program, nutrition educators, and future smartphone app development. A WIC app can be a facilitator for support and self-monitoring strategies, yet it may have its limitations as a sole source of nutrition education. For instance, language difference demonstrates the need for various approaches for nutrition education through an app. Further investigation needs to be done to evaluate the effects of cultural differences based on language on behavioral intention toward smartphone app usage. Additionally, research should be conducted within this

population to assess the outcome and prolonged smartphone app use when UCD was

used in app development.

Appendix A. English Screening Form

Phone Script for Recruiting Participants

"Hello (   ), my name is (   ). I'm calling about the study you signed up for at the local WIC clinic. Is this a good time for you to talk about this?"

*If it is not a good time, reschedule the call. Ask a time and day of the week it would be convenient to receive a call, and make sure you have the best phone number to use at that time.

"How are things going today?"

*Pause, wait for their response, spend a minute or so to establish rapport, and proceed:

"Thanks again for showing interest. We are trying to find out if WIC participants are interested in texting and using smart phone apps to get information and support healthy eating and breastfeeding. This discussion group will help us to design the right kind of smartphone app for WIC clients."

"On the form you completed, you indicated that you use a smart phone that has apps. Is that correct?"

*if 'yes', continue. If 'no', explain that we are looking for participants who do use smartphones and that they will not be able to participate in the study.

"I would like to give you more details about the study. On (*day and month of that WIC clinic's focus group*), we will be meeting with 8-10 women from your WIC clinic for about 2 ½ hours to talk about ways to improve healthy practices such as diet, physical activity, and breastfeeding. We will also talk about what kind of smartphone apps everyone uses and what features you might like in a smartphone app for WIC participants. During the discussion, we will also have refreshments. After the discussion group, you will get a $100 gift card."

*If participant has children: "Because the meeting will last 2 ½ hours, we are asking all participants to find child care for their children. Would you be able to find childcare for your child(ren) on that day?"

*If yes, proceed.

"Keep in mind that your participation would be totally voluntary. This study is separate from WIC, and no one there will know about what you say individually during the

discussion group. Also, your participation in this study will in no way affect the benefits you receive from WIC."

Before we hang up, I would like to confirm your address and phone number. Do you still live at (*address*)? Is your phone number still (*phone number*)?

if address and phone number have changed, correct the information on the screening form.

"Are you still receiving the (*WIC Packages listed*) packages from WIC?"

Use this information to confirm that participant is pregnant or a mother.

"Lastly, I see that you checked (*language*) as the language you use most often. Would you feel more comfortable participating in a Spanish or English focus group?"

Note the language of the discussion group they would like to participate in on screening form.

Finishing the Interview

"Again, the discussion group will be taking place on (*day and month of that WIC clinic's focus group*) at (*time of focus group*). Would you still like to participate?

If no: "Thank you for your time and have a great day! Goodbye!"

If yes: "I am going to go ahead and put you down for joining us on that day.

"Thank you for agreeing to be in the study. We will see you soon! Goodbye!"

Appendix B. Spanish Screening Form

Escritura Telefónica Para Reclutar a Participantes

"¡Hola (   ), mi nombre es (   ). Estoy llamando acerca del estudio que se inscribió en la clínica local de WIC. ¿Es este un buen momento para hablar de esto? "

Si no es un buen momento, volver a programar la llamada. Pedir una hora y el día de la semana que sería conveniente para recibir una llamada y asegúrate de que tienes el mejor número de teléfono para utilizar en aquel momento.

"¿Cómo van las cosas hoy?"

Gracias por mostrar interés. Nosotros estamos tratando de averiguar si los participantes de WIC están interesados en enviar mensajes de texto y utilizar aplicaciones de teléfonos inteligentes para obtener información y apoyar una alimentación saludable y la lactancia. Este grupo de discusión nos ayudará a diseñar el tipo correcto de la aplicación de teléfono inteligente para los clients de WIC."

"En la forma que ha completado, usted señaló que utilice un teléfono inteligente que tiene aplicaciones. ¿Es correcto?"

si 'sí', seguir. Si 'no', explican que buscamos a participantes que utilizan teléfonos inteligentes y que no serán capaces de participar en el studio."

"Me gustaría dar más detalles sobre el estudio. (Día y mes de grupo de enfoque de esa clínica WIC), nos reuniremos con 8-10 mujeres de su clínica de WIC por aproximadamente 2 horas y media para hablar sobre maneras de mejorar las prácticas saludables tales como dieta, actividad física y la lactancia. También hablaremos sobre qué tipo de aplicaciones de teléfono inteligente cada uno de los participantes usa y qué características le gustaría en una aplicación para los participantes de WIC. Durante el debate, también habrá refrescos. Después el grupo de discusión, usted recibirá una tarjeta de regalo de $100." *Si el participante tiene hijos:*
"Porque la reunión durará 2 horas y media, estamos pidiendo a todos los participantes a encontrar cuidado de niños para sus hijos. ¿Serías capaz de encontrar cuidado para sus hijo/a(s) en ese día?"

Si la respuesta es sí, continúe

Tenga en cuenta que su participación sería totalmente voluntaria. Este estudio está separado de WIC, y nadie sabrá lo que dices individualmente durante el grupo de discusión. Además, su participación en este estudio será de ninguna manera afectar los beneficios que recibe de WIC."

Antes de que colgamos, me gustaría confirmar su dirección y número de teléfono. ¿Todavía vive en (dirección). Es todavía su número de teléfono (número de teléfono).
Si la dirección y el número de teléfono han cambiado, corrija la información en el formulario de evaluación.

"¿Todavía recibe los paquetes (WIC paquetes listados) de WIC?"
 Utilizar esta información para confirmar que ese participante está embarazada o una madre.

"Por último, veo que te registraste (el lenguaje) como el idioma que utilice con más

frecuencia. Usted se sentiría más cómoda participando en un grupo de enfoque en Español o Inglés? ".

Nota:el lenguaje de los grupos de discusión que les gustaría participar en el formulario de selección.

Terminando la Entrevista

Una vez más, los grupos de discusión se llevará a cabo (día y mes de la clínica de WIC grupo de enfoque) a las (hora de focus group). ¿Desea participar?
* Si no "Gracias por su tiempo y que tenga un buen día! Adiós! "

* Si la respuesta es sí: "Voy a seguir adelante y le puse por acompañarnos en ese día

"Gracias por haber aceptado participar en el estudio. Nos vemos pronto! ¡ Adiós!"

Appendix C. Focus Group Demographics

Focus Group Demographics		
Caregiver Age	**Frequency**	**% Frequency**
Less than 17 yrs	0	0%
17-20 yrs	1	2%
21-24 yrs	13	27%
25-28 yrs	7	15%
29-32 yrs	12	25%
33-36 yrs	8	17%
37-40 yrs	5	10%
41-44 yrs	0	0%
44-47 yrs	2	4%
Race	**Frequency**	**% Frequency**
Non-Hispanic White	9	19%
Hispanic	38	79%
American Indian/Native American	1	2%
Language Most Often Spoken at Home	**Frequency**	**% Frequency**

English	28	58%
Spanish	20	42%
Education Level		
Elementary School	3	6%
Middle School	9	19%
High School	27	56%
Associate's Degree	5	10%
Bachelor's Degree	3	6%
I would rather not say	1	2%
Number of Children	**Frequency**	**% Frequency**
Pregnant	2	4%
1	4	8%
2	18	38%
3	15	31%
4	6	13%
5+	3	6%
WIC Participation	**Frequency**	**% Frequency**
Less than a year	19	40%
One to two years	3	6%
Two to three years	6	13%
More than three years	19	40%
Did not answer	1	2%

Appendix D. Focus Group Discussion Guide

PRELIMINARY ACTIVITIES [10 minutes]

Moderator:

1. **Introduce herself and welcomes participants to the group meeting.**
2. **Ask participants to sign in.**

3. **Informs all participants about the project, including all responses will be confidential except to researchers, and that any reports or publications from the discussion will not include names.**
4. **Ensures that all participants complete a consent form and an app usage report.**

Moderator:

1. **Ask each participant to complete a demographic survey.**
2. **Explain the "notes page." Let them know that, throughout the focus group, they can write down their thoughts on the topic if they do not get a chance to voice their thoughts.**
3. **Present overview of the topics to discuss during the 1.5-hour focus group session.**
4. **Thank all participants again for taking the time to meet with us.**
5. **Explain that we will honor their time by making sure that we wrap up on time.**
6. **Ask if anyone minds if we record and videotape the session for or records. (Anyone who declines to participate will be given a Best Food FITS grocery bag as a "thank you" before they leave.)**
7. **Ask if there are any questions before we start.**

WELCOME & ICE BREAKER [10 minutes]

1. **Ask participants:** What is your favorite thing about your smartphone?

2. **Explain that a prototype of the smartphone app will be presented to them shortly:**

I will be handing out tablets that will show the basic design and features of a smartphone app but it is not the final product. Some of the buttons will not work but this sample will give you an idea of how the app is supposed to work. This focus group discussion is a last of several discussions. Your opinions will let us know what changes, if any, need to be made before releasing the final smartphone app.

HAND OUT TABLETS & LET PARTICIPANTS LOOK OVER THE SMARTPHONE APPLICATION [10 minutes]

1. **Be sure that participants thoroughly examine the prototype:**

In order to stay on task, I do not want anyone to move away from the smartphone app into the other apps on the tablet. If you accidently leave the app and are having trouble getting back in, please raise your hand and someone will assist you.

On the homepage, you'll see six round buttons along the bottom. Be sure to open all of the features by pressing the buttons and tabs on all of the pages, even the breastfeeding features if you don't currently breastfeed. After you get familiar with the app and its function, I will ask your opinion based on your first impression. There are no wrong answers. Some questions will

ask how easy or hard something might be and you can tell me that it was not easy, hard or anywhere in between. Any questions before we begin the discussion?

DISCUSSION PART A [20 minutes]

1. **Ask how participants would they use the app. Use the bulleted prompts to get the group talking if necessary:**

   a. Now that you have had some time to get familiar with the app, keep in mind that this discussion will help us make a better app for you. How would you use this app?

Prompts

   - How would you use it in your spare time?
   - How would you use it at home?
   - How would you use it with your family?
   - How would you use it outside your home?

2. **Ask participants what they like about the smartphone app:**

   a. What are some things that you really like about the app?

   - What is it about that feature that makes you like it?
   - Why do you like that?
   - What is it about the design that makes you like it?
   - Why do you like that?

3. **Ask participants what they don't like about the smartphone app:**

   a. What are some things that you don't like about the app?

   - What is it about that feature that makes you not like it?
   - Why don't you like that?
   - What is it about the design that makes you not like it?
   - Why don't you like that?

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4. Ask participants more questions about the design:

Personalization

    a. In what ways could you personalize or customize the app?

> - If you can't think of any ways to personalize the app, what are some things that you think are easy to change?
>
> - What kind of information do you think the app could use to make better suggestions for your family?

Perceived Ease of Use

    b. How easy was it to use?

> - How easy was it to figure out how to move from one page to the next?
> - How much thought did you have to put into moving from one page to the next?
>
> - Can you describe an instance when you got stuck on a page and didn't know how to get out? What happened?
>
> - Can you describe an instance when you didn't know how you got on a page? What happened?
>
> - How easy was it to get back to the home page?
> - How easy was it to find the homepage button?
>
> - How many steps did it take to get back to the homepage? Is that too many? Why is that too many?

Complexity

    c. How easy was it to understand how the app works?

> - In what ways did the layout of the design make it easier to understand how to use them or the benefit of using it was clear?

> - In what ways did the layout of the design make it hard to understand how to use them or the benefit to using it was unclear?

5. Briefly discuss the features:

Ease of Use

    a. Which features don't need any explanation on how to use them?

> - What made it easy to know how to use that feature?

    b. Which features, if any, need more explanation on how to use them?

> - What made it difficult to know how to use that feature?
> - How can we make it easier to use them?
> - In what ways, if any, would someone showing you how to use the features be helpful?

    c. How likely are you to use this app if a peer counselor showed you how to use it?

> - How important would it be for a peer counselor to show you how to use the app?

Perceived Usefulness

    d. How would you use this app?

> - Which features would you use every day?
> - Which features would you use a few times a week?
> - Which features would you use a few times a month?

- Which features would you never use?
- Why wouldn't you use this feature?

Extrinsic Motivation

    e.   How would using this app make you more motivated to be healthy?

- Give examples of how you could use this app to get motivated.
- Do you think it would harder to be motivated to achieve your health goals without this app? Why?
- Would there be no change in your motivation? Why?

Job Fit

    f.   In what ways does this app help mothers?

- Which features are most helpful to mothers?
- Which features, if any, don't make a mother's job easier?
- Can anyone point out a feature that would make their job as a mother harder? Please explain.

Relative Advantage

    g.   In what ways is this app better than other apps that promote healthy behavior?

- How is it better than Facebook?
- How is it better than Pinterest?
- How is it better than Instagram?

    h.   In what ways are other apps better than this one?

- How is Facebook better?
- How is Pinterest better?
- How is Instagram better?

DISCUSSION PART B [40 MINUTES]

1. **Explain that will now discuss the features individually.**

Now that I have an understanding of your overall opinion of the app, we will be going through each button on the homepage. I will be asking you questions about each tab. I will be asking questions like how easy or difficult something might be and you can tell me that it was not easy or difficult. Any questions before we begin the second part of the discussion?

2. **Show screenshots of the list of features available for physical activity. Ask participants the following:**

Calendar Tab

   a. What do you like about the calendar feature?

   - What qualities would make you want to use this feature?

   b. What don't you like about this feature?

   - What would keep you from using this feature?

Ease of Use

   c. How easy would it be to use this feature?

   - How many steps do you expect logging your activities would be? Is that too many steps?
   - How easy or hard would it be to assess the weekly challenges when you are doing a few things at once?

Perceived Usefulness

   d. How would you use the Calendar tab to be physically active for 30 minutes on most days?

> - How would you use the calendar tab for your favorite activity?

e. How confident are you that using this feature will help you be physically active for 30 minutes on most days?

> - How long do you think you would use this feature?

Intention to Use

f. How often would you use the calendar feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

Map Tab

g. What do you like about the Map feature?

> - What qualities would make you want to use this feature?

h. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

i. How easy would it be to use this feature?

> - How easy or hard would it be to find a place to exercise?

Perceived Usefulness

j. How would they use the Maps tab to be physically active for 30 minutes on most days?

> - How would you use the Map tab for your favorite activity?
> - How many steps do you expect it would take to finding a place to exercise? Is that too many steps?

k. How confident are you that using this feature will help you be physically active for 30 minutes on most days?

> • How long do you think you would use this feature?

Intention to Use

l. How often do you think you would use the map feature?

> • How many times a day?
> • How many times a week?
> • How many times a month?

<u>Library Tab</u>

m. What do you like about the Library feature?

> • What about this feature would make you want to use it?

n. What don't you like about this feature?

> • What would keep you from using this feature?

Ease of Use

o. How easy would it be to use this feature?

> • How many steps do you expect it would take to find information about physical activity? Is that too many steps?
> • How easy or hard would it be to find answers to questions that you may have about physical activity?

Perceived Usefulness

p. How would you use the library tab to be physically active for 30 minutes on most days?

> • How would you use the share tab to share your progress?

q. How confident are you that using this feature will help you be physically active for 30 minutes on most days?

> - How long do you think you would use this feature?

Intention to Use

r. How often would you use the share feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

<u>Share Tab</u>

s. What do you like about the Share feature?

> - What about this feature would make you want to use it?

t. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

u. How easy would it be to use this feature?

> - How many steps do you expect it would take to connect with Facebook or other social media? Is that too many steps?
> - How easy or hard would it be to share your progress on Facebook or Instagram?

Perceived Usefulness

v. How would you use the share tab to be physically active for 30 minutes on most days?

> - How would you use the share tab to share your progress?

w. How confident are you that using this feature will help you be physically active for 30 minutes on most days?

> - How long do you think you would use this feature?

Intention to Use

x. How often would you use the share feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

y. Anything missing from the physical activities page that you would like to see?

z. Do you have any questions about the physical activity part of the app?

3. **Show screenshots of the list of features available for healthy meals. Ask participants the following:**

Recipe Tab

a. What do you like about this feature?

> - What about this feature would make you want to use it?

b. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

c. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to make a meal?

Perceived Usefulness

d. How would you use the Recipes tab to eat healthier?

> - In what ways would you use this tab to make a meal?

    e.   How confident are you that using this feature will help you eat healthier?

> - How long do you think you would use this feature?

Intention to Use

    f.   How often do you think you would use the recipes feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

Maps Tab

    g.   What do you like about this feature?

> - What about this feature would make you want to use it?

    h.   What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

    i.   How easy would it be to use this feature?

> - How many steps do you expect it would take to find a resource? Is that too many steps?
> - How easy or hard would it be to find a place?

Perceived Usefulness

    j.   How would you use the Maps tab to prepare healthy meals at home?

> - In what ways would you use this feature to eat healthier?

k. How confident are you that using this feature will help you eat healthier?

> • How long do you think you would use this feature?

Intention to Use

l. How often do you think you would use the maps feature?

> • How many times a day?
> • How many times a week?
> • How many times a month?

Shopping List Tab

m. What do you like about this feature?

> • What about this feature would make you want to use it?

n. What don't you like about this feature?

> • What would keep you from using this feature?

Ease of Use

o. How easy would it be to use this feature?

> • How many steps do you expect it would take to use this feature? Is that too many steps?
> • How easy or hard would it be to make a meal?

Perceived Usefulness

p. How would you use the Shopping List tab to eat healthier?

> • In what ways would you use this tab to make a meal?

q. How confident are you that using this feature will help you eat healthier?

> - How long do you think you would use this feature?

Intention to Use

    r.   How often do you think you would use the Shopping List feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

<u>**Library Tab**</u>

    s.   What do you like about this feature?

> - What about this feature would make you want to use it?

    t.   What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

    u.   How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to make a meal?

Perceived Usefulness

    v.   How would you use the Library tab to eat healthier?

> - In what ways would you use this tab to make a meal?

    w.   How confident are you that using this feature will help you eat healthier?

> - How long do you think you would use this feature?

Intention to Use

      x.   How often do you think you would use the recipes feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

Calendar Tab

      y.   What do you like about this feature?

> - What about this feature would make you want to use it?

      z.   What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

      aa. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to make a meal?

Perceived Usefulness

      bb. How would you use the Share tab to eat healthier?

> - In what ways would you use this tab to make a meal?

      cc. How confident are you that using this feature will help you eat healthier?

> • How long do you think you would use this feature?

Intention to Use

    dd. How often do you think you would use the Calendar feature?

> • How many times a day?
> • How many times a week?
> • How many times a month?

<u>Fruits and Vegetables Tab</u>

    ee. What do you like about this feature?

> • What about this feature would make you want to use it?

    ff. What don't you like about this feature?

> • What would keep you from using this feature?

Ease of Use

    gg. How easy would it be to use this feature?

> • How many steps do you expect it would take to use this feature? Is that too many steps?
> • How easy or hard would it be to make a meal?

Perceived Usefulness

    hh. How would you use the Fruits and Vegetables tab to eat healthier?

> • In what ways would you use this tab to make a meal?

    ii. How confident are you that using this feature will help you eat healthier?

> • How long do you think you would use this feature?

Intention to Use

      jj. How often do you think you would use the Fruits and Vegetables feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

      kk. Anything missing from the healthy meals page that you would like to see?

      ll. Do you have any questions about this apart of the app?

4. **Show screenshots of the list of features available for breastfeeding. Ask participants the following:**

Time Tracker Tab

      a. What do you like about this feature?

> - What about this feature would make you want to use it?

      b. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

      c. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to breastfeed with this feature?

Perceived Usefulness

      d. How would you use the Time Tracker tab to breastfeed?

> - In what ways would you use this tab to breastfeed?

e. How confident are you that using this feature will help you breastfeed?

> - How long do you think you would use this feature?

Intention to Use

f. How often do you think you would use the Time Tracker feature if or when you breastfeed?

> - How many times a day?
> - How many times a week?
> - How many times a month?

Growth Chart Tab

g. What do you like about this feature?

> - What about this feature would make you want to use it?

h. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

i. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to breastfeed with this feature?

Perceived Usefulness

j. How would you use the Growth Chart tab to breastfeed?

> - In what ways would you use this tab to breastfeed?

k. How confident are you that using this feature will help you breastfeed?

> - How long do you think you would use this feature?

Intention to Use

l. How often do you think you would use the Growth Chart feature if or when you breastfeed?

> - How many times a day?
> - How many times a week?
> - How many times a month?

Library Tab

m. What do you like about this feature?

> - What about this feature would make you want to use it?

n. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

o. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to breastfeed with this feature?

Perceived Usefulness

p. How would you use the Library tab to breastfeed?

> - In what ways would you use this tab to breastfeed?

q. How confident are you that using this feature will help you breastfeed?

> - How long do you think you would use this feature?

Intention to Use

r. How often do you think you would use the Library feature if or when you breastfeed?

> - How many times a day?
> - How many times a week?
> - How many times a month?

<u>Live Assistance Tab</u>

s. What do you like about this feature?

> - What about this feature would make you want to use it?

t. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

u. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to breastfeed with this feature?

Perceived Usefulness

v. How would you use the Live Assistant tab to breastfeed?

> - In what ways would you use this tab to breastfeed?

w. How confident are you that using this feature will help you breastfeed?

> - How long do you think you would use this feature?

Intention to Use

x. How often do you think you would use the Live Assistance feature if or when you breastfeed?

> - How many times a day?
> - How many times a week?
> - How many times a month?

y. Anything missing from the breast feeding page that you would like to see?
z. Do you have any questions about this apart of the app?

5. Explain the library and general tracker features on the home screen.

Now let's talk about a few features on the homepage. We created a few buttons that will allow you to access all the healthy habits in one place. For example, the library button lists all the resources from healthy meals, breast-feeding, and physical activity under one button. We also created a general tracker button that allows you to track the healthy habits mentioned in this app.

<u>**General Tracker**</u>

a. What do you like about the general tracker feature?

> - What about this feature would make you want to use it?

b. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

c. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?

> - How easy or hard would it be to track everything with this feature?

Perceived Usefulness

    d. How would you use the general tracker?

> - In what ways would you use this tab to track everything in this app?

    e. How confident are you that using this feature will help you track healthy habits?

> - How long do you think you would use this feature?

Intention to Use

    f. How often do you think you would use the general tracker feature?

> - How many times a day?
> - How many times a week?
> - How many times a month?

    g. Anything missing from the general tracker that you would like to see?
    h. Do you have any questions about this apart of the app?

<u>Library</u>

    i. What do you like about the library feature?

> - What about this feature would make you want to use it?

    j. What don't you like about this feature?

> - What would keep you from using this feature?

Ease of Use

    k. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?
> - How easy or hard would it be to find information about health habits mentioned in this app with this feature?

Perceived Usefulness

    l.   How would you use the library button?

> - In what ways would you use this library button in this app?

    m. How confident are you that using this feature will help you find information on health habits mentioned in this app?

> - How long do you think you would use this feature?

Intention to Use

    n. How often do you think you would use the library button?

> - How many times a day?
> - How many times a week?
> - How many times a month?

    o. Anything missing from the library button that you would like to see?
    p. Do you have any questions about this apart of the app?

Share

The Share button is not currently linked to any social media or activity.

    q. What kind of things would you like to share?
    r. What kinds of social media would you like the app to link to?

Ease of Use

    s. How easy would it be to use this feature?

> - How many steps do you expect it would take to use this feature? Is that too many steps?

> - How easy or hard would it be to find information about health habits mentioned in this app with this feature?

Perceived Usefulness

    t. How would you use the share button?

> - In what ways would you use the share button in this app?

    u. How confident are you that using this feature will help you share your comments or progress on health habits mentioned in this app?

> - How long do you think you would use this feature?

Intention to Use

    v. How often do you think you would use the share button?

> - How many times a day?
> - How many times a week?
> - How many times a month?

    w. Do you have any questions about this apart of the app?

CLOSING [10 minutes]

    1. Ask participants:

        a. How likely would you use this app if it were available?

        b. Anything that was not covered and participants think that should be discussed.

LUNCH OR DINNER [15 MINUTES] – take survey [15 minutes]

    2. Instruct the participants to take the survey

Now take a few minutes to complete a survey online. In addition to receiving your gift card, you will also be entered into a raffle. After finishing the survey, we ask you to give us your email address. Any questions?

    3. Thank them for their time and participation.

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