Nutrition in Healthcare Education: Evaluating the Effectiveness of a Nutritional Phone App in Raising Healthcare Students Confidence, Self-Perceived Knowledge, and Use in Practice

Tressa Romick and Alicia Craig-Rodriguez
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Abstract

**Purpose:** Determine whether the use of the Physicians Committee for Responsible Medicine (PCRM) nutrition phone app increases self-perceived nutrition knowledge and confidence among FSU healthcare students.

**Methods:** Quasi-experimental design with convenience sampling using an online survey distributed via email. The evaluation tool was a modified version of the validated NUTCOMP questionnaire and was administered via Qualtrics. The intervention was a mobile app, PCRM’s Nutrition Guide for Clinicians. An online survey assessed baseline self-perceived nutrition care competence. A repeat survey was deployed three months later to reassess competence after using the app. Surveys were sent to students within FSU’s medical, undergraduate nursing, graduate nursing, and physician assistant programs. Microsoft Excel and IBM SPSS programs were used to analyze data using descriptive statistics.

**Results:** Nine students completed the first pre-intervention study and five completed the second post-intervention survey. Not all students created a unique signature key when completing the pre-survey; therefore, participant surveys were treated as unpaired, rather than paired samples. Those without the intervention had a mean score of 128.6 points, while those students who used the intervention had a mean score of 136 points.

**Discussion:** This project was one of the first to explore the potential benefits and effectiveness of an evidence-based nutrition mobile application designed for provider use in practice. While the use of mobile technologies is gaining recognition in healthcare, nutrition-based applications are commonly designed for patient use, rather than provider use.
Conclusion: Despite the small sample size, the findings in this study support current evidence that further nutrition education is needed to provide guidance in practice. Overall, there was small increase in the average scores of self-perceived nutrition competence for students who used the PCRM app. Mobile apps may be one way to improve nutrition education in clinical practice. Further research is needed using larger sample sizes to determine the clinical significance of nutrition-based mobile applications for healthcare provider use
Nutrition in Healthcare Education: Evaluating the Effectiveness of a Nutritional Phone App in Raising Healthcare Students Confidence, Self-Perceived Knowledge, and Use in Practice

Nutrition is the process by which the body obtains nutrients needed for health and growth, thus, nutrition and health are intertwined ideas (Oxford Languages and Google - English | Oxford Languages, n.d.). Suboptimal nutrition is a major determinant in a majority of the United States leading chronic diseases (Healthy Diet, 2019). Type II diabetes, heart disease, stroke, and cancer kill nearly 1.5 million US citizens each year (Leading Causes of Death, 2021). These diseases are known to have strong links to nutrition and diet and yet nutrition education remains a small part of the curriculum across a variety of healthcare specialties and programs.

Healthcare providers are considered a credible source for diet-related health information, yet many primary care providers have self-reported deficiencies in nutrition knowledge and cite a lack of education in medical training as a common reason (Aspry et al., 2018; Crowley et al., 2019; Kaar et al. 2018). In one US study of internal medicine programs, 61% of residents said they had little to zero formal nutritional education in their curriculum (Khandelwal et al., 2018). The nutrition information is abundant, but healthcare providers are not being taught sufficiently enough to feel competent to counsel patients. It should be no surprise that in the United States, where 60% of American adults have one or more diet-related chronic diseases, over 60% of these adults are not receiving nutrition counseling (Frame, 2021).

Nutrition counseling in healthcare is lacking in the United States and internationally and the consequences are of significant concern. Worldwide, in 2017, Afshin et al. (2019) calculated that 11 million deaths and 255 million disability-adjusted-life-years-lost were attributable to
dietary risk factors. Leading risk factors for death included high sodium intake, low whole grains intake, and low fruit intake; factors that, with physical and economic accessibility, are easily modifiable. One microsimulation predicted that 2.47 million quality-adjusted life years could be gained, 940,000 cardiac events could be prevented, and $42 billion USD could be saved by using modest incentives and basic education on healthy and unhealthy foods (Mozaffarian et al., 2018). Another predictive simulation study found that increasing adherence to a healthier Mediterranean diet, at either 20% more than baseline or 80%, saved an estimated $8.2 billion and $31 billion USD respectively in health-related costs (Jones et al., 2019).

Nutrition education needs to be incorporated more thoroughly throughout healthcare programs and the education continuum (Aspry et al., 2018). However, given that most program changes cannot be made overnight, there are other supplemental learning options and resources that need to be explored. Digital, social, and mobile technologies (DSMTs) have become increasingly popular, especially in recent years with the outbreak of COVID-19. Prior studies found that, in particular, mobile phones and phone apps are the most used mobile technologies and are used widely across the education continuum (Curran et al., 2017). A large majority of studies on this method of learning, however, are limited to non-nutritional topics or focus on educating patients rather than providers (DiFilippo et al., 2015). This project would provide additional information to address the paucity of nutrition education, and potentially contribute one way to improve nutrition knowledge and confidence among healthcare students and providers.
Problem Statement

The low priority of nutrition education in healthcare programs is yielding providers who perceive themselves inadequately prepared to provide nutrition counseling to their patients, creating missed opportunities to profoundly improve health outcomes and prevent disease. There is a strong need for exploration into ways to incorporate nutrition education into providers’ learning, including the use of nutritional phone apps.

Purpose

The purpose of this project was to determine whether the use of the Physicians Committee for Responsible Medicine nutrition phone app could increase self-perceived nutrition knowledge and confidence among FSU healthcare students.

Aims

The specific aims of this project were to:

1. Explore FSU healthcare students' baseline self-perceived readiness, knowledge and confidence regarding nutritional counseling of patients.

2. Introduce to healthcare students, an evidence-based Nutritional Guide phone app developed by the Physicians Committee for Responsible Medicine (PCRM).

3. Determine whether the use of the PCRM phone app over a 3-month period improved students' mean scores of readiness, perceived confidence/knowledge of nutritional counseling.
4. Determine students’ frequency of use of the PCRM app, opinions on ease of navigation, usefulness, likelihood on continued use, and general thoughts on mobile apps as a method of learning.

Literature Review

A thorough and in-depth search of the literature was performed to gain information relevant to the project topic and discover any current research that exists surrounding nutrition. Using a variety of different research terms such as: nutrition, nutrition education, diet, nutrition and health, mobile phone apps, nutrition phone apps, etc. many articles and data were collected. Several themes emerged in the analysis of the collected articles including inconsistent education of healthcare students and barriers to education, underutilization of nutrition knowledge in healthcare, and the use of mobile phone apps as learning tools.

Inconsistent Education of Healthcare Students and Education Barriers

In 1985 the National Academy of Sciences performed a survey of one third of the US medical schools’ curriculums; the academy determined that the amount of nutrition health and disease education in the programs was inadequate and recommended a minimum of 25 hours of nutrition education (Aspry et al., 2018). Considering this recommendation was published nearly three decades ago, there is now a need for an even higher minimum number of nutrition education hours given the large amounts of new nutritional studies and information available (Adams et al., 2015). In one of the most recent surveys of 121 US medical schools, 71% of the schools reported providing less than the recommended 25 hours of nutrition education, with a handful of schools requiring zero nutrition education hours (Adams et al., 2015). The average number of hours spent across all programs was approximately 19 hours. When comparing this
survey to surveys conducted in years past, the deficiency of nutrition education hours has barely budged in the past decade, decreasing from 73% of schools below the minimum recommendation to 71% (Adams et al., 2015).

The United States is not the only country with inadequate hours devoted to nutrition education. Crowley et al. (2020) found that medical students in New Zealand also struggled with nutrition competence. The students consistently gave low ratings of their self-perceived nutrition skills and knowledge throughout the program and at all points in the study the participants marked a high need for more nutrition education. There is not a standardized test for assessing nutrition knowledge, but often even providers who consider themselves knowledgeable about nutrition fail to correctly identify important nutrition recommendations (Aggarwal et al., 2019). Aggarwal et al. (2019) surveyed 303 physicians in the Department of Medicine at the University of Florida and found that, despite 91% of the group rating themselves as somewhat or very knowledgeable, only 6% could correctly select the number of daily recommended fruits and vegetable servings and added-sugar intake limit.

The struggle to better incorporate nutrition into healthcare programs has been going on, with continued failures, even as far back as 1963 (Kris-Etherton et al., 2015). Several studies have identified barriers that have made the incorporation of more nutrition education hours difficult. Khandelwal et al. (2018) surveyed 40 educators and 133 residents across US medical residency programs and identified barriers to nutrition education for each. Educators identified their top barriers for incorporating nutrition education as: competing curricular demands, lack of faculty with nutrition expertise, inadequate funding, and a lack of administrative support. Residents' barriers to learning and providing nutrition counseling included: lack of time, lack of reimbursement, perceived lack of interest in nutrition, and lack of interest of preceptors in
teaching nutrition. Along similar lines, Crowley et al. (2020) found that limited exposure to nutrition experts, a lack of interprofessional nutrition collaboration, and a lack of role modeling of nutrition care were all major barriers to students’ learning. Furthermore, even if students received nutrition education in the didactic portion of their learning, it was rare that they experienced any clinical nutrition learning (Crowley et al., 2020). Most residents and medical students lack the opportunity to observe and learn evidence-based nutrition practices from physicians with up-to-date nutrition knowledge or other licensed nutrition experts (Adams et al., 2015).

**Underutilization of Nutrition Knowledge in Healthcare**

The barriers to nutrition education are challenging to overcome, but the importance of nutrition plays a vital role in not just improving students’ knowledge, but also improving the health of their future patients. The World Health Organization clearly states that a healthy diet throughout life can prevent malnutrition and a wide range of diet-related noncommunicable diseases and conditions (Healthy Diet, 2019). However, worldwide, people are consuming more foods high in fat, salt, and sugar than ever before, with alarmingly low rates of fiber-rich fruit, vegetables, and whole grain consumption (Healthy Diet, 2019). Primary care providers hold a unique position as frontline prevention for patients, with prime opportunities to catch health conditions early or before they occur and prevent further decline or development of conditions. Despite this ideal position for nutrition intervention and education, nutrition counseling is only included in an estimated 25-40% of primary care visits (Frame, 2021).

A countless number of studies underscore what good nutrition can achieve for patients, if only providers were able to properly educate patients. Plant-focused diets (i.e., Mediterranean,
vegetarian, DASH, paleo) have demonstrated significant improvements in inflammatory markers, thus implying a means for therapy and prevention of several chronic diseases such as chronic vascular disease (Eichelmann et al., 2016). Similarly, it has been found that the more whole, plant-based food a person’s consumes, in comparison with processed plant-based foods (juices, refined grains, sweets, etc.) and animal foods, the lower their risk of chronic heart disease and vascular disease (Satija et al., 2017).

One of the most impactful studies with findings that demonstrated the influence of diet on reducing inflammation was initially recorded by Esselstyn and colleagues in 1985, and was repeated in 2014 with a larger group. These studies found that by educating patients with existing coronary artery disease, on how to eat and maintain a whole-foods plant-based diet, they could reduce the symptoms of and potentially reverse artery blockages (as shown in imaging of some patients). After following patients for 3.7 years, it was found that the group that remained adherent to the diet had only a 10% cardiac event rate, compared to the nonadherent group that suffered a 62% event rate. Although this study did not have a control group, these findings are still compelling and cannot be ignored.

The potential for diet to become as effective as pharmacologic measures, with less risk and less cost makes nutrition a highly favorable focus for medicine (Franzago et al., 2020). Diet, in and of itself, has been found to be able to modify gene expression through DNA methylation and epigenetics, again making it a very ideal therapeutic agent for a variety of diseases (Franzago et al., 2020). Recent evidence has demonstrated that improvement in diet could potentially prevent one in every five deaths globally (Afshin et al., 2019). This knowledge needs to be properly utilized, not just in education, but in healthcare practice as well.
Use of Mobile Phone Apps as Learning Tools

The vast advancements in technology over the last several decades have opened many new avenues to learn and use information. As mentioned earlier, mobile technologies (DSMTs) such as phone apps have become one of the most common digital methods of learning and continuing education (Curran et al., 2017). Healthcare professionals and students stated that benefits and uses of mobile apps and technology include: access to large amounts of information in one place, reduced communication barriers, easy verification of information, flexibility, convenience, and easily accessible up-to-date information in comparison to static textbooks (Curran et al., 2017; Curran et al., 2019). Mobile technologies have been found to help encourage professional development, social support, promote active learning, and assist in learning during rounds and in practice (Curran et al., 2017).

As with any new technology or method of learning, there are barriers to consider and overcome with mobile technologies. Technical challenges or access issues that may impair learning include cost of some apps and resources, website or app malfunctions or glitches, workplace computers or phones with blocked access to websites or resources, and complicated installment (Curran et al., 2017, 2019). Other challenges related to user error or perception that need to be considered are negative perception of media use by professionals (lack of professionalism), digital literacy, generational gaps, privacy, knowing what resources are available, overreliance, distraction, and information overload (Curran et al., 2017, 2019). Curran et al. (2017) also reported a gap in evaluating how mobile technologies, in general, might be used to improve learning and subsequently improve patient health outcomes. Additional research and evaluative studies are needed to exam how these technologies may be used in education (Curran et al., 2017; DiFilippo et al. (2015).
During this review, it is important to note that there was a significant lack of evidence and research regarding the use of nutrition phone applications as educational tools for healthcare providers and students. A systematic review performed by DiFilippo et al. (2015) corroborates this finding, acknowledging a gap in research on mobile nutritional phone apps as supportive educational interventions. Large public access to and use of mobile smartphones and apps are more recent developments within the last decade, thus narrowing the available literature and research. The literature review revealed no other recent studies or analyses specific to nutrition education of providers using phone apps. The majority of nutrition-focused phone apps studied in the literature focused on calorie counting and weight loss, and were designed for patient, rather than provider use (DiFilippo et al., 2015).

There is a clear and strong need for greater and more thorough nutrition education among healthcare programs across the world. Nutrition is one of the six pillars of health and even small changes in diet can have significantly positive effects on patients and their health. There are a wide variety of ways to learn, and mobile phones and apps are the most commonly used mobile technologies and DSMTs are helpful to learners across the educational continuum (Curran et al., 2017, 2019). There is, however, a gap in the research of using phone apps as a method to educate providers on the use of nutrition in healthcare; and further study to close this gap could benefit educators and students alike.

**Theoretical Framework**

Social Cognitive Theory (SCT) was the framework used to explore nutritional knowledge and confidence among healthcare students. This theory began as Albert Bandura’s Social Learning Theory in the late 1960s and transitioned into the Social Cognitive Theory in
This theory examines the concept of reciprocal interaction with variables that affect learning, and specifically explores the interaction of environment, behavior, and cognitive factors (McEwen & Wills, 2014). Social Cognitive Theory focuses on the unique way in which a person acquires, reinforces, and maintains a certain behavior including methods such as observational learning, mirroring and imitation, and modeling (McEwen & Wills, 2014; The Social Cognitive Theory, 2019). The unique element of the SCT is its focus on the maintenance of behavior, compared to other behavior theories which focus solely on the initiation of behavior which is not particularly helpful in maintaining long-term lifestyle health goals (The Social Cognitive Theory, 2019). Social Cognitive Theory has six main constructs: reciprocal determinism, behavioral capability, observational learning, reinforcements, expectations, and self-efficacy (The Social Cognitive Theory, 2019). This theory was chosen as each construct provided a strong foundation on which to build this Evidence-Based Practice (EBP) project.

The basis of this EBP project was to explore the lack of nutrition education amongst healthcare programs. The first concept, reciprocal determinism, refers to the dynamic and give-and-take interactions of a person, their environment, and their behavior (The Social Cognitive Theory, 2019). This construct is important in aiding a greater understanding of the interplay of poor nutrition education in schools (environment) and providers’ (person) confidence and skill in discussing nutrition with patients (behavior). The second construct, behavioral capability, refers to an individual’s actual ability to carry out a behavior via knowledge and skills (The Social Cognitive Theory, 2019). This part of the theory emphasizes that a provider cannot have behavioral capability in nutrition counseling if they lack the knowledge to carry out the behavior in the first place.
The fourth construct, *reinforcement*, helps describe the intervention for the provider and the patient. The use of a nutrition app could reinforce the importance of nutrition in providers’ minds and create a ripple effect, influencing how often they counsel their patients. In turn both could affect the likelihood of continuing or discontinuing good and bad nutrition behaviors. *The Social Cognitive Theory* (2019), describes the sixth construct, *self-efficacy*, as “the level of a person’s confidence in his or her ability to successfully perform a behavior.” This definition correlates with, looking at how the nutritional app effected the soon-to-be providers confidence in nutrition knowledge and skill. The concept of self-efficacy in nutrition is exactly what this project aimed to increase with use of the intervention.

Constructs three and five, *observational learning* and *expectations*, are concepts that help to describe the relationship of other variables that played a part in the clinical problem and may have interacted with the outcome variable. Observational learning often occurs through modeling, people observe the behavior of others and then may be more likely to reproduce those actions (*The Social Cognitive Theory*, 2019). Khandelwal et al. (2018) found that one barrier to residents using nutrition counseling was a perceived lack of interest from clinical preceptors. The more providers, preceptors, and teachers actively performing nutrition counseling and education, the more opportunities students have for observational learning and thus the more likely they will be to reproduce those actions. The fifth concept of *expectations* builds on observational learning as expectations are largely constructed from previous experiences. Experiencing and observing how nutrition plays an important role in the health of patients during clinical or in classes, helps students to understand the consequences of nutrition.
Methodology

Design, Setting, and Participants

This project utilized a quasi-experimental design with convenience sampling using an online survey that was distributed through the Florida State University’s emailing system, Outlook. An introductory email (see Appendix A) was sent out with a description of the study, a pre-intervention survey link, and instructions on how to download and use the app. The pre-intervention survey was sent to assess participants’ baseline nutrition knowledge and confidence. A second email (see Appendix B) with a repeat survey was deployed three months later to reassess students’ nutrition care competence after using the intervention. Participation was voluntary, and by accessing the first survey link in the email, comprehension and consent was implied. Participant information and responses were protected using Qualtrics survey encryption software. The participants had 3 months to independently explore and use the PCRM app in their academic, didactic, and/or clinical settings or wherever they found nutrition education was pertinent.

The setting for this project was within the medical and nursing colleges of Florida State University. Students from the following programs were offered an opportunity to participate: medical students, undergraduate nursing students, graduate nursing and practitioner students, and physician assistant students. The goal was to attain as many participants as possible, with inclusion criteria of being a student in any of the previously mentioned programs, age range 18-75, and pre and post survey completion. Exclusion criteria consisted of having a degree or certificate in a primarily nutrition-focused major, lack of access to a smart phone or mobile device, or an inability to read and speak English fluently.
Resources and Instruments/Tools

This project required several different resources and tools for implementation. The cooperation of the educational Heads of each program were necessary to distribute the introductory emails to potential participants.

An adapted version of the validated NUTrition COMPetence (NUTCOMP) survey tool (developed by Ball & Leverett, 2015) was the main instrument in data collection. Ball & Leverett (2015) created and validated the original survey in four stages: preparation of scope and structure, development of questionnaire items, pilot study, and test-retest reliability. Stages one and two resulted in the creation four constructs with 35 questions and additional demographic and education questions. Stage three confirmed the surveys concurrent validity and high level of internal consistency with a Cronbach’s α of 0.98 for the overall questionnaire. The fourth stage confirmed the questionnaire had high test-retest reliability. The questionnaire creators also, through other extensive processes, ensured construct validity, content validity, and face validity of the survey. Permission to use the NUTCOMP survey tool in this EBP project was granted by one of the two investigators. In this project, two adapted versions of this survey were sent out intended as a pre-intervention and post-intervention assessment. The first survey can be found in Appendix C and the second survey with additional questions about the intervention may be seen in Appendix D. The Nutrition Guide for Clinicians, designed by the Physicians Committee for Responsible Medicine, was the nutrition phone application instrument used in this study. This project also included the creation of a short video with instructions on how to download and use the phone application.
Intervention and Data Collection

The educational intervention tested was the nutritional phone app by PCRM, Nutrition Guide for Clinicians. Participants were to download this app after completing the pre-survey and were given a 3-month time period to explore and use the application during the fall semester of 2022. At the end of the 3-month period, the same NUTCOMP survey was intended to be repeated via Qualtrics to reassess students’ self-perceived nutrition knowledge, confidence, and use in practice. The data collected through these surveys was analyzed looking for changes, patterns and/or themes in these scores and ratings to determine if the intervention was helpful.

Human Subject and Informed Consent

Institutional Review Board (IRB) approval was obtained from the University’s Office for Human Subjects Protection (see Appendix E). The introductory email included informed consent and information about the project and consent was implied if participants followed the survey link in the email.

Data Analysis

Data was analyzed using the Statistical Package for Social Sciences (SPSS) software version 27.0 and Microsoft Excel. All data from both surveys from Qualtrics were transferred to Microsoft Excel to organize information. This data was then transferred to SPSS for analysis using descriptive statistics (i.e., frequencies and measures of center). Quantitative scored data was collected using a 5-point Likert scale to evaluate four different constructs of nutrition competence: knowledge, skills, communication, and attitudes towards nutrition. Total score and
sub-scores in each of these sections were analyzed for each survey, as were demographics and qualitative information.

Results

The survey invitation email links were sent to all students within Florida State University’s medical program, physician assistant program, undergraduate nursing program, and graduate nurse practitioner program. Of these programs, a total of 26 students clicked the links to begin a survey. Nine students completed the pre-intervention study and 5 students completed the post-intervention study. Not all students created a unique signature key when completing the pre-survey; therefore, participant surveys were treated as unpaired, rather than paired samples.

Demographics

Of the 14 participants, four (28.6%) were in the age range of 18-25 years old, seven (50%) were within 26-35 years old, two (14.3%) within 36-45 years old and one (7.1%) above age 45. Most participants identified as female at 92.9% (n=13) and 7.1% male (n=1). Half of the participants identified as White (50%), five (35.7%) identified with 2 or more races, as well as one (7.1%) American Indian/Alaskan Native and one (7.1%) Black/African American. Twelve of the 14 participants (85.7%) were nurse practitioner students, one (7.1%) medical student, and one (7.1%) undergraduate nursing student. As for current employment, nine currently work as nurses, one physician, one server, and three fulltime students. The full demographic data including race/ethnicity, gender, prior education, current program, and employment is available in Table 1.
Table 1

*Demographic Characteristics of the Sample*

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<th>Demographic/Characteristic</th>
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<th>Percentage</th>
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<td>26-35</td>
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<td>7.1</td>
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<tr>
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<tr>
<td>Undergraduate nursing student</td>
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<td>7.1</td>
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</table>

**Findings**

*Aim 1*

The pre-intervention group surveys (n = 9) explored students’ baseline confidence and self-perceived competence regarding providing nutrition care. These self-measures of
competence encompassed knowledge, skills, communication, and attitudes towards nutrition care that facilitate effective healthcare practice. Survey scores were analyzed for total overall score, and sub-scores of each section of competence listed previously. Total overall scores could range from 35 to 175 points based on how participants answered each question. The total mean score for this group was 128.56, with a standard deviation (SD) of 14.34. The median total score was 128, with a minimum of 110 and maximum of 157 points.

Sub-scores in each section (depending upon the number of questions) varied in the number of points possible. Section one addressed confidence of nutrition knowledge, with a possible point range of 7 to 35 points. This section had a mean of 22 and median of 22, with standard deviation of 3.84 and minimum of 17 and maximum of 31. Section two had participants rate their confidence in their nutrition skills and had possible score range of 11 to 55. The mean score for this section was 37.11 (SD = 5.58) and the median was 36 with a minimum of 29 and maximum of 47. The third section assessed for confidence in communication and counselling about nutrition, with possible scores ranging from nine to 45. The mean group score of this section was 31.67 (SD = 5.45) with a median of 33 and minimum of 24 and maximum of 39. The fourth and final section measured attitudes towards nutrition care, with a possible score range of eight to 40. This section had a mean of 37.78 (SD = 4.03), and a median of 40 with minimum of 28 and maximum of 40 points.

Aim 2

The Physicians Committee for Responsible Medicine’s (PCRM) Nutrition Guide for Clinicians phone app was introduced to healthcare students using a video educational intervention format. The overall effectiveness of this video in introducing how to download and
use the app was not directly measured, however participants were encouraged to reach out to the primary investigator should they have any problems/questions. Zero participants reported problems or questions about the intervention.

**Aim 3**

The post-intervention group (n = 5) surveys address whether students’ mean scores were higher with the interventional use of the PCRM app over a 3-month period. As the survey’s scored questions are identical to the pre-intervention group, the ranges in possible points are the same as discussed earlier. As with the pre-intervention group, the post-intervention group was scored and analyzed at the total overall level and then again at the subsection/score levels. The average of the total scores for this group was 136 (SD = 20.21) with a median of 139 and minimum of 104 and maximum of 157.

Section one, confidence in nutrition knowledge, had an average score of 24.80 (SD = 3.35), median of 25 and minimum of 21 and maximum of 29. Section two scores, confidence in nutrition skills, averaged 42.20 (SD = 7.12). The median was 44, and minimum of 31 and maximum of 49 points. For section three, confidence in communicating and counselling on nutrition, had a mean score of 34.2 (SD = 4.82) and the median was 34 with a minimum of 28 and maximum of 41. The fourth section, measuring attitudes towards nutrition, had a mean score of 34.8 (SD = 6.87). The median was 38, with a minimum of 24 and maximum of 40. Please see Table 2 to view a comparison of mean scores of each section pre and post intervention.
Table 2

Mean Scores of Total and Each Subsection Pre and Post Comparison

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
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<tr>
<td>Total</td>
<td>128.56 (SD = 4.78)</td>
<td>136.00 (SD = 9.04)</td>
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<tr>
<td>Sub score C1</td>
<td>22.00 (SD = 1.28)</td>
<td>24.80 (SD = 1.50)</td>
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<td>Sub score C2</td>
<td>37.11 (SD = 1.86)</td>
<td>42.20 (SD = 3.18)</td>
</tr>
<tr>
<td>Sub score C3</td>
<td>31.67 (SD = 1.82)</td>
<td>34.20 (SD = 2.15)</td>
</tr>
<tr>
<td>Sub score C4</td>
<td>37.78 (SD = 1.34)</td>
<td>34.80 (SD = 3.07)</td>
</tr>
</tbody>
</table>

**Aim 4**

The post-intervention group (n = 5) had two respondents who did not use the app very much at all (40%), two used the app a few times a month (40%), and one respondent used the app multiple times a week (20%). For ease of navigation of the app, 2 participants found it to be very easy, one somewhat easy, one found it neither easy nor difficult, and one of the five participants did not report an answer to this question. One participant rated the app as very useful to their practice, one found it to be somewhat useful, and two respondents were neutral finding the app neither useful or not useful, and again one participant did not respond to this question. Three of the five participants responded that they are very likely to continue to use the app beyond this study, one responded neutrally with being neither likely nor unlikely to continue the use of the app, and one did not answer this question. In general, 60% (n = 3) of post-intervention participants thought a mobile app could be a good method of learning and using nutrition information, one participant responded with maybe, and one was unsure and/or had no opinion on the question.
Discussion

Summary

The literature has shown that nutrition, whether poor or optimal, is a key factor in the risk of development of several of the United States leading chronic diseases and preventable deaths (Eichelmann et al., 2016; Healthy Diet, 2019; Satija et al., 2017). However, many providers have continued to consider their nutrition knowledge insufficient to properly counsel and guide patients on nutrition topics and health. The need for increased nutrition education in healthcare programs remains a priority and mobile technologies may be one approach to help meet this need.

Outcomes and the Literature

This project sought to test one mobile app, the PCRM’s Nutrition Guide for Clinicians, and its ability to increase healthcare students self-perceived nutrition competence. The NUTCOMP questionnaire was the validated survey used to assess students’ baseline and post-intervention self-reported nutrition competence. The pre-intervention group did have a lower average total NUTCOMP score, 128.56 points, than the post-intervention group at 136 points providing an indication that the intervention may have helped improve healthcare students self-perceived nutrition competence. However, given the small sample sizes, this cannot be stated for certain. In contrast to Crowley et al. (2020), whose authors reported that across-the-board, students gave themselves low ratings of confidence in nutrition skills, participants in this project had an average pre-intervention score of 3.36, closer to “somewhat confident” and post-intervention average score of 3.75 closer to the “very confident” ranking. However, in concordance with the Crowley et al. (2020) study, all participants, regardless of the intervention,
agreed/strongly agreed that they needed further nutrition education to help support them in their healthcare role. Many participants also appeared to hold positive attitudes towards nutrition care with most marking “somewhat agree” or “completely agree” with positive statements about nutrition and health.

Adams et al. (2015) reported that 71% of medical school programs in the United States did not meet a minimum of 25 hours of nutrition education. This project also found low amounts of nutrition education with 8 out of the 14 participants reporting no courses with nutrition content in their program. Crowley et al. (2020) revealed that even when students did have nutrition content in their didactic courses, it was rare when they observed it being applied in practice/clinicals. Nine out of 14 participants reported they had never taken a professional development course, nor had they completed any continuing education credits/units (CEUs) related to nutrition.

Two studies performed by Curran et al. (2017, 2019) found that mobile phones and apps are the most popular type of mobile technology and are often used across the education continuum. The post-intervention group in this project were asked if they thought mobile applications were an effective method of learning and using nutrition care in practice. Three out of the five participants said yes, with one maybe, and one marking “unsure/no opinion.” More than half of the post-intervention participants found the app to be useful in their schooling or general education and were likely to continue using the app beyond the intervention period. Curran et al. (2017, 2019) also discussed certain barriers to the use of technology in learning such as ease of use and digital literacy. Four out of five of the PCRM app users found the app easy to use with only one marking “neither easy nor difficult.”
Significance and Implications of Results

Nutrition is one of the six pillars of health and overall attitudes towards nutrition care appear to be positive. There is a clear need and desire for increased nutrition education to provide accurate nutrition care and this is supported by this project and the literature. Mobile technologies are growing in popularity and use as effective methods of learning and supportive education. Given the current gap in the literature regarding the use of mobile apps as an adjunct method of providing nutrition education, this project served to provide some additional insight on the potential learning benefits and effectiveness of a mobile apps in providing up-to-date, evidence-based nutrition information to providers. This study, having shown a slight improvement in scores with the use of the PCRM app, may spur further clinical inquiry into the design and/or use of mobile applications to increase nutrition knowledge and use in practice by providers.

Limitations

There were limitations with this project that included difficulties with recruitment, attrition of participants, and logistical blocks that influenced how the data could be analyzed. The Principal Investigator was required to rely on faculty program heads of each department to distribute email invitations to potential student participants, and this impacted overall recruitment. There was, overall, a low response rate considering that number of potential students in each program. This, along with attrition, created a small sample size for this project. Additionally, when analyzing the results for the pre- and post-surveys, a logistical problem was noted in that each survey participant was instructed to create a memorable pin/key to match their two anonymous surveys, however only one person’s key matched on both surveys. This led to a
need to change the statistical analysis plan and the survey samples in the pre-intervention and post intervention group to be treated as unpaired, rather than paired samples. Each group thus became either those who received the intervention or those who did not when comparing scores. If this project were to be repeated, a more reliable method of participant recruitment, is recommended, with members of the project team having direct involvement and accountability in the distribution of email invitations; as well as ensuring that the pre-intervention and post-intervention surveys can be appropriately matched during the data analysis.

**Suggestions for Future Clinical Research**

Further research is needed to determine how mobile technologies can aid in the learning and use of nutrition in healthcare practice. Larger sample sizes are recommended to ensure statistical significance and the ability to test for effect size. Research teams or organizations might also benefit by investigating or creating other nutrition apps that aim to teach and to deliver evidence-based information for healthcare providers. Other methods of how to incorporate and maintain nutrition education in healthcare programs is also an important consideration for the future.
References


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https://doi.org/10.1016/S0140-6736(19)30041-8


https://doi.org/10.1161/CIR.0000000000000563

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Supplemental Nutrition Assistance Program (SNAP): A microsimulation study. *PLOS Medicine, 15*(10), e1002661. https://doi.org/10.1371/journal.pmed.1002661


Appendix A

Introductory E-mail Pre-Intervention

Hello all and thank you for taking your time to consider participating in my DNP project,

Hippocrates once believed food and medicine to be one and the same, and he may just be right. Suboptimal nutrition is a major determinant in many of the United States leading chronic diseases. Type II diabetes, heart disease, stroke, and cancer kill nearly 1.5 million US citizens each year. Despite this information, 71% of US medical schools do not meet the recommended minimum 25 hours of nutrition education. The lack of sufficient nutrition education in healthcare programs often yields providers who perceive themselves unprepared to provide nutrition counseling to their patients. This is creating missed opportunities to profoundly improve health outcomes and prevent disease. There is a strong need for exploration into ways to incorporate nutrition education into providers’ learning.

All RN, NP, PA, and medical students are encouraged to participate.

Note: You will need access to a smart phone or smart mobile device to participate in this project.

Please take a moment to participate in a brief (pre-intervention) survey (approximately 10-15 minutes) which asks you to rate your self-perceived knowledge and confidence in different areas of nutrition care. And/or read on for more study details.

Follow this link to the Survey then return to this email to view attached videos or you can follow the links for the videos at the end of the survey. By clicking the link below you are consenting to participate in this project:

https://fsu.qualtrics.com/jfe/form/SV_4Pin6sds2ww2yd8

Or copy and paste the URL below into your internet browser:

https://fsu.qualtrics.com/jfe/form/SV_4Pin6sds2ww2yd8

Video Links on how to use the intervention (double click):

How to download the app you will be using:

https://youtube.com/shorts/LnoxaGrop_c?feature=share

A walkthrough of how to use the app:

https://youtu.be/XnPi36zENYU
Whether you have had nutrition courses or not, your participation is invaluable for understanding where we are and where we need to go in improving nutrition education in healthcare.

Study details

This survey has been approved by the Human Subjects Committee of Florida State University. Contact information can be found below.

Voluntary participation & withdrawal from participation

Participation consists of answering a pre-intervention survey with 35 Likert scale questions (ratings 1-5), 4 multiple choice questions, 7 demographic questions, and a post-intervention survey with the same questions plus a few additional questions on opinions on the intervention. Each survey should take approximately 15 minutes to complete. Questions include demographic information, level of education and training and questions pertaining to your self-perceived confidence, knowledge, and attitudes surrounding nutrition care.

Participation in this study also involves the use of a completely free and evidence-based nutrition app known as the “Nutrition Guide for Clinicians” designed by the Physicians Committee for Responsible Medicine. The intention is to download this app to your phone or smart device for your self-paced use in clinicians, didactics, or wherever you may find nutrition education/information applicable over a 3-month period.

You may choose to stop participating at any time by exiting or not completing either survey. Consent is implied by following the link to the first survey.

Confidentiality

The data collected in this study will be kept confidential to the extent permitted by law. Collected data will be coded and de-identified through FSU’s Qualtrics survey software. Email and IP addresses will not be linked to survey responses. Only members of the research team will have access to data. The data you provide will only be used for the specific research purposes of this study.

Risks

Risks associated with participation are minimal and are no greater than those that may occur in the course of everyday life.
Benefits

The benefit of participating in this study is the contribution to nursing research. Such research is important to identify the strengths and weaknesses in healthcare nutrition education as well as finding one possible way to improve/increase nutrition education. All of which could ultimately lead to improved care for future patients.

A second potential personal benefit is that once data collection has ended with the completion of the second (post) survey, instructions will be provided on how to enter a raffle for a $100 Publix gift card. Information provided for the raffle will not be linked to prior survey answers.

Follow this link to the Survey then return to this email to view attached videos or you can follow the links for the videos at the end of the survey. By clicking the link below you are consenting to participate in this project:  
https://fsu.qualtrics.com/jfe/form/SV_4Pin6ds2ww2yd8

With sincere appreciation,
Tressa, Romick, RN, BSN, DNP student,
Florida State University
tmr20bm@fsu.edu
Alicia Craig-Rodriguez, DNP, MBA, APRN, FNP-BC
acraigrodriguez@fsu.edu

Human Subjects Office
2010 Levy Avenue
Suite 276-C
Tallahassee, FL 32306-2742
Ph: (850) 644-7900
Appendix B

Introductory E-mail Post-Intervention

Dear study participants thank you for taking your time to finish this project,

This email is for those who participated in my DNP project and completed the initial survey. At the end of the initial survey, you should have downloaded the Physician’s Committee for Responsible Medicine app “Nutrition Guide for Clinician’s” as this was the intervention being tested over the last 3 months. If you downloaded the app and did not find any time to use it or an applicable time to use it, we would still love for you to complete this second post-survey as this is also helpful information.

Please take a moment (approximately 15-20 minutes) to complete your post-survey. This survey involves the same questions from the pre-survey, plus a few questions about your thoughts on the intervention itself.

If you need a refresher on the study details, you can find them below. Thank you again for taking your time to participate in this project, it is greatly appreciated!

Follow this link to complete the Final Survey (due by _12/10/22_):
https://fsu.qualtrics.com/jfe/form/SV_0al965ksmAwVMpw

Or copy and paste the URL below into your internet browser:
https://fsu.qualtrics.com/jfe/form/SV_0al965ksmAwVMpw

Whether you have had nutrition courses or not, your participation is invaluable for understanding where we are and where we need to go in improving nutrition education in healthcare.

Study details

This survey has been approved by the Human Subjects Committee of Florida State University. Contact information can be found below.

Voluntary participation & withdrawal from participation

Participation consists of answering a pre-intervention survey with 35 Likert scale questions (ratings 1-5), 4 multiple choice questions, 7 demographic questions, and a post-intervention survey with the same questions plus a few additional questions on opinions on the intervention. Each survey should take approximately 15 minutes to complete. Questions include demographic information, level of education and training and questions pertaining to your self-perceived confidence, knowledge, and attitudes surrounding nutrition care.

Participation in this study also involves the use of a completely free and evidence-based nutrition app known as the “Nutrition Guide for Clinicians” designed by the Physicians Committee for
Responsible Medicine. The intention is to download this app to your phone or smart device for your self-paced use in clinicals, didactics, or wherever you may find nutrition education/information applicable over a 3-month period.

You may choose to stop participating at any time by exiting or not completing either survey. Consent is implied by following the link to the first survey.

Confidentiality

The data collected in this study will be kept confidential to the extent permitted by law. Collected data will be coded and de-identified through FSU's Qualtrics survey software. Email and IP addresses will not be linked to survey responses. Only members of the research team will have access to data. The data you provide will only be used for the specific research purposes of this study.

Risks

Risks associated with participation are minimal and are no greater than those that may occur in the course of everyday life.

Benefits

The benefit of participating in this study is the contribution to nursing research. Such research is important to identify the strengths and weaknesses in healthcare nutrition education as well as finding one possible way to improve/increase nutrition education. All of which could ultimately lead to improved care for future patients.

A second potential personal benefit is that once data collection has ended with the completion of the second (post) survey, instructions will be provided on how to enter a raffle for a $100 Publix gift card. Information provided for the raffle will not be linked to prior survey answers.

Final Survey Link: https://fsu.qualtrics.com/jfe/form/SV_0AI965ksmAwVMPw

With sincere appreciation,
Tressa, Romick, RN, BSN, DNP student,
Florida State University
tmr20bm@fsu.edu
Alicia Craig-Rodriguez, DNP, MBA, APRN, FNP-BC
acraigrodriguez@fsu.edu

Human Subjects Office
2010 Levy Avenue
Suite 276-C
Tallahassee, FL 32306-2742
Ph: (850) 644-7900
Appendix C

Pre-Intervention Survey

Survey header:

Thank you again for taking time to participate in this project. Please read all of the following information to better understand what this project entails.

NOTE: In order to fully participate in this project, you will need access to a smart phone or smart mobile device.

1. **Pre-survey:** This project will begin with this first survey (pre-intervention) which will gather information on your baseline self-perceived knowledge and confidence in nutrition skills and counseling. This survey also includes unscorred questions about your previous nutrition education and demographic questions. At the end of this first survey there will be two links describing how to use the intervention, these links are also located in the original introductory email should you need them.

2. **Intervention:** After completing the first survey, if you still wish to participate, you will download a free phone app about nutrition designed for providers use in practice. This app was designed by the Physician’s Committee for Responsible Medicine and is called “PCRM’s Nutrition Guide for Clinicians.” You will have 3 months to independently explore and use the PCRM app as you see fit in your academic, didactic, and/or clinical settings or wherever you find nutrition education may be pertinent. Again, at the end of this first survey there will be 2 links to videos, one with instructions on how to download the app, and another walkthrough of the app and the best way to use it. This app is completely free, and the account/information you use within it will only be retained within your phone and the app, this data will not be collected or stored in any way for the purposes of this project. After the allotted time period for this intervention a link for a post-survey will be sent out.

3. **Post-survey:** At the end of the 3-month intervention period a post-survey will be sent out via email. This survey will contain all of the same questions as the first survey, plus a few additional questions about opinions on the intervention itself. At the end of this survey there will be information about how to enter a raffle to win a $100 Publix gift card.

4. **Raffle:** Those who complete the second survey will find instructions to enter the raffle to win a $100 Publix gift card. Any information provided for the raffle will be completely separate from survey answers.

Your input will be invaluable in completing my research. This study is being conducted through the College of Nursing at Florida State University and has been approved by the FSU Institutional Review Board. If you have any questions, please contact Tressa Romick at tr2643@fsu.edu.

Instructions: Use the arrows located at bottom right to begin & progress through the survey. You may return to a previous question with the back (left) button.

Please enter the first letter of your first name, and the first letter of your last name, and the last 4 digits of your phone number below. This will be your signature key to help us link your first pre-survey, with your second post-survey answers when we analyze the data. This is case sensitive so please remember whether you chose to capitalize your letters or not. Example: Tressa Romick would be “tr2643”.  
### Section One: Confidence in Knowledge about Nutrition and Chronic Disease

**Please rate how confident you are in your knowledge of...**

<table>
<thead>
<tr>
<th></th>
<th>Not Confident at all (1 point)</th>
<th>Not Very Confident (2 points)</th>
<th>Somewhat Confident (3 points)</th>
<th>Very Confident (4 points)</th>
<th>Extremely Confident (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How different body systems are affected by foods and nutrients</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. How foods and nutrients influence the development and management of chronic disease</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3. How an individual's body composition (including size, shape, weight) can impact on the development of chronic disease</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. The Dietary Guidelines for Americans, including number of recommended serves of food groups and serving sizes for different ages and genders</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5. Guidelines for the nutrition-related management of specific chronic diseases (including type 2 diabetes and cardiovascular disease)</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>6. How foods and nutrients interact with medications</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>7. The most recently published peer-reviewed evidence regarding nutrition and chronic disease</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

### Section Two: Confidence in Nutrition Skills

**Please rate how confident you are in your ability to...**

<table>
<thead>
<tr>
<th></th>
<th>Not Confident at all (1 point)</th>
<th>Not Very Confident (2 points)</th>
<th>Somewhat Confident (3 points)</th>
<th>Very Confident (4 points)</th>
<th>Extremely Confident (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interpret data about height, weight and body composition against reference ranges</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
2. Interpret an individual’s biological data (e.g., blood pressure, cholesterol levels) against reference ranges

3. Collect information on the food that an individual usually eats (e.g., diet history, food frequency questionnaire)

4. Use the Dietary Guidelines for Americans to evaluate the appropriateness of an individual’s food intake

5. Determine appropriate food or nutrition goals for an individual with chronic disease

6. Formulate a meal plan for an individual with chronic disease

7. Recommend changes in food choices for an individual with chronic disease

8. Monitor and evaluate changes over time regarding the food an individual usually eats

9. Maintain clear and concise records regarding the nutrition-related assessment and advice you provide to individuals

10. Access the most recently published peer-reviewed evidence regarding nutrition and chronic disease

11. Provide nutrition care that results in improvements in the food that an individual usually eats

Section Three: Confidence in Communication and Counselling about Nutrition

Please rate how confident you are in your ability to...

<table>
<thead>
<tr>
<th>Not Confident at all (1 point)</th>
<th>Not Very Confident (2 points)</th>
<th>Somewhat Confident (3 points)</th>
<th>Very Confident (4 points)</th>
<th>Extremely Confident (5 points)</th>
</tr>
</thead>
</table>

1. Clearly describe what patients/clients can expect from their discussions with you about food or nutrition

2. Check a patient’s/client’s understanding of the influence of food and nutrients on their health
3. Work with patients/clients to identify possible ways to improve the food they usually eat

4. Demonstrate genuine empathy to patients/clients about their food-related experiences and goals

5. Maintain a non-judgmental attitude in discussions with patients/clients about the food they eat

6. Communicate with clients about food and nutrition using culturally appropriate language

7. Consider how personal, social, cultural, psychological, and economic factors may influence the foods that a patient/client eats

8. Identify individuals who need additional support from other health professionals or services regarding the food they eat

9. Communicate with other health professionals about the discussions you've had with patients/clients regarding food

---

**Section Four: Attitudes Towards Nutrition Care**

*Please rate your agreement with the following statements:*

<table>
<thead>
<tr>
<th>Completely Disagree (1 point)</th>
<th>Somewhat Disagree (2 points)</th>
<th>Neither Agree nor Disagree (3 points)</th>
<th>Somewhat Agree (4 points)</th>
<th>Completely Agree (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is important that all individuals usually eat healthy foods regardless of age, body weight and physical activity levels</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. If the topic arises, it is important that I encourage my patients/clients to eat healthy foods</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. It is important that I take every opportunity possible to encourage my patients/clients to eat healthy foods</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Encouraging my patients/clients to eat healthy foods is an</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
effective use of my professional time

5. Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is an effective use of my professional time

6. Encouraging my patients/clients to eat healthy foods is within my scope of practice

7. Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is within my scope of practice

8. It is important that I encourage my patients/clients to seek support from other health professionals if I am unable to meet their nutrition-related needs
Section Five: Previous Nutrition Education and Training (not scored)

1. Which of the following best describes your previous nutrition education prior to entering your current program?
   a. I have completed a degree/certificate that was predominantly focused on nutrition
   b. I have taken courses/classes that predominately focused on nutrition prior to entering my current program
   c. I have taken courses/classes with some nutrition content prior to entering my current program
   d. I did not take any courses/classes containing nutrition content prior to entering my current program

2. Which of the following best describes your nutrition education within your current program?
   a. I have completed or am currently taking a course/class within my program that is predominantly nutrition focused
   b. I have completed or am currently taking a course/class within my program that has some nutrition content
   c. I have not had any course/class within my program that contained nutrition content

3. Have you ever participated in any professional development or continuing education for work on the topic of nutrition?
   a. Yes
   b. No

4. I feel I need further nutrition education to support me in my current role
   a. Strongly Disagree
   b. Disagree
   c. Neither Agree Nor Disagree
   d. Agree
   e. Strongly Agree

Section Six: Demographics (not scored)

1. Age range
   a. 18-25 years old
   b. 26-35 years old
   c. 36-45 years old
   d. 45+ years old
   e. Prefer not to answer

2. Which gender do you most closely identify with?
   a. Male
   b. Female
c. Other  
d. Prefer not to answer  

3. Race/Ethnicity: Which race/ethnicity do you most closely identify with?  
   a. Hispanic, Latino, or Spanish Origin of any race  
   b. American Indian or Alaskan Native  
   c. Asian  
   d. Native Hawaiian or Other Pacific Islander  
   e. Black or African American  
   f. Other  
   g. White  
   h. 2 or more races  
   i. Prefer not to answer  

4. Education – Which is the highest degree that you have already completed?  
   a. High school diploma or GED  
   b. Associate degree  
   c. Bachelor’s degree or baccalaureate  
   d. Master’s degree  
   e. Doctorate degree  
   f. Prefer not to answer  

5. What is your current type of employment (i.e., student, nurse, cashier)? You may write “N/A” if you do not wish to answer: ___________  

6. Which program are you currently enrolled in?  
   a. Physician Assistant  
   b. Nurse Practitioner  
   c. Undergraduate Nursing  
   d. Medical (M.D.)  

Thank you for participating in my project! Please follow these video links to learn how to download and use the interventional app (these links are also in your original introductory email that you received):  

How to download the app you will be using: https://youtube.com/shorts/LnoxaGrop_c?feature=share  
A walkthrough of how to use the app: https://youtu.be/XnP136zE NYU
Appendix D

Post-Intervention Survey

Thank you for all your help and participation in my DNP project. At the end of this second survey, you will find instructions on how to enter a raffle for a $100 Publix gift card, if you wish to. Again, thank you for potentially helping to improve nutrition education in healthcare.

Please enter the first letter of your first name, and the first letter of your last name, and the last 4 digits of your phone number below. This will be your signature key to help us link your first pre-survey, with your second post-survey answers when we analyze the data. This is case sensitive so please remember whether you chose to capitalize your letters or not. Example: Tressa Romick would be “tr2643”. ___________
**Supplementary File: NUTCOMP Tool**

### Section One: Confidence in Knowledge about Nutrition and Chronic Disease

**Please rate how confident you are in your knowledge of...**

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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
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<td>2. How foods and nutrients influence the development and management of chronic disease</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. How an individual's body composition (including size, shape, weight) can impact on the development of chronic disease</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>4. The Dietary Guidelines for Americans, including number of recommended serves of food groups and serving sizes for different ages and genders</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Guidelines for the nutrition-related management of specific chronic diseases (including type 2 diabetes and cardiovascular disease)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. How foods and nutrients interact with medications</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. The most recently published peer-reviewed evidence regarding nutrition and chronic disease</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Section Two: Confidence in Nutrition Skills

**Please rate how confident you are in your ability to...**

<table>
<thead>
<tr>
<th></th>
<th>Not Confident at all (1 point)</th>
<th>Not Very Confident (2 points)</th>
<th>Somewhat Confident (3 points)</th>
<th>Very Confident (4 points)</th>
<th>Extremely Confident (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interpret data about height, weight and body composition against reference ranges</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
2. Interpret an individual’s biological data (e.g., blood pressure, cholesterol levels) against reference ranges

3. Collect information on the food that an individual usually eats (e.g., diet history, food frequency questionnaire)

4. Use the Dietary Guidelines for Americans to evaluate the appropriateness of an individual’s food intake

5. Determine appropriate food or nutrition goals for an individual with chronic disease

6. Formulate a meal plan for an individual with chronic disease

7. Recommend changes in food choices for an individual with chronic disease

8. Monitor and evaluate changes over time regarding the food an individual usually eats

9. Maintain clear and concise records regarding the nutrition-related assessment and advice you provide to individuals

10. Access the most recently published peer-reviewed evidence regarding nutrition and chronic disease

11. Provide nutrition care that results in improvements in the food that an individual usually eats

Section Three: Confidence in Communication and Counselling about Nutrition

<table>
<thead>
<tr>
<th>Please rate how confident you are in your ability to...</th>
<th>Not Confident at all (1 point)</th>
<th>Not Very Confident (2 points)</th>
<th>Somewhat Confident (3 points)</th>
<th>Very Confident (4 points)</th>
<th>Extremely Confident (5 points)</th>
</tr>
</thead>
</table>

1. Clearly describe what patients/clients can expect from their discussions with you about food or nutrition

2. Check a patient’s/client’s understanding of the influence of food and nutrients on their health
3. Work with patients/clients to identify possible ways to improve the food they usually eat  
4. Demonstrate genuine empathy to patients/clients about their food-related experiences and goals  
5. Maintain a non-judgemental attitude in discussions with patients/clients about the food they eat  
6. Communicate with clients about food and nutrition using culturally appropriate language  
7. Consider how personal, social, cultural, psychological, and economic factors may influence the foods that a patient/client eats  
8. Identify individuals who need additional support from other health professionals or services regarding the food they eat  
9. Communicate with other health professionals about the discussions you've had with patients/clients regarding food

Section Four: Attitudes Towards Nutrition Care
Please rate your agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Completely Disagree (1 point)</th>
<th>Somewhat Disagree (2 points)</th>
<th>Neither Agree nor Disagree (3 points)</th>
<th>Somewhat Agree (4 points)</th>
<th>Completely Agree (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is important that all individuals usually eat healthy foods regardless of age, body weight and physical activity levels</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. If the topic arises, it is important that I encourage my patients/clients to eat healthy foods</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. It is important that I take every opportunity possible to encourage my patients/clients to eat healthy foods</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Encouraging my patients/clients to eat healthy foods is an</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
effective use of my professional time

5. Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is an effective use of my professional time

6. Encouraging my patients/clients to eat healthy foods is within my scope of practice

7. Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is within my scope of practice

8. It is important that I encourage my patients/clients to seek support from other health professionals if I am unable to meet their nutrition-related needs
Section Five: Previous Nutrition Education and Training (not scored)

1. Which of the following best describes your previous nutrition education prior to entering your current program?
   a. I have completed a degree/certificate that was predominantly focused on nutrition
   b. I have taken courses/classes that predominantly focused on nutrition prior to entering my current program
   c. I have taken courses/classes with some nutrition content prior to entering my current program
   d. I did not take any courses/classes containing nutrition content prior to entering my current program

2. Which of the following best describes your nutrition education within your current program?
   a. I have completed or am currently taking a course/class within my program that is predominantly nutrition focused
   b. I have completed or am currently taking a course/class within my program that has some nutrition content
   c. I have not had any course/class within my program that contained nutrition content

3. Have you ever participated in any professional development or continuing education on the topic of nutrition?
   a. Yes
   b. No

4. I feel I need further nutrition education to support me in my current role
   a. Strongly Disagree
   b. Disagree
   c. Neither Agree Nor Disagree
   d. Agree
   e. Strongly Agree

Section Six: Demographics (not scored)

1. Age range
   a. 18-25 years old
   b. 26-35 years old
   c. 36-45 years old
   d. 45+ years old
   e. Prefer not to answer

2. Which gender do you most closely identify with?
   a. Male
b. Female
  c. Other
  d. Prefer not to answer

3. Race/Ethnicity: Which race/ethnicity do you most closely identify with?
   a. Hispanic, Latino, or Spanish Origin of any race
   b. American Indian or Alaskan Native
   c. Asian
   d. Native Hawaiian or Other Pacific Islander
   e. Black or African American
   f. Other
   g. White
   h. 2 or more races
   i. Prefer not to answer

4. Education – Which is the highest degree that you have already completed?
   a. High school diploma or GED
   b. Associates degree
   c. Bachelor’s degree or baccalaureate
   d. Master’s degree
   e. Doctorate degree
   f. Prefer not to answer

5. What is your current type of employment (i.e., student, nurse, cashier)? You may write “N/A” if you do not wish to answer:
   ________

6. Which program are you currently enrolled in?
   a. Physician Assistant
   b. Nurse practitioner
   c. Undergraduate Nursing
   d. Medical (M.D.)

Section Seven: Opinions on the PCRM app (not scored)

1. How often did you use the PCRM Nutrition Guide for Clinicians app?
   a. Daily
   b. A few times a week
c. Once a week
  d. A few times a month or once a month
  e. Not very much at all

2. How easy was it for you to navigate the app?
   a. Very easy
   b. Somewhat easy
   c. Neither easy nor difficult
   d. Somewhat difficult
   e. Very difficult

3. How helpful/useful was the app for your clinical setting, didactics, and/or general education on nutrition?
   a. Very helpful/useful
   b. Somewhat helpful/useful
   c. Neither helpful/useful nor unhelpful/not useful
   d. Somewhat unhelpful/not useful
   e. Not helpful or useful at all

4. How likely are you to continue using the app?
   a. Very likely
   b. Somewhat likely
   c. Neither likely or unlikely
   d. Somewhat unlikely
   e. Very unlikely

5. Do you think, in general, a mobile app could be a good method of learning and using nutrition care in practice?
   a. Yes
   b. No
   c. Maybe
   d. Unsure/No opinion
Congratulations you have completed your project participation! If you would like to, you can enter the raffle to win a $100 Publix gift card by emailing Tressa Romiek at tmr20bm@fsu.edu, with your name and stating that you would like to enter. A winner will be announced before the end of the semester and the gift card will be emailed to you. Your email will not be linked to survey answers. If you have any further questions or comments you can reach out to the primary investigator at tmr20bm@fsu.edu. Thank you again!
Appendix E

IRB Approval Form

FLORIDA STATE UNIVERSITY
OFFICE of the VICE PRESIDENT for RESEARCH

EXEMPTION DETERMINATION

August 15, 2022

Tressa Romick, 850-644-5260
tmr20bm@fsu.edu

Dear Tressa Romick:

On 8/15/2022, the IRB staff reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(3)(b) Benign behavioral interventions (low risk)</td>
</tr>
</tbody>
</table>

Title: Nutrition in Healthcare Education: Evaluating the Effectiveness of a Nutritional Phone App in Raising Healthcare Students Confidence, Self-Perceived Knowledge, and Use in Practice

<table>
<thead>
<tr>
<th>Investigator:</th>
<th>Tressa Romick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission ID:</td>
<td>STUDY0003428</td>
</tr>
<tr>
<td>Study ID:</td>
<td>STUDY0003428</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
</tr>
<tr>
<td>Grant ID:</td>
<td>None</td>
</tr>
<tr>
<td>IND, IDE, or HDE:</td>
<td>None</td>
</tr>
</tbody>
</table>

Documents Reviewed:
- Craig-Rodriguez CITI certificate, Category: CITI Training Completion Documentation;
- First Introductory Email Consent, Category: Consent Form;
- IRB Determination Form, Category: IRB Protocol;
- Post-Intervention Introductory Email, Category: Recruitment Materials;
- Post-Survey, Category: Recruitment Materials;
- Pre-Intervention Introductory Email, Category: Recruitment Materials;
- Pre-Survey, Category: Recruitment Materials;
- Second Introductory Email Consent, Category: Consent Form;
- Video 1 - App Download Instructions, Category: Other;
- Video 2 - Walkthrough of App Use, Category: Other;

The IRB staff determined the protocol qualifies for exemption, and where applicable the IRB has determined that the protocol qualifies for approval in accordance with federal regulatory requirements for Limited IRB review, effective on 8/15/2022. Further IRB review and approval by this organization is not required.
COVID-19 Information for Research Involving Human Subjects: Note that the U.S. is operating under the national emergency Proclamation 9994 concerning the COVID-19 pandemic and that this national emergency remains in effect until rescinded or terminated by the President of the U.S. (go here for the Proclamation letter). Conditions are dynamic and related policies or guidance evolve accordingly; as applicable, refer to the U.S. Centers for Disease Control and Prevention website specific for universities or refer to our COVID-19 and Human Research Studies web page to learn more about how you should or may protect persons (whether vaccinated or unvaccinated) involved in any of your in-person research activities.

Other Information:

You are advised that any modification(s) to the protocol for this project that may alter this exemption determination must be reviewed and approved prior to implementation of the proposed modification(s).

Modifications to the research may invalidate the exemption determination (because the research no longer meets the exemption criteria described in HRP-312 – WORKSHEET – Exemption Determination).

Examples of minor changes to exempt research that would not alter the exemption determination and should therefore not be submitted to the IRB for further review include the following:

• Making administrative (formatting, grammar, spelling) revisions to the protocol, consent or recruitment materials or other study documents
• Adding or revising non-sensitive questions or non-identifiable response options to a survey, interview, focus group or other data collection instrument
• Increasing or decreasing the number of study subjects—unless adding a new study sample such as children or prisoners or adding a new source of data or records
• Making study team/personnel changes—except (1) a change in Principal Investigator (PI) or (2) a change in other study personnel for whom regulatory approval of involvement in the study must be documented for purposes of institutional policy, sponsorship or funding, or other administrative purposes (e.g., graduation or manuscript clearance; addition of non-FSU study personnel).

Examples of changes to exempt research that do require prospectively submitting a modification to the IRB before implementing changes include the following:

• Making substantive revisions or additions (e.g., change in PI; funding source; sample; source of study subjects or their data; study sites or settings; procedures, interventions or interactions with study subjects; use of any drug, device, supplement or biologic; study subjects’ time or duration spent performing or participating in study activities) to the protocol, consent or recruitment materials or other study documents
• Adding or revising sensitive questions or identifiable response options to a survey, interview, focus group or other data collection instrument
• Adding a new study sample such as children or prisoners or adding a new source of data or records
• Obtaining, using, studying, analyzing, generating, storing or maintaining identifiable information or identifiable biospecimens in addition to or in lieu of de-identified or anonymous information or specimens
• Change in study risks (e.g., impact upon study subjects; impact upon students’ opportunity to learn educational content or assessment of educators who provide instruction; any disclosure of study subjects’ responses outside of the research may
place study subjects at risk of criminal or civil liability or be damaging to subjects' financial standing, employability, educational advancement or reputation

- Change in Principal Investigator (PI) or (for students) faculty advisor
- Any involvement of a non-FSU institution or organization
- New or change in financial interest

In conducting this protocol, you are required to follow the applicable requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the Library within the RAMP IRB system.

Sincerely,

Office for Human Subjects Protection (OHSP)
Florida State University Office of Research
2010 Levy Avenue, Building B Suite 276
Tallahassee, FL 32306-2742
Phone: 850-644-7900
Email: humansubjects@fsu.edu
OHSP Web: https://ohsp.fsu.edu