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Doctor of Nursing Practice

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School of Nursing

Increasing Folic Acid Self-Efficacy in College-Age Women of Childbearing Age

A doctoral project submitted in partial satisfaction

of the requirements for the degree of

Doctor of Nursing Practice

by

Kristie Lynn Buchanan

February 2024

Dedication

I dedicate this DNP project to my heavenly father Jesus Christ. Without him, this project and journey would not have been successful. To my husband Tyler, thank you for all your love and support during this grueling journey. I look forward to reaping the benefits of completing this journey with you. To my mother who inspired me to be a nurse in the first place, thank you. To my dad who encouraged and pushed me into completing a DNP. To all my past and future nursing students, thank you for hearing my unending push to take folic acid! Last, thank you to my homework buddies Rosie, Daisy, Marlin, Bella, and Sophie. To God be the glory!

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Abstract

Preventative measures taken by women of childbearing age before and during conception limit the risk of fetal defects or complications. One specific measure that is recommended by the Centers for Disease Control and Prevention is that all women of childbearing age take folic acid 400 mcg daily. Evidence-based research suggests that taking 400 mcg daily limits the risk of fetal neural tube defects if taken daily and started at least two months before conception. Fetal neural tube defects are classified as defects that damage the baby's spine and brain. The researcher conducted an evidence-based practice project that sought to determine if an educational session regarding folic acid indications and use increased the self-efficacy of college-age women of childbearing age to use folic acid. The evidence-based project was conducted as a quasi-experimental study and involved undergraduate nursing students at a local community college in West Texas who had completed semester one to three of their program. Leaders of the nursing program agreed that their nursing students would benefit from folic acid education so they could then educate patients on it as well.

Keywords: folic acid, neural tube defects, self-efficacy scale, Pender's health promotion theory, college-age women, folic acid awareness

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Chapter 1: Introduction

Health promotion for the prevention of health-related illness and disease starts with evidence-based education and interventions in clinical and educational practice. This should be accomplished by providers, nurses, and nurse educators. Providers, nurses, and nurse educators are the primary educators for patients and the information they provide to patients can promote better health outcomes. Nurse educators have a pivotal role in educating nursing students that will follow them into future clinical practice.

Women of child-bearing age require prenatal care education before conception. Such vital education promotes better health outcomes for the woman and baby. Although every woman of childbearing age requires prenatal care education, college-age women 18–40 years old require extended education, because they are potentially at higher risk for fetal maldevelopment, such as neural tube defects (NTDs) caused by excess alcohol consumption, which I discuss later in this chapter. Area healthcare team members note an educational gap among college-age women and their lack of adequate intake of folic acid supplementation before and during conception. This educational gap is often because of a lack of proper education regarding folic acid and prenatal care.

Statement of the Problem

Women of childbearing age are suggested by their providers to take various precautions to promote a healthy pregnancy that increases optimal fetal health that limits fetal complications. Daily folic acid consumption is one of the precautions that women of childbearing age are highly suggested to take before and during conception to limit the risk of fetal NTDs. NTDs are considered major birth defects of the baby's brain and spine.

Folic acid is a man-made form of folate. Folate is an essential water-soluble vitamin naturally present in food, especially in fruits, green leafy vegetables, and liver (Khan et al., 2022). Folic acid is the synthesized form of folate present in fortified foods and supplements and has a higher bioavailability than naturally occurring folate (Khan et al., 2022). Folate has been added to grains in the United States to prevent congenital disabilities, especially NTDs, as it is necessary for the formation of several coenzymes in many metabolic systems and maintenance in erythropoiesis (Khan et al., 2022). The Centers for Disease Control and Prevention (CDC; 2022a) recommends that all women of childbearing age take 400 mcg daily of folic acid daily. Multiple research studies show that women of childbearing age either do not take folic acid and/or are unaware of its intended use and purpose.

Many women who are actively trying to conceive may be advised by their physician to eat a healthy diet and take daily prenatal vitamins with folic acid. However, many of these women do not fully understand why these directives are recommended and why compliance with treatment guidelines are essential for a healthy pregnancy. In addition, according to the CDC, 50% of pregnancies are unplanned; therefore, these women are not conscious of the necessity to take folic acid supplements and may discover they are pregnant after the first trimester (Dwyer et al., 2022). This is concerning as the optimal benefits of folic acid are evident if taken before conceiving.

In the intended setting of the project at a local community college in West Texas, the college-age women, like most college-age women in the United States, are largely unaware of folic acid and its intended use. An educational gap surrounding folic acid exists. This educational gap exists for nursing students mainly because proper education on folic acid use and indications are not taught before the last semester of nursing school. Because the nursing program is 2 years

in length, this leaves at minimum a 2-year educational gap in folic acid awareness until it is covered in the last semester of nursing school. In addition, my focus population in the study was on nursing students 18–40 years old, and research suggests that college-age women may be even more prone to fetal NTDs because of excessive alcohol consumption. Consumption of alcohol is associated with a decreased absorption of folic acid in the bloodstream.

Background of Problem of Interest

Research studies conducted by Kim et al. (2018), Salgues et al. (2017), and Yallew et al. (2017) showed a lack of folic acid awareness and use in college-age women of childbearing age. In a study conducted by Kim et al. (2018) from August 2012 to March 2013, 704 women 19–45 years old completed a self-administered survey regarding their awareness, knowledge, and use of folic acid, as well as questions to identify the risk of inadequate folate intake. Approximately 67% of women reported that they had heard of folic acid, and 23.7% had knowledge of both the role of folic acid in preventing birth defects and the appropriate time for taking folic acid supplements to prevent birth defects. However, only 9.4% of women were taking folic acid supplements at the time of the survey (Kim et al., 2018).

Most healthcare experts agree that folic acid supplementation is a key preconception intervention. The lack of folic acid awareness and use in women of childbearing age is also a problem outside of the United States. Another research study that included women living in France concluded that 36% of women never heard of folic acid and 82% were not aware of its benefits (Salgues et al., 2017). With several similar studies with similar results conducted with this age group, it can be assumed that folic acid unawareness is an issue and needs to be addressed.

Based on studies done on primates, alcohol consumption is associated with reduced folic acid absorption (Yallem et al., 2017). Rates of alcohol consumption continue to be a concern, particularly for college-age individuals. Drinking patterns have changed over time with the frequency of binge drinking (consuming four more drinks for women/five or more drinks for men) remaining high (30% to 40%). Young adults in the college-age range are developmentally and socially at higher risk for drinking at binge levels (Krieger et al., 2018).

According to the CDC (2022b), in the United States alone, 3,000 pregnancies are affected by NTDs every year. NTDs are a group of severe congenital abnormalities resulting from the failure of closure of the fetal neural tube. It is a result of a combination of genetic and environmental factors and therefore, is classified as having a multifactorial etiology (Alshahwani et al., 2019). According to the CDC (2022b), the two most commonly diagnosed NTDs are spina bifida, which is a spinal cord defect, and anencephaly, which is a brain defect. NTDs happen primarily in the first trimester of pregnancy, often before women know they have conceived and often before experiencing the quickening phenomenon when the woman can feel the presence of fetal movement. This commonly occurs around 18–22 weeks after conception (Svenaeus, 2018). While there is no cure for NTDs, such as spina bifida and anencephaly, people born with NTDs have lifelong limitations depending on the severity of the disease. Some of the reported limitations found with NTDs include urinary and fecal incontinence, poor muscle control, chronic pain, immobility, and health issues related to being overweight (Bendt et al., 2020).

The financial impact of NTDs is burdensome. According to the CDC (2022b), the total lifetime direct cost of care for a child born with spina bifida in the United States is estimated to be \$791,900. NTDs can result in substantial death, morbidity, disability, and socioeconomic

costs (Mulu et al., 2022). Concerning cost analysis, cost may be reduced if women take a daily folic acid supplement.

In addition to the lack of folic acid awareness, local hospitals in a Southwest Texas are noting a large trend in women coming into the labor and delivery units with little to no prior prenatal care or education. This lack of prenatal care and education also includes the lack of taking folic acid before or during conception. The patient demographics of Southwest Texas is largely Hispanic and African American. The lack of education regarding appropriate folic acid consumption is a major concern.

Women who have children born with an NTD can potentially put themselves at risk for lifelong stressors when caring for a child with an NTD. In addition, the known correlation of increased alcohol consumption in college-age women can greatly increase their risk for a fetal NTD. An educational implementation for this target population can provide them with the latest evidence-based education on the benefits of daily folic acid consumption that could potentially lead to decreased incidences of NTDs in this age group.

Purpose of the Study

The purpose of this scholarly project was to increase self-efficacy of folic acid use in college-age women of childbearing age. I created and conducted an educational session to help increase their self-efficacy. It included evidence-based education on appropriate folic acid supplementation before and during conception, its ability to reduce fetal NTDs, and the link between alcohol consumption and the reduction of folic acid absorption in the bloodstream. I measured the before-and-after results of self-efficacy using a pre- and posteducation survey that participants took.

Significance of Problem of Interest

Research studies by Kim et al., 2018, Salgues et al., 2017, and Yallem et al., 2017 have clearly indicated that there is a problem in college-age women's lack of awareness and use of folic acid. An educational program has the potential to benefit women by increasing their willingness and self-efficacy with the use of folic acid. Increased self-efficacy and willingness to use folic acid can promote better health outcomes and prevent future fetal maldevelopment during pregnancy. An additional benefit includes a decrease in the overall statistical cases of NTDs and reduced hospital costs. The CDC found that only 40% of women in the general population were following recommendations to use folic acid before conception (2022b).

Perceived Need for the Nursing Program

The nursing program at the community college where I conducted the study agreed that an educational session regarding folic acid for nursing students was necessary. Nursing programs want their nursing students to model optimal health and serve as leaders and role models to their patients. Nursing students who serve as role models can potentially convince patients to achieve optimal health themselves. Nursing programs also benefit from having healthy nursing students that can finish the program in time, thus producing an adequate amount of nursing graduates each year. Nursing programs also encourage students to be leaders and educators. Nursing students who are well-educated on the use of folic acid can be better prepared to educate and answer questions on folic acid to other female patients.

An educational program is beneficial to college-age women of childbearing age because it will include several evidence-based educational components. Essential education includes that folic acid is easily obtainable as an over-the-counter medication without a prescription. Folic acid is also relatively affordable costing on average less than \$5 for a 6-month supply. Evidence-

based research shows that with 4 mg of folic acid taken daily, it may take 20 weeks to reach red-blood-cell folate levels between 1,050 and 1,340 nmol/L, optimal for reduction of the NTD risk. Therefore, folic acid supplementation should be started 5–6 months before conception (van Gool et al., 2018). Patients should be aware that folic acid could take several months to reach optimal blood levels to reduce NTDs.

Nature and Design of Project

I conducted a quasi-experimental evidence-based project at a local nursing school in a community college in West Texas. The targeted participants included college-age women in their first to third semester of nursing school who are 18–40 years old. I conducted three educational sessions that educated participants on their increased risk for NTDs, the relation of the increased alcohol consumption that increases their risk, the importance of folic acid intake, and the overall promotion of women's and fetal health. The educational program was in the form of a seminar. Consent for participation was collected from voluntary participants before the start of the study. Consent forms were collected from a third party outside of the research study to limit conflict of interest. The third-party person held the role of administrative assistant at the local community college. I informed participants that participation in the study was voluntary and that no compensation would be awarded for participation. The educational sessions included a lecture that included evidence-based education on NTDs and the different types of NTDs, their appropriate use, and intended benefits. I provided the education with the help of visual PowerPoint presentations. In addition, I administered a six-item pre- and posteducation survey on NTDs to measure participants' levels of self-efficacy to take folic acid.

PICO

The problem (P) is identified as college-age women and their lack of self-efficacy with folic acid. The clinical (PICO) is the following: Will an educational session regarding folic acid (I) compared to no educational session (C) increase the self-efficacy of college-age women (P) of childbearing age to use folic acid (O)?

Other Considerations

The affected population included college-age women of childbearing age at a local community college who were in their first to third semester of nursing school. At the selected program, these students did not receive folic acid education until their last semester of nursing school when they take an obstetrics course. The nursing program is 2 years in length. The obstetrics course highlights the purpose of folic acid usually during one lecture period.

With any affected population, factors such as ethical, economic, and cultural characteristics should be considered. Research suggests that folic acid supplement use is strongly correlated to higher socioeconomic status and is a marker of good health literacy, which increases the susceptibility for compliance (Castral et al., 2017). I was mindful of this as the local nursing program accepts many students of lower socioeconomic status. Cultural considerations are necessary to consider when providing education on folic acid. Research has found that Hispanic women have less knowledge regarding the benefits of folic acid and have lower folic acid consumption compared to women from other racial/ethnic groups (Flores et al., 2017). I considered participants' cultures when providing education during the study.

Definition of Key Terms

Folic acid. Folic acid is a water-soluble vitamin used in the management and treatment of megaloblastic anemia and prevention of fetal neural tube defects (Merrell et al., 2022).

Neural tube defect. Neural tube defects (NTDs), are the most common severe central nervous system anomalies as a result of failure to complete neurulation in the brain or spine (Bhandari et al., 2022).

Scope and Limitations

The scope of the evidence-based project includes expedited approval from the Institutional Review Boards (IRBs) of the community college and Abilene Christian University. In the study I followed all guidelines stipulated by these IRBs. This research study could not include vulnerable populations, so I excluded pregnant women from participation in the study. The target population of the study included women 18–40 years of age.

Summary

This scholarly project intends to put into action the DNP Essential VII, domain three, population health. DNP essential VII prompts clinical prevention and population health for improving the nation's health in conjunction with Pender's health theory. The goal was to observe an increase in self-efficacy and willingness to use folic acid in college-age women of childbearing age. By preventing NTDs via early prenatal care education, it is hoped and expected that local providers see an increase in folic acid consumption in women who appear for future clinical appointments.

Chapter 2: Literature Review

This chapter reviews the literature focused on the following PICO research question: Will an educational session regarding folic acid (I) compared to no educational session (C) increase the self-efficacy of college-age women (P) of childbearing age to use folic acid (O)? I conducted a review of literature to determine the prevalence of childbearing-age women unaware of folic acid use and its indications. An additional focus highlights a literature review on the interventions attempted and the success of interventions that address the issue of a lack of awareness of folic acid and its importance for women of childbearing age.

Literature Search Methods

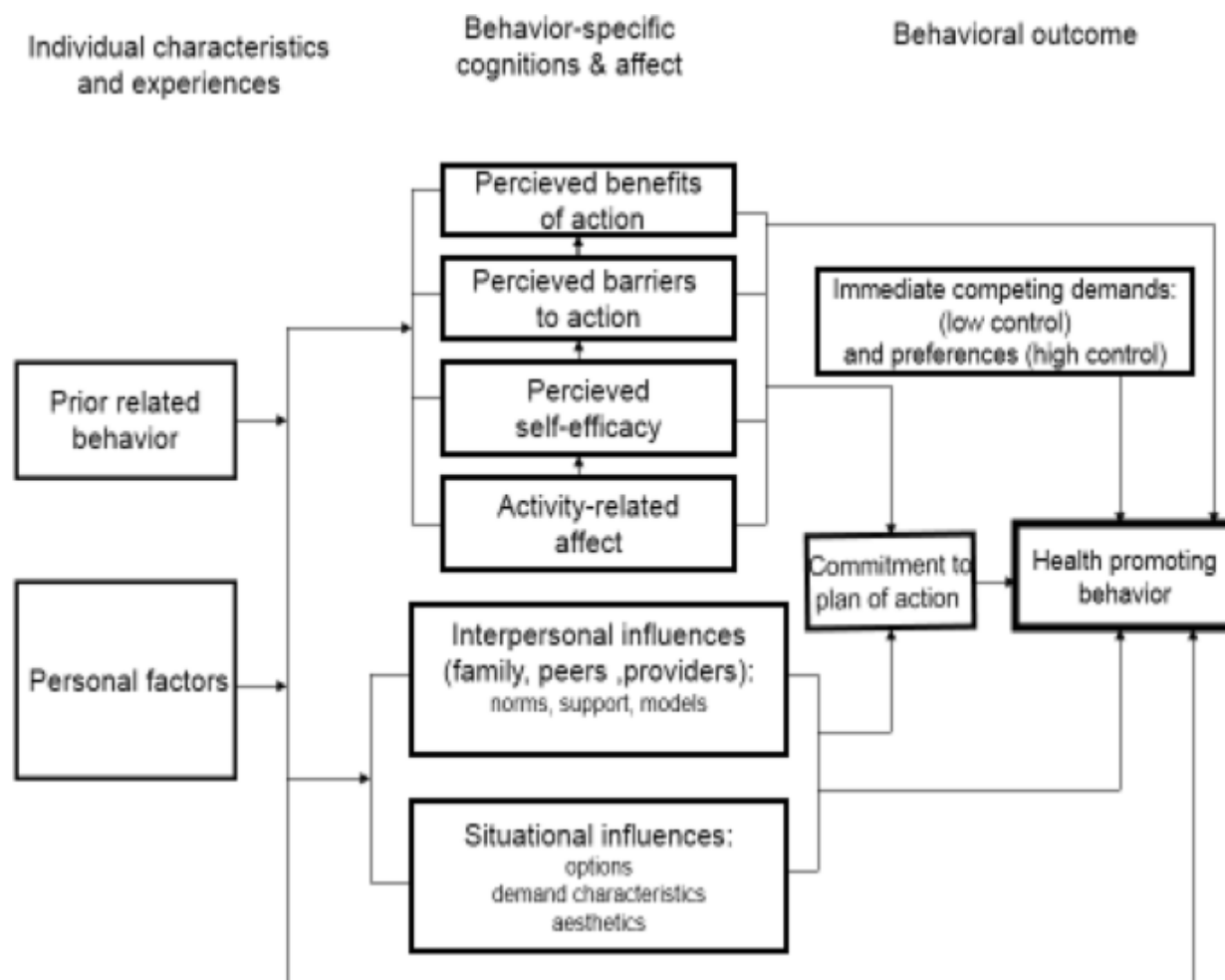
The following key terms were used to locate the relevant literature review studies: *childbearing age women, folic acid, folic acid unawareness, folic acid use, Pender's health belief model, neural tube defects, and folic acid indications*. The articles referenced in this chapter were published from the years 2016 to 2021. The search engines used to locate articles for review included MEDLINE, CINAHL, PubMed, and the Abilene Christian University Library database. The studies discussed in this chapter were conducted in the United States and other countries. Additional search criteria included studies that were published in the English language, peer-reviewed studies, and not older than 7 years.

A total of seven studies on the issue of folic acid unawareness were located for review. To narrow the focus for these articles, I searched those studies that were no older than 7 years, written in the English language, were peer-reviewed, and included the terms *folic acid, neural tube defects, Pender's health promotion model, folic acid awareness, and college-age women*.

Theoretical Framework Discussion

The foundation of this scholarly project was Pender's health promotion theory, which focuses on helping people achieve higher levels of well-being and identifies underlying factors that influence health (Khoshnood et al., 2018). Practicing health-promoting behaviors is one of the best approaches to maintaining one's health. Pender's model is one of the most widely used models to plan for and change unhealthy behaviors and promote health (Khodaveisi et al., 2017). Different studies have highlighted the efficacy of this model to control unhealthy behaviors (Khodaveisi et al., 2017). Pender's model is based on social cognitive theory according to which cognitive-perceptual factors (perceived benefits, barriers, and self-efficacy) influence engagement in health-promoting behaviors (Khodaveisi et al., 2017).

To utilize Pender's model for this project, I encouraged the participants to reflect and identify behaviors that act as a barrier to health promotion. Such barriers could include the lack of self-efficacy in the use of folic acid, excess alcohol consumption, and consuming foods low in folate. I educated the participants on factors that promote better health, such as daily folic acid use, consuming foods high in folate, and decreasing the amount of alcohol consumption. These behavior changes promote better health and an optimal pregnancy with minimal risk of fetal NTDs. Pictured in Figure 1 is a visual illustration of Pender's model.

Figure 1*Pender's Health Promotion Model*

Note. Flowchart reprinted from *Health Promotion in Nursing Practice* (7th ed., p. 35) by N. J. Pender, C. L. Murdaugh, & M. A. Parsons, 2015, Pearson.

Literature Review

It was important to locate articles that highlight the magnitude of unawareness of folic acid and its intended use in women of childbearing age. I conducted this literature review to determine the prevalence and statistics of folic acid unawareness in women of childbearing age. Both Medawar et al. (2019) and Dessie et al. (2019) highlight the prevalence of unawareness of folic acid and use in women of childbearing age. In a cross-sectional study conducted between

June and November of 2014 implemented by Medawar et al. (2019), Lebanese women between the ages of 20 and 40 were found to be largely unaware of folic acid and its indication. Data collection from the questionnaires concluded that 76% reported having knowledge about folic acid during pregnancy, but only a small proportion knew the benefits of taking it (Medawar et al., 2019). In addition, 93.9% of the women took folic acid supplements during pregnancy; however, only 33.6% of the participants took folic acid before becoming aware of their pregnancy (Medawar et al., 2019).

Dessie et al. (2019) also highlighted the prevalence of unawareness of folic acid and its intended use in women of childbearing age. They conducted the descriptive, cross-sectional study from August to November 2014 in Southeast Ethiopia to determine the level of folic acid awareness for the prevention of NTDs and associated factors among pregnant women. Chosen by systematic random sampling method, a total of 398 consenting pregnant women in Adama that attended antenatal courses were included in the study (Dessie et al., 2019). For data collection, structured pretested interviewer-administered questionnaires were utilized. Questionnaire items focused on the participants' demographic information, their awareness of folic acid, their uses of folic acid, and the recommended time of consumption (Dessie et al., 2019). This study highlighted that sociodemographic factors may play a role in the unawareness and use of folic acid. More than half of the women (54.8%) were 25 years old and above (the minimum was 16 years old), and 96% of the women were married. About 37.7% of the women attended elementary school and 33.4% attended high school. More than half of the women (51.5%) had a monthly income lower than middle class definition and 57.8% of the women were housewives. Data outcomes showed a higher prevalence in folic acid unawareness and use in the women who were younger and reported lower income.

Findings of the Medawar et al. (2019) study and the Dessie et al. (2019) study highlighted the recent magnitude of the level of unawareness of folic acid and its use to prevent NTDs. Of the interviewed women, 20.9% reported having heard or read something about folic acid supplements, but only 1.01% and 6.03%, respectively, were aware of the recommended time of intake and the role of folic acid in preventing NTDs and other congenital anomalies (Dessie et al., 2019; Medawar et al., 2019).

Understanding the Consumption of Folic Acid During Preconception

Garcia et al. (2018) conducted a qualitative study among Pakistani, Bangladeshi, and White British mothers in the U.K. to determine their understanding of folic acid consumption before conception. The study intended to analyze the similarities and differences in Pakistani, Bangladeshi, and White British mothers' health beliefs (attitudes, knowledge, and perceptions) and health behaviors regarding their consumption of folic acid preconception to reduce the risk of fetal NTDs (Garcia et al., 2018). Participants were chosen by random sampling from a local Children's Center. Participants were placed in three sample groups: subjects with normal birth outcomes, subjects who suffered bereavement with perinatal loss, and local healthcare workers working in OB/GYN clinics. Data were collected using bio-questionnaires and interview transcripts for all participant groups (normal birth outcome, bereaved mothers, and healthcare professionals) and were entered into Microsoft Excel to determine participant characteristics (Garcia et al., 2018). In a face-to-face group discussion, the subjects discussed their limited knowledge of pregnancy and their understanding of risks associated with the causes of infant death. While the consumption of folic acid during pregnancy emerged from the narrative of all focus groups, it was evident that very few mothers were aware of the importance of taking folic acid before conception and its benefits to prevent NTDs (Garcia et al., 2018).

Effectiveness of Folic Acid Recommendations

Despite public recommendations on folic acid supplementation for all women of childbearing age by the CDC, a number of studies found that women have not been following the recommended guidelines. Zadarko-Domaradzka et al. (2021) implemented a study to evaluate the effectiveness of folic acid supplementation recommendations among women of childbearing age and to assess and characterize their awareness about this public health measure. This cross-sectional study found significant data. Of 1,285 women who completed questionnaires on their folic acid awareness and current use, 91.1% of the respondents were not aware of its recommended dose and 43% did not know the role it plays in the human body (Zadarko-Domaradzka et al., 2021).

Increasing Folic Acid Use

Rampersaud et al. (2016) sought to evaluate whether or not educational text messages would increase the use of folic acid among college-age women 18–24 years old. Chosen by random sampling from a university in Florida, 162 women were included in a study that sought to evaluate if educational text messages would increase their use of folic acid. The 162 participants were divided into four groups: control, text message only, supplement only, and text message and supplement (Rampersaud et al., 2016). A baseline visit and a second (education and randomization) visit were conducted over four weeks. This was followed by a 6-week intervention phase, a 1-week period to complete poststudy dietary recalls, and a 2-week period for the third (poststudy) visit to collect unused supplements and distribute participant compensation (Rampersaud et al., 2016). Study inclusion criteria included healthy females with no chronic disease and not known to be pregnant or intending to become pregnant in the following 6 months, possession of a cell phone with unlimited text messaging capability, and

willingness to take a vitamin supplement daily for 6 weeks and to discontinue the use of any multivitamin/mineral or other supplements they may have been taking at the time of screening (Rampersaud et al., 2016).

The subjects of the study were evaluated on their baseline knowledge of folic acid, supplement intake, and their scores on a self-efficacy scale and multiple-choice test with 14 questions about folic acid, public health recommendations, and food and supplement sources (Rampersaud et al., 2016). The self-efficacy scale was developed for the study and included six statements regarding the participant's confidence and intent for taking a folic acid dietary supplement and including folic acid-containing foods in the diet. Response choices included *I don't know enough to answer, strongly disagree, disagree, neutral, agree, and strongly agree* (Rampersaud et al., 2016).

The questions on the knowledge quiz and self-efficacy scale were prescreened by a group of people who specialized in creating tools and instruments for research projects. The subjects in the supplement groups received folic acid-containing supplements. The text message group received 18 folate-related text messages. At the end of the study, it was concluded that despite all the groups receiving the same folic acid education, intake of folic acid and total folate was greater in the supplement groups compared with the non-supplement groups at mid- and poststudy. The text messages had no impact on any study measure (Rampersaud et al., 2016). The changes in supplement intake frequency over time were evaluated using contingency analysis with Bowker's test of symmetry and Pearson chi-square analysis for differences among groups at a given time period. A Cronbach's alpha test for reliability was conducted for the quiz (combined baseline, mid-study, and poststudy time points) and self-efficacy scale (combined baseline and poststudy time points), yielding values of .71 and .64. The Cronbach's alpha value

for the quiz increased across time points, suggesting that consistency and reliability improved throughout the study. Statistical significance was defined as $p \leq .05$ (Rampersaud et al., 2016). There was a significant increase in mean knowledge score posteducation compared with baseline ($p < .0001$). Knowledge scores were significantly lower poststudy compared to mid-study, but they were still higher compared with the baseline ($p < .0001$; Rampersaud et al., 2016). Limitations to this study included the small sample size and potential bias of including subjects with more knowledge than the average person. A follow-up intervention did not occur.

Health Promotion Model

The health promotion model was created by Pender in 1982 and was revised in 1987, 1996, and 2002. Pender's background in nursing, human development, experimental psychology, and education led her to use a holistic nursing perspective, social psychology, and learning theory as foundations for the model (Aqtam et al., 2018). Her model has been utilized in a number of research studies that focus on health promotion (Mekonnen et al., 2021).

Mekonnen et al. (2021) conducted a study in Ethiopia utilizing Pender's model to assess the magnitude of adherence to iron with folic acid supplementation and associated factors among pregnant women who were attending antenatal care. The study was conducted as a facility-based cross-sectional study from February to March 2020 (Mekonnen et al., 2021). Through random sampling 422 participants were included in the study. Data were collected using a structured questionnaire through face-to-face interview. The researchers utilized bivariate and multivariable logistic regression analyses to identify associated factors of adherence. In addition, they used $p < .05$ as a cutoff to determine statistical significance of multivariable logistics regressions (Mekonnen et al., 2021). A quiz was administered to all participants to evaluate the overview of the health promotion model and all of its components on a Likert scale.

In the Mekonnen et al. (2021) study, receiving counseling about anemia and folic acid supplementation by health care providers were significantly associated with adherence. Pregnant women who received counseling on folic acid were 2.28 times more likely to adhere to folic acid use than those who did not get counseling. Another factor that had a significant association with adherence to folic acid supplementation in the present study was the perceived benefit of the pregnant women. Pregnant women with high perceived benefits of folic acid supplementation were 2.72 times more likely to adhere to folic acid supplementation than those who had low perceived benefit (Mekonnen et al., 2021).

Prevention of Neural Tube Defects

Cawley et al. (2018) conducted a study to determine the best time period during which women achieve optimal blood levels of folate to reduce their risk for fetal NTDs. Women ($N = 502$) were randomly selected at their first antenatal visit between June 2014 and March 2016 after sonographic confirmation of an ongoing singleton pregnancy. Blood samples taken from the subjects were analyzed for RBC and serum folate. Of the 502 women, 98.2% ($n = 493$) reported taking folic acid (Cawley et al., 2018). There was a positive correlation between the duration of supplementation and both RBC folate ($r = 0.43, p < .001$) and serum folate ($\rho = 0.29, p < .001$). The optimal RBC folate level was achieved in 80.4% ($n = 46$) of women who started FA 400ug 4–8 weeks before their last menstrual period (LMP) compared with only 53.6% ($n = 153$) of women who started 4–8 weeks after their LMP ($p < .001$). This study provided, for the first time, information on both the timing and duration of folic acid that achieves optimum RBC folate levels associated with the prevention of NTDs. The findings of this study suggest that national and international guidelines need to highlight the importance of women starting folic acid at least 6 weeks before conception (4 weeks before LMP; Cawley et

al.,2018). Potential limitations to this study included being conducted in a country with voluntary folic acid food fortification; thus, the implications of the findings for countries with mandatory folic acid fortification require further study (Cawley et al., 2018).

Conclusion

Preconceptual care and education is a vital component to promote women's optimal health. Optimal health helps to achieve a healthy pregnancy and fetal well-being. Folic acid is an important component of care to take in before conceiving to reduce the risk of fetal NTDs; however, this important knowledge is often lacking in women of childbearing age. Research studies referenced in this chapter highlight the magnitude of unawareness of folic acid, its benefits, and its intended use. This supports the need for the implementation of an educational intervention in practice settings along with education in schools and in public media. Some of the studies mentioned in this chapter did not have follow-up evaluations, thus leaving a gap. Most studies pm;y briefly mentioned the statistical tests utilized to collect and evaluate data, another weakness. Although some gaps and weaknesses are noted in some of the studies, they do a proficient job on highlighting the lack of folic acid awareness and use in college-age women.

Chapter Summary

The significance of folic acid unawareness in women of childbearing age is documented in many research studies conducted in the United States and other countries. The benefit of starting folic acid 6 weeks before conception is an important educational component that all practicing clinicians should be providing to all women of childbearing age (Cawley et al., 2018). Using Pender's health promotion model as a framework to guide the practice, providers can promote optimal health in women and encourage the consumption of folic acid.

Chapter 3: Research Method

This chapter discusses the quasi-experiment research study that I conducted at a community college nursing program. The voluntary participants included biologically assigned female students of childbearing age in their first to third semester of nursing school. Before conducting the quasi-experiment, I obtained Institutional Review Board (IRB) approval and followed the guidelines as outlined by the IRB. The design of the study was intended to educate the participants on the importance of folic acid, its intended use, NTDs, and how folic acid significantly decreases the risk of fetal NTDs. I utilized a self-efficacy scale, discussed later in this chapter, to collect and review the pre- and posteducation outcomes. The data from the results were then analyzed for significance, using a Wilcoxon signed rank test. A statistical consultant recommended the Wilcoxon signed rank test as a proper fit for the analysis.

Project Design

The purpose of this evidence-based project was to analyze and measure if there was an increase in self-efficacy with the use of folic acid in women of childbearing age after receiving education on the importance of folic acid intake for these women. My first approach was to design the research project using a quasi-experiment design utilizing convenience sampling. Quasi-experimental studies are not classified as true experimental designs and are used to evaluate the association between an intervention and an outcome using experiments in which the intervention is not randomly assigned (Schweizer et al., 2016). In this project, I chose participants by convenience sampling, thus eliminating random sampling. Convenience sampling is a nonprobability sampling method in which participants are selected for inclusion in the study, because they are readily accessible to the researcher (Andrade, 2021).

This quasi-experiment had a one-group, pretest-posttest design. This design is a type of quasi-experiment in which the outcome of interest is measured two times: once before and once after exposing a nonrandom group of participants to a certain intervention or treatment (Handley et al., 2018). My objective was to evaluate the effect of an educational invention that I implemented in this project. I included nonrandomized participants chosen by convenience sampling who met the inclusion criteria. All participants were between 18–40 years old, assigned biologically female at birth, and currently not pregnant. This one-group completed a pretest and posttest that included the use of a self-efficacy scale to measure the effect of the educational intervention.

Interprofessional Collaboration

Interprofessional collaboration occurred with the target stakeholders—the nursing students—at the site where the study is to be conducted. I ensured all students were aware of all benefits and potential risks throughout the entire study. I reminded participants that the study was voluntary and that the need to withdraw at any time was available. I had previously informed a professor and department chair of the IRB at the local community college of the pending need to apply for IRB exemption. I provided them with the forms to be filled out. In addition, I regularly updated the assigned dissertation chair member and the assigned dissertation committee member on the process of the study throughout its duration.

Practice Setting

The intended practice setting for the study was a community college in West Texas. I used one of the classrooms in the Allied Health building on campus. The purpose of selecting this building was to accommodate the participants as these nursing students were already

required to attend classes in the Allied Health building, and their participation would be feasible and convenient.

Target Population

The target population was women biologically assigned female at birth and who were 18–40 years old. I included a minimum of 54 participants because I utilized G*Power to calculate the minimum participants needed to produce a moderate effect size. To meet additional inclusion criteria, the participants must have been able to bear children; hence, women with hysterectomies did not meet the criteria. Participants were selected from an associate degree nursing program at a local community college. In addition, they were in the first to third semester, and none had prior contact with me as a nursing instructor. The larger sample size was intended to prevent a type II error when evaluating the null hypothesis. A type II error occurs when we declare no differences or associations between study groups when, in fact, there were (Kim, 2015). This can be avoided by simply increasing or ensuring the sample is large enough. From past enrollment data, the nursing program typically had at least 60 women enrolled each semester between all three cohorts.

Instruments/Measurement Tools

Instruments and tools are necessary to determine outcomes and significance in research data. To gather demographic data to describe the included samples, I created a demographic sheet (Appendix C) that included items such as gender, marital status, desire for future children, current number of children, and if participants were currently taking a supplement that contains folic acid. Any tool or instrument used in a study should be checked for reliability and validity to determine its effectiveness. For this research study, I utilized a self-efficacy scale created in 2016 to collect data and observe outcomes. Permission to utilize scale is found in Appendix A. This

scale was created by Rampersaud et al. (2016) for a previous study that focused on folic acid awareness and use.

The self-efficacy scale includes six statements regarding participant confidence and intent to take a folic acid supplement and include folate/folic acid-containing foods in their diet (Rampersaud et al., 2016). Response choices include *strongly disagree*, *disagree*, *neutral*, *agree*, and *strongly agree*. The 6-item scale contains the following self-efficacy statements:

1. I am confident that I could remember to take a vitamin supplement containing folic acid 5 or more days a week.
2. It would be too difficult to change my diet to include more foods that are high in folate.
3. I intend to take a vitamin supplement containing folic acid 5 or more days a week.
4. I am confident that I could include more foods in my diet that are high in folate.
5. It would be too difficult for me to remember to take a vitamin supplement containing folic.
6. I intend to include more foods in my diet that are high in folate. (Rampersaud et al., 2016)

To meet reliability and validity requirements, the self-efficacy survey statements were reviewed by individuals outside the research team with knowledge or expertise on the topic or instrument type (Rampersaud et al., 2016). Researchers conducted a Cronbach's alpha test for reliability (combined baseline and poststudy time points), yielding a value of $\alpha = .64$, $p \leq .5$ (Rampersaud et al., 2016). I utilized the survey to measure if there was an increase in the self-efficacy of participants to take folic acid after they completed the educational sessions.

Data Collection, Management, and Analysis Plan

To obtain the data for the project, I recruited subjects for participation in the study. I designed a recruitment flyer (Appendix B), which was distributed by an administrative assistant prior to starting the study. To accommodate the students' schedules, at least two different educational sessions per week were offered. The students were made aware that the study was completely voluntary, and had no compensation. I also informed the students that their student identifiers would be kept confidential.

Students who chose to participate provided the administrative assistant of the Allied Health building with a unique identifier. The administrative assistant then distributed the consent form I provided to be filled out before the start of the study. The consent forms were signed by hand and returned to me to upload into a secure file on a password-protected computer and then shredded. Due to potential bias because I could become some of the students' future nursing instructor, the administrative assistant served as a proxy to collect consent forms from the participants and attended the three educational sessions I conducted.

The demographic sheet (Appendix C) was also filled out by the student. The demographic sheet contains information about participants, such as their age group, current children, desire for future children, and if they were taking a supplement containing folic acid during the time of the study. In the United States 45% of pregnancies are estimated to be unintended or unplanned each year (Aztlán-James et al., 2017). Therefore, those participants who answered *no* to plans for future children, unless they had had a hysterectomy, still met inclusion criteria. I divided participants into three sections grouped according to age: from ages 18–29, 30–39, and 40+. Students were informed about the three educational sessions in which they would listen to a lecture with a visual PowerPoint presentation.

The study commenced 1 week after collection of consent forms. The participants responded to the six survey statement, as delineated above, to determine their self-efficacy to take folic acid before the educational sessions. To follow the public recommendations of the CDC, I did not recommend a specific brand of folic acid as many over-the-counter brands are available. I informed participants that any brand would be acceptable, including prenatal or multivitamins, as long as it contained at least 400 mcg of folic acid and met the recommended CDC guidelines. I conducted three educational sessions, 2 weeks apart. Once the final educational session was completed, the participants once again completed the same 6-item self-efficacy survey.

To begin to analyze the data, I conducted a demographic analysis. These data originated from the demographic sheets filled out by the students before the study began. I entered the demographics data into an Excel spreadsheet utilizing a pivot table. Students were identified on the Excel spreadsheet by a unique identifier and no actual names were used to maintain confidentiality. I identified participants by a four-digit number—the last four digits of their phone number. The participants' identifying number was then entered into Excel and the other columns contained their age group, gender, and plans for future children (yes or no).

To determine whether an increase in self-efficacy was present after the last educational session, my data analysis began utilizing a paired Wilcoxon signed rank test. A Wilcoxon signed rank test is appropriate to use as it is a nonparametric statistical hypothesis test that can be used to evaluate the median difference between two paired samples or compare a 1-sample median to a reference value. For this project, I utilized a statistical consultant for reference.

The three educational sessions highlighted different aspects of folic acid. The first educational session focused on what folic acid is, the recommended dose based on the CDC

guidelines, how to obtain it, the average cost, the most reported mild side effects, the importance of use, how it works in the body, and how alcohol decreases the absorption of folate in the bloodstream. I informed participants that serious reactions to folic acid are extremely rare, and that the most reported mild side effect is an upset stomach, which can be alleviated by taking it with food. I presented the relevant information via a PowerPoint presentation. In addition, each PowerPoint presentation listed learning objectives for each session.

The second educational session focused on fetal neural tube defects (NTDs). I educated participants about what NTDS are, how they affect quality of life, the different types of NTDs, and how folic acid plays a role in decreasing the risk of an NTD. The third and final session combined knowledge from the first two sessions and provided education on foods that are high in folate. A focus on health promotion and barriers to achieving optimal health promotion was also focus in the third session. An outline of the educational sessions is provided in Appendix D.

Risks/Benefits

Before the study, I explained the risks and benefits associated with participation in the project to the participating nursing students. The benefits of participating in the study were numerous. The main benefit the participating students would gain is knowledge of the importance of folic acid supplementation, its intended use, and how it significantly reduces the risk of fetal NTDs. The participating students gained knowledge of the benefits of starting folic acid supplementation several months before conception to enhance its benefits of reducing NTDs. The knowledge gained is meant to increase their self-efficacy to take folic acid daily. This knowledge gained by the students is meant to benefit their future patients by proxy so the students can then educate their patients on the importance of folic acid and its intended use. In

addition to the benefits of the knowledge gained during the study, no physical demands were required of the students and risk was minimal.

Several studies have been conducted on the risks of folate deficiency. Some of these risks include increased risk for fetal NTDS, a potential link between elevated homocysteine (a marker for an increased risk for arteriosclerosis) and folate deficiency, lowering the risk of stroke but not an adverse cardiac event when hyperhomocysteinemia is corrected with folic acid, lack of folic acid during pregnancy may increase the risk of diabetes-associated congenital disabilities and autism, and maternal folic acid during pregnancy may lower the risk of childhood leukemia (Field et al., 2018). While there is plenty of evidence-based knowledge on the importance of folic acid, there is little to no research on the adverse effects of folic acid; therefore, the risk to the students was little to none.

IRB Approval and Process

This study required an expedited IRB evaluation. Research studies can qualify for an expedited evaluation if there is no more than minimal risk and all of the research procedures fit within one or more of the expedited categories in the federal IRB regulations (Walch-Patterson, 2020). Studies that qualify must be submitted to the IRB for review before starting the research, therefore the IRB process was started before initiating the study (Walch-Patterson, 2020). The process to obtain IRB can take up to 2 weeks, therefore I began the process to obtain approval about 1–2 months before conducting the study. I filled out paperwork from both the Abilene Christian University IRB and the local community college's IRB. In general, the IRB process includes creating and submitting an IRB application for IRB review, receiving a request to make any necessary revisions to obtain IRB approval, getting notice of the IRB approval, then conducting the research exactly as approved by the IRB (Shoenbill et al., 2017).

Feasibility and Appropriateness

I conducted the study based on the availability of the students to attend three different educational sessions. To make this process feasible, the three educational sessions were conducted immediately after class. This ensured that the students who chose to be in the study did not have to travel to another location after class and were present in the classroom in the Allied Health building. To participate in filling out the survey at the end of the study, the student would have had to attend all three educational sessions. The cost associated with the study was minimal for the students. The major cost associated with the students was their time and participation in the study. One small financial cost for the student was the purchase of an over-the-counter folic acid supplement. On average, a 250-day supply of folic acid costs less than \$5. The cost is relatively low for me as well.

To keep the study appropriate and free from other interfering meetings or designated class times for the students, the three educational settings were scheduled in advance, and all were spaced two weeks apart. The day before the educational sessions, I reminded participants about the session the next day. The nursing program director and the president of the community college were already aware of the upcoming study and were willing to be a resource if needed. In addition, the president gave written permission for the study to be implemented.

Timeline

The study was completed over a 6-week period. It included three different educational sessions, with 2-week intervals. The students were given dates of scheduled educational meetings in advance to increase cooperation and the feasibility of attendance. See Table 1 to view the timeline of the project dates and details.

Table 1*DNP Project Timeline*

Date	Detail
3/20/23	First educational session (self-efficacy survey given before the session started)
3/29/23	Second educational session
4/10/23	Third educational session (self-efficacy survey given at the end of the session)

Summary

In this chapter I discuss the details of the study, designed to be completed in 6 weeks, with three separate educational sessions scheduled 2 weeks apart. Each educational session highlighted the importance of folic acid, its intended use, fetal NTDs, and how increased use of folic acid significantly reduces the risk of fetal NTDs. Participation in the study was voluntary, and the study started after expedited IRB approval was received.

Chapter 4: Results

This chapter presents the findings of this study. The project was a quasi-experimental design and the study group consisted of college-age women 18–40 years old, who were instructed on the benefits of folic acid. The study group participated in three educational sessions related to various topics on folic acid. I gave the same pretest and posttest survey before and after the educational sessions to measure any increase in participant self-efficacy regarding folic acid intake.

The hypothesis was that after completing the educational sessions, an increase in self-efficacy would be observed. The postexam results show an increase in both the confidence to take a supplement containing folic acid 5 or more days of the week and the ability to remember to do so 5 or more days a week. Improvement was also shown in both the confidence to increase foods high in folate in their diet as well as the intent to do so. The study consisted of 44 participants, and demographics were collected prior to the study. Of 44 surveyed participants, 43 participants reported a desire for future children, and only one out of 44 reported taking a supplement containing folic acid on a daily basis.

Purpose of the Project

The purpose of the project was to determine whether educational sessions would increase self-efficacy in childbearing age women to take folic acid. Initiating folic acid consumption prior to conception has shown optimal benefits towards a great reduction in fetal NTDs. Early education has a benefit of increasing primary preventative care, because it is more cost effective to prevent a fetal NTD. Additional benefits include being able to share the information in their community and disseminate the information more widely.

Participants of the study completed a 6-item survey as a pretest and posttest. This test evaluated the participants' ability to be confident to take folic acid or include food high in folate in their diet. The pretest established a baseline knowledge and confidence for participants, and this baseline was compared with the posttest results. The results were analyzed utilizing a Wilcoxon signed-rank test.

Question Guiding the Inquiry

I sought to answer the following PICO question: Will an educational session regarding folic acid (I) compared to no educational session (C) increase the self-efficacy of college-age women (P) of childbearing age to use folic acid (O)? Participants included college-age women of childbearing age at a local nursing program in West Texas. The intervention included three distinct educational sessions with a pretest and posttest survey. The comparison was between the participants' pretest results and their posttest results, resulting in the outcome, which was improved self-efficacy to take folic acid.

Data Analysis

The participants completed a six-item pretest and posttest. For each item, participants responded on a 5-point Likert scale with one of the following: *strongly disagree*, *disagree*, *neutral*, *agree*, and *strongly agree*. Each response was coded to a number in Excel with *strongly disagree* = 1, *disagree* = 2, and so on. At the recommendation of a statistical consultant, I conducted a Wilcoxon signed-rank test to analyze the data. The Wilcoxon signed-rank test is a nonparametric statistical test used to compare the medians of two dependent distributions by identifying the difference between paired data values and ranking the absolute value of the differences (Kim, 2015). As the study had no control group and was nonrandomized with one sample of participants ($n = 44$), this test was appropriate for analysis. There were six statements

on the self-efficacy survey and participants rated their confidence on each statement. Each statement surveyed their confidence and intent in taking folic acid and including food high in folate in their diet. I analyzed responses to each of the statements before and after I conducted the educational sessions to determine the impact of education.

Wilcoxon Signed-Rank Test

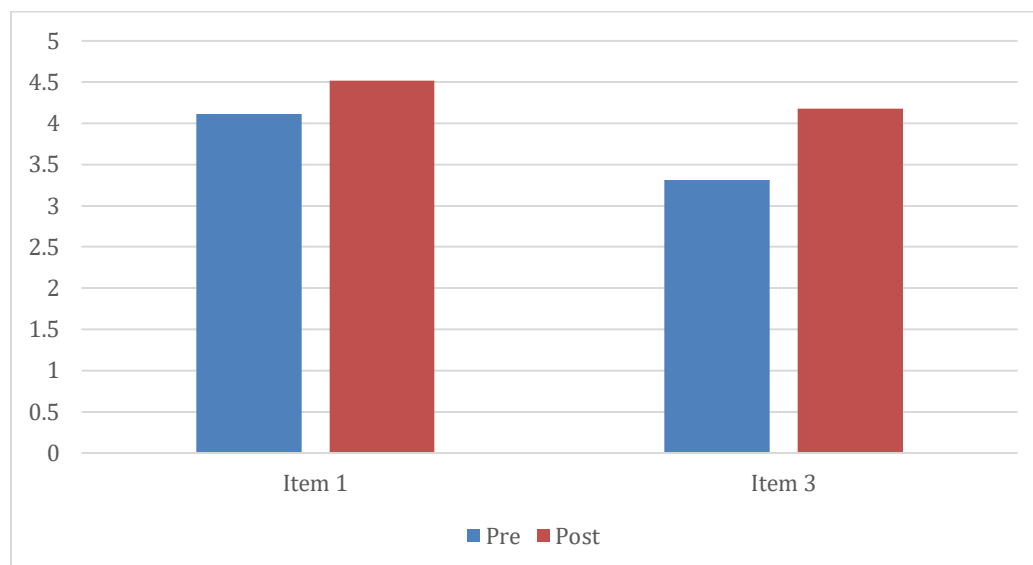
When conducting a Wilcoxon signed-rank test, the critical value first must be determined. The critical value for the Wilcoxon signed-rank test depends on the sample size and the significance level chosen. The critical value can be found in a table of critical values. The table provides critical values for both one-tailed and two-tailed tests at different significance levels. The critical value determines the threshold at which the null hypothesis is rejected. For the project, a significance level of $p < .05$ was chosen. The sample size for each question is the number of non-zero differences from pretest to posttest. For each question, the alternative hypothesis is one-tailed, looking for improvement from pretest to posttest. The null hypothesis can be rejected for each question if the test statistic is lower than the critical value. For this project, the Wilcoxon signed-rank test was conducted in Excel with the guidance of a statistical consultant.

For ease of reading the results, I discuss survey items 1 and 3 together as they both pertain to taking folic acid. Item 1 on the self-efficacy survey was the following: “I am confident that I could remember to take a vitamin supplement containing folic acid 5 or more days out of the week”, and item 3 on the survey was the following: “I intend to take a vitamin supplement containing folic acid 5 or more days a week.” Figure 2 illustrates that the mean for both items showed an increase in the confidence and intent to take folic acid after receiving education about the importance of folic acid intake. For item 1, $N_r = 17$, $W = 7.5$, and critical value = 41. For Item

3, $N_r = 27$, $W = 9.5$, and critical value = 119. For both items 1 and 3, because W , the test statistic, was lower than the critical value, the null hypothesis can be rejected. There is evidence to show improvement between the pretest and posttest for the confidence to take folic acid 5 or more days a week and the intent to do so.

Figure 2

Pretest and Posttest Results for Items 1 and 3 on Self-Efficacy Survey

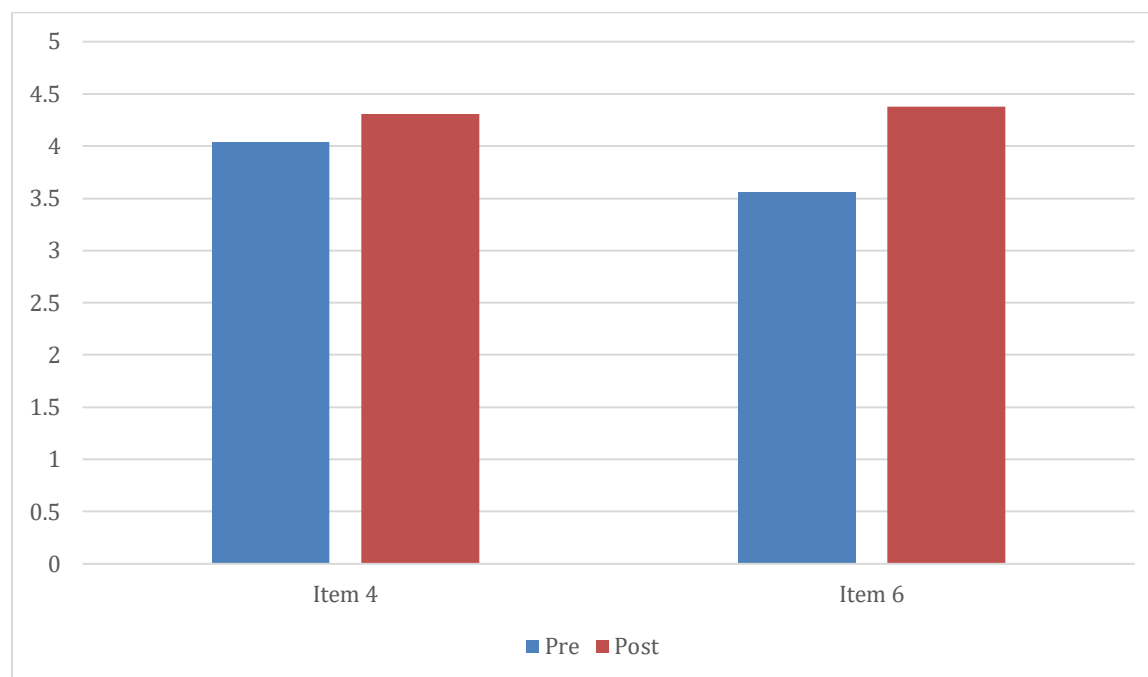


I discuss items 4 and 6 on the self-efficacy survey together as they both pertain to the confidence and intent to increase food intake in their diet that is high in folate. Item 4 on the self-efficacy survey was the following: “I am confident that I could include more foods in my diet that are high in folate”, and item 6 on the survey was the following: “I intend to include more foods in my diet that are high in folate.” Figure 3 illustrates the mean for both items that showed an increase in the confidence and intent to increase food high in folate. For item 4, $N_r = 18$, $W = 34$, and the critical value = 47. For Item 6, $N_r = 28$, $W = 0$, and the critical value = 130. For both items 4 and 6, because the test statistic was lower than the critical value, the null hypothesis can

be rejected. There is evidence to show improvement between the pretest and posttest for the confidence to increase food intake that is high in folate and the intent to do so.

Figure 3

Pretest and Posttest Results for Items 4 and 6 on Self-Efficacy Survey



Last, items 2 and 5 will be discussed together as they both pertain to the difficulty in the participant's ability to change their diet and remember to take a vitamin supplement containing folic acid 5 or more days a week. Item 2 on the self-efficacy survey was the following: "It would be too difficult to change my diet to include more foods that are high in folate", and item 5 on the survey was the following: "It would be too difficult to remember to take a vitamin supplement containing folic acid 5 or more days a week." For both these items, there was not sufficient evidence to support an improvement in the pretest and posttest means. The lack of evidence points to likely user error in reading these items and also little room for improvement from pretest and posttest responses.

Chapter Summary

The purpose of the project was to determine if self-efficacy was increased in participants to take folic acid. Results from items 1, 3, 4, and 6 support an increase in self-efficacy. Education seemed in this case to be both necessary and appropriate to improve awareness for health promotion. Women of childbearing age can promote optimal prenatal care by increasing their intake of folic acid via supplements and food intake high in folate. This study demonstrated that an educational session is an effective way to increase self-efficacy in the participants.

Chapter 5: Discussion, Conclusions, and Recommendations

The benefits of initiating folic acid prior to conception are well-noted in the literature discussion earlier in this paper. The recommended dose for folic acid can be found on the CDC's (2022a) website. The literature supports a gap in folic acid awareness in women of childbearing age. A gap in folic acid awareness was also noted in the sample group in this project. In-depth and consistent education can help bridge the gap of unawareness.

Discussion

This project aimed to determine if an educational session would increase self-efficacy in women of childbearing age regarding folic acid consumption. Data were collected through pretest and posttest after three educational sessions. This project found that the sample group showed an increase in confidence and intent to increase folate in their diet and to take a supplement containing folic acid at least 5 days out of the week, thus increasing their self-efficacy. Improving health behaviors such as taking folic acid aligns with Pender's health promotion model.

Perceived self-efficacy is the judgment or personal capability to organize and execute a health-promoting behavior (Chen et al., 2021). It is a part of Pender's health promotion model. Greater perceived self-efficacy results in fewer perceived barriers to a specific health behavior. Self-efficacy also influences perceived barriers to action, so higher efficacy results in lowered perceptions of barriers to the performance of the behavior (Chen et al., 2021). In the last session of the study, the participants were asked to reflect on their current health behaviors and what barriers currently exist in their behavior that prevent them from achieving optimal health promotion. The purpose of the reflection was to increase awareness of what they could do to increase optimal health behaviors such as increasing folate in their diet and taking a supplement.

DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health

The DNP Essentials were created to distinguish a DNP-prepared nurse in clinical practice. Essential VII is the application of best practices to promote health in the community and prevent illness (AACN, 2006). The health of the population is improved by applying evidenced-based practices and interventions that prevent illnesses and improve health outcomes (AACN, 2006). This project served to promote the health of women of childbearing age by increasing their awareness of how folic greatly reduces the risk of fetal NTDs. Increasing knowledge and awareness of folic acid in women of childbearing age can improve the overall outcomes of the community and population by reducing the number of babies born with NTDs. Their increased knowledge can also be spread to other women of childbearing age, thus furthering overall community awareness and knowledge.

Recommendations

There will continue to be an increased need for folic acid education among women of childbearing age in the community. This project increased the confidence and intent to take folic acid and increase foods high in folate in students enrolled in nursing school. Future research should be considered for a different population and location. The results from such future research can add to the already existing literature on the current educational gap on folic acid awareness. DNP-prepared leaders and educators should implement educational practices related to folic acid to women of childbearing age.

Chapter Summary

NTDs are a group of disabling and sometimes fatal birth defects that result in about 300,000 cases a year worldwide (Wald, 2022). Evidence supports that fetal NTDs are increased

in women deficient in folate. Deficits can be corrected by increasing folate in the diet and taking the recommended dose of folic acid as suggested by the CDC. There is a large educational gap in folic acid in women of childbearing age, including the group in this project.

As DNP-prepared nurses, clinical prevention and population health for improving the nation's health can be addressed through education and clinical practices that focus on prevention. Education can increase awareness and self-efficacy. Self-efficacy can help to promote improved health behaviors. Evidence-based education that is supported by the literature as well as the CDC can be effective, as this projects demonstrated.

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Appendix A: ACU IRB Approval to Use Survey

ABILENE CHRISTIAN UNIVERSITY
16633 North Dallas Parkway
Ste 800
Addison, Texas 75001



Permission to Use Survey/Questionnaire Tool

October 29, 2022

Name: Kristie Buchanan MSN, RN
Institution/Facility: Abilene Christian University

Dear Dr. Kauwell,

I am a doctoral student from Abilene Christian University writing my capstone entitled *Increasing Folic Acid Self-Efficacy in College-Age Women of Childbearing Age*, under the direction of my capstone committee chaired by Dr. Cheryl Green, who can be reached at [REDACTED]

[REDACTED] I would like your permission to use the Self-Efficacy Scale instrument in my capstone project. I would like to use your scale in either print or electronic format under the following conditions:

- I will use the surveys only for my capstone project and will not sell or use it for compensation
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed capstone paper to your attention upon completion of the study, if desired
- * If I publish my work beyond my capstone project I will include the original study from the developing authors as a reference and provide attribution for their survey

If these are acceptable terms and conditions, please indicate so by signing this form. Thank you.


Signature of Author Permission: Gail P. A. Kauwell Digitally signed by Gail P. A. Kauwell
Date: 2022.10.29 16:24:57 -0400

Sincerely,


Kristie Buchanan MSN, RN
Abilene Christian University

Appendix B: Recruitment Flyer

VOLUNTEERS NEEDED FOR RESEARCH STUDY ON FOLIC ACID

 *Have you heard anything about folic acid and what it can do for you and your health?*

OVERVIEW

 *You are eligible for this research study if you are of childbearing age and are between the ages of 19-40 years old*

Participation Involves: Attending three educational sessions regarding various topics on folic acid and what it can do for your health promotion. Each session will be about an hour in length and will utilize a self-efficacy scale (6 item question). This will be on paper.

Potential Benefits: Health promotion for you and your future pregnancy

 *Location:* [REDACTED] *Campus*

- Participation is voluntary and withdrawal from the study will have no consequences
- No compensation will be awarded for participation

FOR MORE INFORMATION:

Please contact Kristie Buchanan (principle investigator) at [REDACTED] or at [REDACTED] (please email me for the consent form which will be emailed back to the above email address)

Appendix C: Demographic Sheet**Demographics Data Collection Sheet**

Please circle which category you belong in:

Age group: 18 to 29

30 to 39

40

Marital Status: Married

Single

Other

Current Children: 1

2

3

4

5+

Do you currently take folic acid on a daily basis?

Yes

No

Do you plan to have future children?

Yes

No

Appendix D: Educational Session Outline

Educational Session Outline

Educational Session 1: *Folic acid and its importance, how to obtain it, its recommended dose, and its relationship to alcohol consumption*

Educational Session 2: *Neural tube defects, different types of neural tube defects, how they affect quality of life*

Educational Session 3: *Combination of the above, foods high in folate, reflection on Pender's health promotion model*