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The Effectiveness of Nutrition Education: Comparing Registered Dietitian Educators with Dietetic Interns

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THE EFFECTIVENESS OF NUTRITION EDUCATION: COMPARING REGISTERED DIETITIAN EDUCATORS AND DIETETIC INTERNS

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Approved by
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APPROVAL OF DISSERTATION

We, the faculty supervising the work of Amy Gannon , affirm that the dissertation, "The Effectiveness of Nutrition Education: Comparing Registered Dietitian Educators and Dietetic Interns"
, meets the high academic standards for original scholarship and creative work established by the EdD Program in Curriculum and Instruction and the College of Education and Professional Development. This work also conforms to the editorial standards of our discipline and the Graduate College of Marshall University. With our signatures, we approve the manuscript for publication.


Elizabeth Campbell (Mar 18, 2019)

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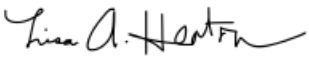
Committee Chairperson Major		Date



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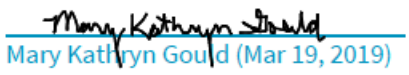
Mary Kathryn Gould (Mar 19, 2019)

Mary Kathryn Gould		3/18/2019
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DEDICATION

An important saying throughout my doctoral journey has been "Begin with the End in Mind." This sentiment is also fitting for the final phase – my dissertation. This motto has helped me power through life's toughest encounters. I started the journey in the summer of 2007 when I enrolled in my first curriculum course. I never thought I would make it through that class; it was like a foreign language, but I remembered my motto to "begin with the end in mind" and kept going. After a few years in the program, I took some time off to enjoy my newborn son. Unfortunately, I was diagnosed with breast cancer in April 2010 when he was only 10 months old. Suddenly, I found myself facing life or death decisions of surgery, chemotherapy, and radiation. This diagnosis was completely unexpected. It derailed my plans to continue with the coursework, and I had no choice but to put the program on hold.

The cancer treatment and reconstructive surgery took approximately three years. Afterward, I became busy working again and re-building my life. Surprisingly, just a few years later I was blessed to become pregnant with my second child. Even before the second pregnancy, I had been considering returning to the doctoral program to finish the degree. I was almost half-way finished with classes and it was clearly the right thing to do. My motto continued to be "begin with the end in mind," and so the journey began again.

Here I am today – at the end, with much to be thankful for and dedications to make. First, I am thankful to God and my healthcare team for providing healing from the breast cancer. Without God's ultimate grace and my oncologist's healing hands, I wouldn't be here to complete this journey. Even though the treatment was long and hard, I knew that I had to recover and become healthy again for my boys. And, while earning a doctorate has been a professional goal for many years, I can honestly say that motherhood is what sealed the deal for me. I love my

children more than life itself and I needed to finish this degree so that I could move on from the past and provide a better life for my two boys.

I dedicate this dissertation to my two children, Henry and Hudson, my husband, George, and my family – my parents, grandparents, and Aunt Kathy. I hope that my children will one day recognize the sacrifices that we've made for my education. I want them to understand that hard work and dedication to education will pay off for years to come. It is my hope that Henry and Hudson will live a better, more productive life because of the hard work and dedication George and I have invested in our education.

My parents, grandparents, and Aunt Kathy have always encouraged me to exceed my educational goals. Despite being one of only a few people in my family to earn a college degree, there was never a time in my life that I doubted I would graduate from college. My family's persistence that I achieve more in life than what they could has finally paid off. I am thankful for their sacrifice and dedication so I could have a great education and a better life for myself and my children.

ACKNOWLEDGMENTS

I acknowledge that I am very blessed to have been afforded the opportunity in life to continue my education to the doctorate level. I have been blessed to have an amazing and supportive team of family, friends, colleagues, and professors through this journey.

First and foremost, I acknowledge my husband, George, for his love and support through this process. I could not have made it this far without him. Throughout the doctoral program, I spent countless hours squirreled away in the dimly-lit basement, reading and writing until the wee hours of the morning. During this time, he un-begrudgingly "took one for the team" – taking the boys to the park, playing games, or otherwise keeping them occupied without me so I could maintain some sense of sanity. I am grateful for his encouragement, patience, kindness, and love. Thank you.

I would like to acknowledge my Aunt Kathy. She has been instrumental in helping me keep my personal life and household in check while I finished up the last few semesters of my doctoral coursework. She drove back and forth to Huntington with me at times when I had major insomnia. She did everything from laundry to babysitting, just to keep my household going while I completed my work. I am so grateful that she's always been an important influence in my life, during my childhood and now. She's the reason that I like nice things, but also the reason that I place high value on important things in life - like education and achieving personal and professional goals.

I would like to acknowledge my doctoral committee – Dr. Campbell, Dr. Heaton, and Dr. Mary Kathryn Gould. My Chair, Dr. Beth Campbell, is a dedicated professor who is amazingly supportive, encouraging, and open-minded. She agreed to serve as my chair even before she got to know me well. She knew I desperately needed a chair, and she's the type of person who

always does the right thing, so she agreed. She has been my director, editor, and cheerleader. She's stuck with me through thick and thin, paying me compliments along the way that kept me going. For that, I am very grateful.

Dr. Lisa Heaton is an excellent editor. She has been patient and kind. Her persistence in teaching me new technology in order to make this process easier must have been taxing. Taking the time to not just explain something, but actually create a video so I could see the technology in action was very thoughtful. I am grateful for Dr. Heaton and her expertise.

Dr. Mary Kathryn Gould is not only a committee member but friend, colleague, and confidant. Her wisdom and insight throughout this process has been priceless. I am thankful for our long walks in Ritter Park. I would like to say thank you to Mary Kathryn spending time with me, exercising our bodies and brains as we hashed out the details of this dissertation.

Dr. Edna Meisel was not an official member of my committee, but she certainly helped me get through Chapters 3 and 4. Although things did not turn out as we initially expected, she worked with me to tweak the plan until we got it right. She spent hours in Drinko Library with me, analyzing and re-analyzing research questions until we found the right answer. I am thankful for her service to my committee and for her great patience with the process. Also, a huge thanks is in order for teaching me how to make kibbe. My husband says this has forever changed our marriage for the better!

I would like to acknowledge Dr. Eric Lassiter and Dr. Ron Childress for helping me understand the research process. Your classes were perhaps the most challenging of my entire college career, but in the end, you both taught me something and I actually learned. I am not sure that I will ever truly understand the difference between interpretivism and positivism or become

a skilled evaluator, but without both of your courses and professional influence, I would not have developed the skillset to complete this dissertation.

I would like to acknowledge my friends and colleagues in the Department of Dietetics at Marshall: Kelli Williams, my mentor and friend, and Mallory Mount and Mary Kathryn Gould, my friends who listened to my woes and told me I could do this, even when I wanted to give up. Thank you for your friendship and support. I don't know what I'd do without you.

Finally, I would like to acknowledge the open-mindedness and flexibility that my Chair and members of my committee have shown with my dissertation topic. I have been fortunate to work with and administer SNAP-Ed for over 14 years. I am lucky to be in a position that has enabled me to work with the Marshall NEP from its earliest phase of development. This experience has been invaluable to the foundation of this document. Allowing me to use my professional experience and work with existing NEP data for this dissertation was not only a means of professional development and growth, but ultimately a critical component of my most outstanding educational achievement, my doctoral dissertation.

Perhaps more importantly though, Dietetics faculty and NEP administrators will use the outcomes of this review to improve important aspects of the program. Without the open-mindedness of Marshall faculty and my committee, these very important findings would have been overlooked and program improvements would not be made, further highlighting the importance of being open to consideration of using existing data for dissertations like mine. For this experience, and all other friends, family, and colleagues who have helped with this journey, I am forever grateful.

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ABSTRACT

The Department of Dietetics at Marshall University is a subcontracting agency with the West Virginia University Extension Service for the purposes of delivering nutrition education to children in low-income schools in a six-county radius in southwestern West Virginia through the Marshall University Nutrition Education Program (NEP). The method of lesson delivery includes an educational model that utilizes both registered dietitians (RD) and dietetic interns. The NEP is evaluated through several methods, including pre-/post-tests, teacher focus groups, and parental feedback surveys. To date, no evaluation has been completed to determine the effectiveness of dietetic interns' delivery of nutrition education lessons compared to the delivery of lessons by registered dietitians. This dissertation is a retrospective review which examined existing data from pre-/post-tests and teacher focus groups to compare teaching effectiveness of professional-level RD educators and dietetic interns who taught lessons for Marshall's NEP between August 2016 and March 2018. Through mixed method analysis, this review showed a statistically significant difference in knowledge gain from pre- to post-test, but did not show any difference in student behavioral change. No significant difference between the mean post-test scores from children who were taught by professional-level RD educators versus dietetic interns was found. Several themes emerged from teacher focus groups, including the empowerment of professional-level RDs in the classroom. Professional-level RD educators used this empowerment to encourage taste sampling of foods and to enhance children's participation in the program. The taste-sampling experience was found to be the most important aspect of the program. This experience was critical to knowledge gain and behavior change of participants. A comparison of these evaluation results will be used to develop a more specific training protocol for dietetic interns

and to improve program evaluation through the use of extensively validated pre-/post-surveys for future program evaluation.

CHAPTER ONE: INTRODUCTION

OVERVIEW

Nutrition education is a part of federal nutrition programs and is carried out with both youth and adult audiences in the US and it is an important aspect of curriculum in many schools from grades pre-kindergarten through high school. Nutrition education first began as an outreach program of land grant institutions (McDowell & Evans, 1990). Contemporary nutrition education programs are usually funded by the United States Department of Agriculture (USDA) and delivered by land grant institutions. In 1988, the Food Stamp Nutrition Education Program (FSNE) was developed to augment the efforts of other USDA low-income nutrition education programs to provide nutrition education to low income families, with a focus on women and children. The intent of the program was (and continues to be) to make behavioral changes early in a child's life to promote lifelong good nutrition and health habits (Braun, 1997).

Eventually, the program was re-named the Supplemental Nutrition Assistance Program Education, or SNAP-Ed. SNAP-Ed is the education arm of the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps. Major changes occurred to SNAP-Ed in 2010 when the program was changed into a formula-funded nutrition education and obesity-prevention program, funded by the Healthy, Hunger Free Kids Act. Formula funded implies that each state receives SNAP-Ed allocations based on a formula calculation, including the number of SNAP recipients and the percentage of people living at or below 180 percent of the federal poverty level (United States Department of Agriculture/Supplemental Nutrition Assistance Program Education [USDA/SNAP-Ed], 2017). Institutions that have a contract with the USDA to carry out the mission of SNAP-Ed are known as implementing agencies;

organizations that contract with implementing agencies to carry out the work of SNAP-Ed are known as subcontractors or subcontracting agencies.

I have been involved with West Virginia's SNAP-Ed program since 2004, when I was first hired as an Extension Specialist with the West Virginia University Extension Service (WVUES). WVUES is the SNAP-Ed implementing agency for the state of West Virginia. I have worked with this nutrition education program in multiple roles for most of my career, including as the state-wide program director, and now faculty advisor and program coordinator for the Marshall University Nutrition Education Program (NEP). West Virginia has only one implementing agency for the program - the West Virginia University Extension Service (WVUES). The Department of Dietetics at Marshall University is a subcontracting agency that delivers nutrition education to low-income schools in a six-county radius in southwestern West Virginia counties, through the Marshall University Nutrition Education Program.

This dissertation seeks to review existing data from pre-/post-tests and teacher focus groups to determine differences in teaching effectiveness between professional-level registered dietitian (RD) educators and dietetic interns who participated in Marshall's NEP between August 2016 and March 2018.

MARSHALL NUTRITION EDUCATION PROGRAM

Marshall's NEP utilizes an adapted version of the *Show Me Nutrition* curriculum, which was developed by the University of Missouri. *Show Me Nutrition* is designed to be delivered in 45 to 60 minute sessions and it meets content standards and objectives for health, math, and communication arts. Important health concepts are taught in each grade level, including nutrition, food safety, physical activity, and media influence. Age-appropriate content, activities, and handouts make learning about healthy eating fun for students in all grade levels (University

of Missouri Extension Service, 2018). Faculty with Marshall's NEP adapted the lessons to fit in a 30 minute time period.

The method of lesson delivery employed by Marshall's NEP includes a model that utilizes both registered dietitians (professional educators, often with many years of experience working in this field) and dietetic interns (graduate students completing a supervised practice experience in the field of Dietetics, through a dietetic internship in the Department of Dietetics). Usually, dietetic interns have little or no professional experience in dietetics or education and are teaching nutrition education lessons for the NEP as part of their supervised practice experience. There is no formal training program in place for the dietetic interns' nutrition education rotation at Marshall, other than a brief introduction of the curriculum. Dietetics faculty complete an observation of mock lessons that are taught in a controlled environment during the orientation phase of the internship.

Marshall's NEP Evaluation

The USDA requires that all SNAP-Ed implementing agencies complete a program evaluation to assess program effectiveness. The Marshall NEP's evaluation consists of assessing knowledge and behavioral change through multiple formats, including student pre-/post-tests, teacher focus groups, instructor evaluations, and parental surveys. Student pre-/post-tests and teacher focus groups have been used as an evaluation method since the program began in 2007 (K. Williams personal communications, February 1, 2018). I have personally been assisting other faculty members and dietetic interns in the Department of Dietetics with data collection and teacher focus groups since fall 2015.

Due to a change in scope of the grant, the NEP changed the evaluation from student pre-/post- tests in fall 2017 to parental pre-/post-surveys. The pre-/post-tests were developed and

validated by Marshall faculty members and were used to assess thousands of students during the ten-year assessment period. The parental pre-/post-surveys were developed and validated by the UC Davis Department of Nutrition and are used nationally in many SNAP-Ed programs in the United States. The pre-/post-parental surveys measure self-reported eating and food safety behaviors before and after the nutrition education intervention.

All pre-/post-test data were collected by Marshall faculty and NEP educators. Focus group data through spring 2018 were collected and transcribed by Marshall Dietetics faculty. Focus groups are ongoing throughout the year. A small amount of the existing data has been presented at several national conferences. Otherwise, most of the data has never been examined in detail, beyond what is required by the SNAP-Ed evaluation.

Until this dissertation, the data had not been reviewed to determine the effectiveness of professional educator versus dietetic interns, in terms of program outcomes and student knowledge and behavioral change. Until this retrospective review, it was unknown if the dietetic intern's delivery of the adapted *Show Me Nutrition* lessons is as effective as the professional-level RD educator's lesson delivery.

CONCEPTUAL FRAMEWORK

The USDA's Food and Nutrition Service (FNS) provides SNAP-Ed programming to encourage SNAP participants to make healthy food choices with SNAP and other government nutrition and food benefits. The nutrition education messages promoted through SNAP-Ed are consistent with the Dietary Guidelines for Americans. The main goal of SNAP-Ed programs is to reduce and prevent obesity in targeted audiences through increased consumption of fruit, vegetables and low fat dairy products (Hersey, Cates, Blitstein, & Williams, 2014).

The Food and Nutrition Service (FNS), the branch of the USDA that administers SNAP-Ed at the federal level, has established that programs are most successful when they are systematically refined and improved over the years (Hersey et al., 2014). Marshall's NEP initially began in 2008 and has been significantly improved since the program's inception. Improvements to the program include changes in the curriculum, additions of extended teacher lessons and parent newsletters, addition of food tastings with each lesson, and the addition of age-appropriate books to augment each lesson (K. Williams personal communications, February 1, 2018).

Hersey et al. (2014) found several factors that were significant in determining whether or not nutrition education programs were impactful over time, including the amount of time the program had been in place and the dose frequency of the lessons. Generally speaking, there is a positive association between the intervention dose of nutrition education lessons and positive diet behavior change (Hersey et al., 2014). Marshall's NEP uses a seven-lesson model for kindergarten through second grade. An extra lesson on gardening is taught by professional-level educators at the end of the spring semester (A. Fox, personal communication, February 28, 2018).

A review by Olander (2007), suggested that the most effective programs are tailored to the age of the audience. Take home messages for parents are also important to ensure carry-over of information from the school environment to home (Olander, 2007). Most SNAP-Ed programs use a mix of professional and paraprofessional educators to deliver nutrition education lessons in elementary schools. Although Marshall's NEP does not use a paraprofessional model, dietetic interns are a crucial component of the program. A review of literature comparing professional-

level RD educators to dietetic interns, or the effectiveness of dietetic interns in nutrition education programs found no relevant articles.

Since Marshall's NEP uses a model of professional-level registered dietitian educators and dietetics interns to deliver lessons and programming, it is important to understand the conceptual framework of dietetics education. Dietetic interns are graduate students who have completed an undergraduate degree in a dietetics-related field, such as human nutrition and foods, food science, public health nutrition, or dietetics. Undergraduate dietetics programs are known as a Didactic Program in Dietetics (DPD). DPDs are accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), an autonomous accrediting agency for education programs preparing students to become registered dietitians (Accreditation Council for Education in Nutrition and Dietetics [ACEND], 2018).

DPDs are pre-professional programs, meaning the curriculum is presented in an educational model that facilitates critical thinking skills through hands-on application, allowing students to apply knowledge to future practice. Recognizing that knowledge is acquired hierarchically, programs incorporate key elements of Bloom's Taxonomy of Educational Objectives, illustrating the cognitive learning hierarchy through a variety of educational experiences. All formative education experiences work toward progressive cognitive development and toward preparing students for the second phase of dietetics education, the dietetic internship (Harman et al., 2014).

The future of healthcare is changing. The Academy of Nutrition and Dietetics reports that the educational preparation of pre-professional, DPD students, should be elevated to connect education and practice, while also developing skills for entry into a supervised practice program, and ultimately, entry-level practice into the profession (Harman et al., 2014). The dietetics

Career Development Guide (CDG), which was developed by the Academy of Nutrition and Dietetics, is used to guide the development of critical thinking skills in the Nutrition Care Process and Model (NCPM) for dietetics students, dietetic interns, and registered dietitians. The NCPM is a research-based model designed to improve the consistency and quality of individualized nutrition practice to provide quality care and to improve the overall treatment outcome for patients (Charney & Peterson, 2013). The NCPM is also used to support critical thinking skills and decision making in all facets of dietetics practice. The NCPM uses four steps to describe the work of the dietetics profession: nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring and evaluation (Charney & Peterson, 2013). An illustration of the Career Development Guide (CDG), including the various stages of learning is included in Chapter 2.

The CDG was adapted from the Dreyfus Model of Skill Acquisition and models of skill development in nursing education and it is used to demonstrate the means in which practitioners can integrate knowledge and experience to develop critical thinking skills and increase competency in the field to reach advanced levels of practice. The acquisition of knowledge and experience occurs through six distinct stages, including novice, beginner, competent, proficient, advanced practice, and expert (Charney & Peterson, 2013).

Students and dietetic interns are in the novice and beginner phases, respectively. These two phases represent the foundation of the dietetics practice, including the Didactic Program in Dietetics (DPD), undergraduate education, and the graduate-level supervised practice experience, the dietetic internship. The competent stage of the model is characterized by entry-level knowledge and skill that all entry-level practitioners who have successfully completed a dietetic internship should possess (Charney & Peterson, 2013). Registered dietitians typically move to

the proficient stage of the model during the first three years of practice. Advanced-practice practitioners have the highest level of knowledge and skill set, including behaviors that demonstrate leadership and vision. Advanced-practice practitioners have often obtained an advanced credential, such as a terminal degree or board certification (Charney & Peterson, 2013).

Marshall's NEP uses a model of professional-level, registered dietitian educators in all six WV counties in which the program operates (Cabell, Wayne, Putnam, Kanawha, Mason, and Lincoln counties). A total of 12 dietetic interns complete a supervised-practice rotation in Cabell County, where they implement the program and deliver lessons in needy elementary schools. These schools differ from the schools where professional-level RD educators deliver lessons. The dietetic interns are supervised by a preceptor, who is a registered dietitian and also the NEP director. Dietetic interns also complete weekly program reports that are evaluated by the dietetic internship director (M.K. Gould, personal communication, February 11, 2018)

The professional-level educators who implement the NEP's lesson delivery have a skill set that falls between the competent and advanced level of practice, including a staff of practitioners with less than three years of experience and practitioners with more than 20 years of experience. Competent, proficient, and advanced-practice registered dietitians should demonstrate job performance and possess knowledge and skills within the appropriate dietetics-practice level and approach practice in accordance with the expected competency level, including implementation of the NEP lessons (Charney & Peterson, 2013). Dietetic interns are in the beginner phase of dietetics practice, which is considered a learning phase and requires many hands-on learning activities. Dietetic interns demonstrate knowledge and skills above those of an undergraduate student, but below that of a competent-level practitioner. The implementation of

NEP lessons are a means for dietetic interns to develop competent, entry-level skills in teaching and working with low-income children, while meeting the needs of the grant through the delivery of nutrition-education lessons in needy schools (Charney & Peterson, 2013).

There is a gap in the literature related to SNAP-Ed program delivery by dietetic interns. Many nutrition education programs, similar to Marshall's NEP, employ a model utilizing professional and para-professional-level educators. Paraprofessional educators operate under a model of competency-based skills that are similar to the competencies and skills achieved by dietetic interns (Baker, Pearson, & Chipman, 2009).

Nutrition education programs with a paraprofessional staffing model have shown statistically significant results with regard to behavioral changes in programs which are similar to Marshall's NEP. One example, the Building and Strengthening Iowa Community Supports (BASICS) and BASICS Plus Program, implemented by the Iowa Nutrition Network, showed statistically significant behavioral changes when compared with a case control group (Hersey et al., 2014). The BASICS program is a traditional model of nutrition education, with the delivery of lessons from an established curricula. The lessons were delivered by both professional and paraprofessional nutrition educators. Dietetic interns were not involved in the lesson delivery. The BASICS Plus Program had the added benefit of a social marketing program. Currently, SNAP-Ed programs nationwide are moving toward a model of nutrition education that is augmented, or in some cases replaced by, policy, systems, and environmental (PSE) change strategies, such as social marketing. The BASICS Plus Program is one example of this (Hersey et al., 2014).

The USDA and FNS requires that SNAP-Ed programs use a strong evaluation to determine overall program effectiveness and to assess whether or not program participants have

improved eating and physical activity behaviors, thereby reducing long-term obesity prevalence, which is the program's goal (USDA/SNAP-Ed, 2017). Theories related to health-behavior change are important to the conceptual framework of nutrition education program delivery and evaluation. The Socio-Ecological Model asserts that nutrition education is most effective when it addresses many levels of behavioral change, including individual food and taste preferences; social and government structures that influence policy decisions; and ultimately food choice (Contento, 2011). This model will be further explored in Chapter 2 of this dissertation. The model of program delivery and evaluation employed by the NEP includes constructs of the socio- ecological model.

NEP evaluators use a mixed method design of data collection, including evaluation of program strength and weaknesses by teacher focus groups; evaluation of student knowledge and behavioral change through pre-/post-tests; and evaluation of behavioral change related to food and beverage consumption through matched pre-/post-parental surveys. It should be noted that pre-/post-testing of students ended in spring 2017. There were no case controls for the pre-/post-tests. Some pre-/post-tests were case matched, but most were not. Parental surveys were used starting in fall 2017. The response rate for the first year was approximately 30 percent (K. Williams personal communications, February 1, 2018). Data from teacher focus groups from fall 2015 to spring 2018 have been logged and major concepts and themes have developed from the data. Starting spring 2018, a new set of focus group questions were developed and used. Figure 1 listed below is a SmartArt graphic used to depict the conceptual framework and multiple methods used to compare professional-level registered dietitian educators to dietetic interns for this dissertation's retrospective review of data.

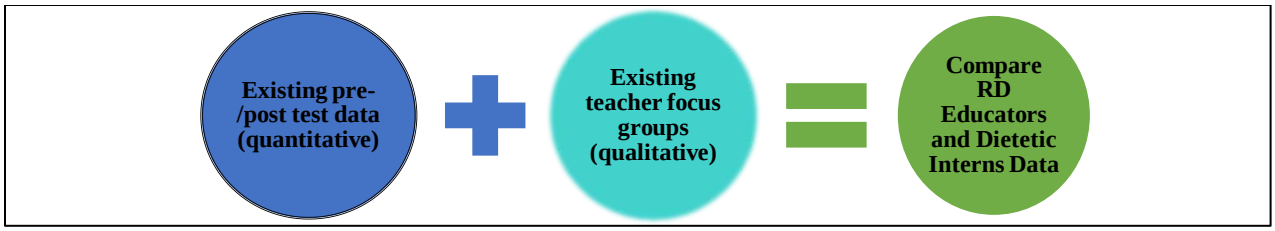

Figure 1. Conceptual Framework for the Marshall NEP Evaluation
This SmartArt graphic depicts the conceptual framework and multiple methods of program evaluation used to compare professional-level registered dietitian educators to dietetic interns for this dissertation's retrospective review of data. Quantitative data included pre-/post-test analysis and qualitative data included teacher focus group analysis. SmartArt graphic developed by Amy Gannon, based on the Marshall NEP evaluation.

PROBLEM STATEMENT

Dietetic interns implement the NEP through delivery of nutrition education lessons to low-income children in needy schools. Generally, dietetic interns have no formal training in education. They receive basic training on lesson delivery and curriculum implementation for three days during dietetic internship orientation. According to the Dietetics Career Development Guide, dietetic interns are at the beginner phase of skill development (Charney & Peterson, 2013). To date, no evaluations outside of teaching observations have been completed to determine the effectiveness of dietetic interns' delivery of nutrition education lessons, or to compare the results of the NEP's evaluation of pre-/post-student tests, teacher focus groups between schools where dietetic interns implemented lessons versus schools where professional-level registered dietitians implemented lessons. Comparison of evaluation results can be used to develop a more specific intern-training protocol for delivery of NEP lessons.

RESEARCH QUESTIONS

The following research questions will be investigated:

1. Is there a difference in overall healthy eating *knowledge* for second grade students who participated in the Marshall University Nutrition Education Program?

2. Is there a difference in overall healthy eating *knowledge* for second grade students when comparing schools with a professional RD educator to schools with a dietetic intern educator?
3. Is there a difference in overall healthy eating *behavior* for second grade students who participated in the Marshall University Nutrition Education Program?
4. Is there a difference in overall healthy eating *behavior* for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern educator?

Focus Group Questions

5. What are the most effective aspects of the program from the participating teacher's point-of-view?
6. To what extent is there a difference between professional-level educator schools and intern schools with regard to teachers' perception of the Marshall University Nutrition Education Program?

OPERATIONAL DEFINITIONS

- Didactic Program in Dietetics - an academic program designed to meet the foundation of knowledge for dietetics practice; may be designed at the baccalaureate or advanced degree level; for the purposes of this study an undergraduate, baccalaureate program.
- Dietetics Career Development Guide - a model used to form the development of critical thinking skills in the nutrition care process and model for dietetics students, dietetic interns, and registered dietitians.
- Dietetic interns - graduate students completing a supervised practice experience in the field of Dietetics.

- Dietetic internship - a supervised practice program that must be completed before graduates of an undergraduate dietetics program are eligible to sit for the national board registration examination.
- Food and Nutrition Service (FNS) - a branch of the United States Department of agriculture that is responsible for administering nutrition assistance and nutrition education programs and addressing the issue of food choice, hunger, and obesity.
- Healthy Eating Habits - for the purposes of this study, increased consumption of fruits and vegetables.
- Intervention Dose - the number of nutrition education lessons each child receives from a nutrition education program.
- Marshall University Nutrition Education Program (MU NEP) - a grant program of the Marshall University Department of Dietetics; funded by the Supplemental Nutrition Assistance Program- Education; provides nutrition education through the form of direct education and environmental change to low income children in needy schools in a six-county radius in West Virginia.
- Needy Schools - schools that qualify for SNAP-Ed programming by meeting the inclusion criteria of having 50 percent or more of the students in the school qualify to receive free or reduced-price meals as part of the National School Lunch and Breakfast Program.
- Nutrition education - instruction provided in the form of direct delivery of lessons or through policy, systems, and environmental change mechanisms; carried out by nutrition instructors to assist needy youth and adult audiences with positively changing eating and physical activity behaviors and reducing obesity.

- Nutrition Education Program (NEP) - programs that provide education to needy families and children to assist with making healthier food choices by teaching the knowledge, skills, attitudes, and behavior changes necessary to improve eating habits.
- Paraprofessional Nutrition Educator - educators who teach nutrition under a model of competency-based skills, but have not received formal nutrition education from an accredited institution of learning and are not licensed or registered professional dietitians.
- Policy, Systems, and Environmental Changes (PSE) - a method of modifying the environment to make healthy nutrition and physical activity choices practical and available to all members of a community.
- Professional-level registered dietitian educator - a registered dietitian who has experience working in a nutrition education program and delivering nutrition education lessons to low-income children.
- Registered dietitian - professional with in-depth training in nutrition and foods who has met the strict educational and experiential standards set forth by the Commission on Dietetic Registration of the Academy of Nutrition and Dietetics.
- Supervised practice experience - an internship program where learning experiences are supervised by preceptors and other professional staff members; for the purposes of this study a dietetic internship program.
- Supplemental Nutrition Assistance Program, Education, or SNAP-Ed - the education arm of the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps.
- United States Department of Agriculture (USDA) - the federal department responsible for developing and carrying out federal laws related to farming, agriculture, forestry, and food.

SIGNIFICANCE OF THE STUDY

Nutrition education implemented by the Marshall NEP is important because childhood obesity rates have tripled since 1980. In children ages 6-11, which include the age range targeted by Marshall's NEP, obesity rates have more than doubled from a low of 7 percent in 1980 to a current rate of 17.5 percent (Trust for America's Health, 2017). Additionally, obesity disproportionately impacts the region where Marshall's NEP is implemented more than most other areas of the US. In 2017, West Virginia had the highest rate of adult obesity in the nation at 37.7 percent. Nationally, the childhood obesity rate is 17 percent (Trust for America's Health, 2017). According to data from the Coronary Artery Risk Detection in Appalachian Communities Program (CARDIAC), (2017), West Virginia childhood obesity rates are significantly high for children in kindergarten, second, and fifth grades, with the highest rate of obesity occurring in fifth grade children, at 27.2 percent. In kindergarten and second grades, which are grades targeted by Marshall's NEP, obesity rates are also higher than the national average (CARDIAC, 2017).

Marshall's NEP directly addresses the obesity issue through the implementation of direct-delivery lessons that are augmented by PSE changes. The NEP field staff consists of six professional-level, registered dietitian educators who work in Cabell, Wayne, Putnam, Kanawha, Mason, and Lincoln counties. Additionally, a total of 12 dietetic interns complete six weeks of an NEP supervised practice rotation in needy schools throughout Cabell County. Dietetic interns have little or no professional experience and are teaching nutrition education lessons for the NEP as part of their supervised practice experience (A. Fox, personal communication, February 28, 2018).

Since the NEP relies so heavily on nutrition education implementation from dietetic interns who have no formal training in education, it is important to compare the results of the NEP professional-level education evaluations versus dietetic intern evaluations. The results of this comparison can be used to develop a more specific intern-training protocol for delivery of NEP lessons and to improve the overall program, with the ultimate goal of improving the health of the NEP participants and reducing overall obesity rates.

DELIMITATIONS AND LIMITATIONS

Like all research, this study has a number of specific delimitations. This dissertation was designed to be a retrospective review of existing data. Thus, most of the issues are related to problems with the existing pre-/post-test used to assess knowledge and behavior constructs of the NEP participants. Important delimitations related to a review of data from the pre-/post-test include: questions on the pre-/post-questions that were not statistically validated for face or content validity; answers on some pre-/post questions were ambiguous ("all the time" and "some of the time"), which caused issues with interpretation of wording and coding of participant responses; some behavioral-based questions included responses that were leading, or were interpreted as not measuring behavior constructs as was intended; limited availability of matched pre-/post-tests; no case control data for pre-/post-tests.

Some delimitations also exist with data reviewed from focus groups, including: original focus groups were conducted with several closed-ended questions; focus groups questions were updated in spring 2018 and thus, there were two sets of similar, but different questions interpreted for this retrospective review; focus groups for schools where dietetic interns taught were limited to one because of the spring 2018 WV teacher strike.

Finally, one limitation relates to the curriculum used to teach nutrition education lessons for the NEP. The *Show Me Nutrition* curricula was adapted from the original version written by the University of Missouri Extension Service, which altered the fidelity of the curriculum as it was written. Marshall University NEP registered dietitians adapted the lessons; the adapted version was not tested or validated with audiences before testing began. This limitation is not directly related to the data reviewed from pre-/post-tests, but is indirectly related. Since the altered curriculum was not validated, program administrators cannot be certain that key messages in the updated versions impact knowledge and behavior change among participants as intended.

CHAPTER TWO: A REVIEW OF THE LITERATURE

WHAT IS NUTRITION EDUCATION?

Contento (2016) defines nutrition education as "any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices, and other food and nutrition-related behaviors conducive to health and well-being, and delivered through multiple venues, involving activities at the individual, institutional, community, and policy levels" (p. 14).

Nutrition education can be delivered in many different venues and through multiple formats, including through youth and adult classes at community centers, food banks, workplaces, supermarkets, Supplemental Nutrition Assistance Program (SNAP) offices, Women, Infant, and Children (WIC) clinics, and through the use of newsletters, emails, and social media as well as with visuals such as infographics, billboards, text messaging, and social marketing approaches (Contento, 2016). It is common for nutrition education to have a traditional component using a direct delivery model, including a standardized curriculum, along with supports that include activities aimed at changing institutions, policies, and the environment to make healthy behavioral change easier (Contento, 2016). Institution, policy, and environmental support activities involve the communication of food and nutrition information to consumers and are intended to help the consumer make healthy choices. Usually the instructor uses a variety of educational strategies designed to facilitate the adoption of healthy food and other nutrition-related behaviors (Hayes, Contento, & Weekly, 2018).

Nutrition education in schools includes all activities that engage children in direct education and across the school campus. Nutrition education is an important aspect of the curriculum in many schools across the United States. Nutrition education initiatives are designed

to facilitate the adoption of good eating and physical activity behaviors, which are supported through a healthy school environment (Hayes et al., 2018). Nutrition education can be delivered through a number of different venues, including federal nutrition programs, such as the National School Lunch Program (NSLP) and School Breakfast Program (SBP). These programs feed approximately 30.4 million children per day, providing the perfect medium for delivering nutritional messages. The socio-ecological model (Figure 2) is part of the conceptual framework for the USDA and SNAP-Ed nutrition program evaluation. The socio-ecological model encourages nutrition education support at many levels, including the individual, institutional, community, and policy levels (Contento, 2016). Nutrition education has been found to be most effective at altering behavior change when multiple spheres of the socio-ecological model are targeted. Children may receive nutrition education at one or more of these levels in schools (Hayes et al., 2018). The socio-ecological model was an important part of the Marshall NEP's framework when it was initially developed. The socio-ecological model continues to be used today, to guide program development and evaluation, and is used when constructing new programming related to PSE change (K. Williams personal communications, February 1, 2018).

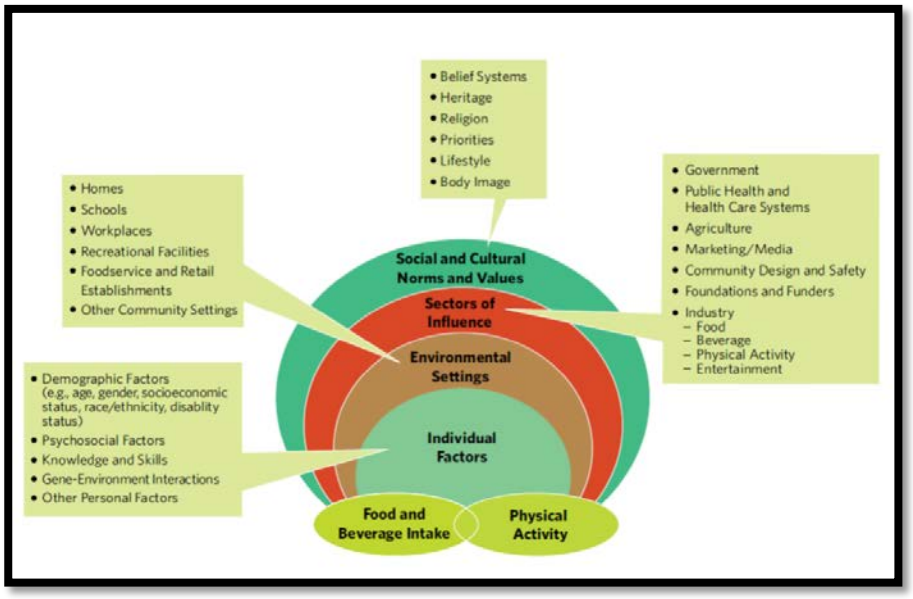

Figure 2. Socio-Ecological Model
The Socio-Ecological Model is used to encourage nutrition education support at many levels, including the individual, institutional, community, and policy levels. From the 2010 Dietary Guidelines for Americans, Retrieved from: https://health.gov/dietaryguidelines/2010/

Many nutrition education programs across the United are theoretically grounded in the framework of the socio-ecological model (Contento, 2016; Hayes et al., 2018). Programs like the Supplemental Nutrition Assistance Program Education (SNAP-Ed) for low-income children, low-income women with children, low-income families, and low-income senior citizens; the USDA's Special Supplemental Program for WIC for pregnant women, infants and children; through the preschool program, Head Start; and through the Health and Human Services Administration for Community Living's Administration on Aging for low-income older adults are sponsored by the United States Department of Agriculture (USDA) (Contento, 2016) and grounded in this framework. This dissertation will focus on nutrition education administered by and delivered through the SNAP-Ed program.

WHAT IS SNAP-ED?

Nutrition education first began as an outreach program of land grant institutions, which are colleges or universities that have been designated by Congress or the state legislature to receive funding from the Morrill Acts of 1862, 1890, and 1994 to bring the agricultural-based research and practice from the University setting to citizens of the state (McDowell & Evans, 1990). Nutrition education programs are typically funded by the United States Department of Agriculture. In 1988, the Food Stamp Nutrition Education Program (FSNE) was developed to assist women and children in low-income families. The intent of the program was to make behavioral changes early in a child's life in order to promote good nutrition and healthy habits throughout life (Braun, 1997).

In the late 1990s, FSNE was renamed the Supplemental Nutrition Education Assistance Program Education, or SNAP-Ed. SNAP-Ed is the education arm of the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps. SNAP is the nation's largest nutrition and food assistance program. According to 2017 data, SNAP helps feed 42 million Americans each month. One in four children in the US participates in SNAP. The program helps reduce food insecurity by 20 percent and improves the overall health of high-risk, low-income children by 35 percent (Trust for America's Health, 2017). SNAP-Ed is administered at the federal level by two departments in the USDA - the Food and Nutrition Service (FNS) and the National Institute for Food and Agriculture (NIFA). FNS and NIFA facilitate aspects of the program including determining national policies and procedures; providing administrative and monitoring oversight; as well as facilitating communication among federal, state, and local partners. A third agency, the Economic and Research Service, helps support nutrition education through research and evaluation projects (USDA/SNAP-Ed, 2017).

Major changes occurred to SNAP-Ed in 2010 through the Healthy, Hunger-Free Kids Act. With this Act, the SNAP-Ed funding model was changed from a program-matched compensation into a formula-funded program. Formula funded implies that each state receives SNAP-Ed allocations based on a formula calculation, including the number of SNAP recipients and the percentage of people living at or below 180 percent of the federal poverty level (USDA/SNAP-Ed, 2017). The program's scope was also changed at the time, with the development of a specific focus on delivering nutrition education and obesity-prevention efforts. Institutions that have a contract with the USDA to carry out the mission of SNAP-Ed are known as implementing agencies. Organizations that contract with implementing agencies to carry out the work of SNAP-Ed are known as subcontracting agencies.

I have been involved with West Virginia's SNAP-Ed program since 2004, when I was hired as an Extension Specialist with the West Virginia University Extension Service (WVUES). WVUES is the SNAP-Ed implementing agency for the state of West Virginia. I have worked with the program in multiple roles for most of my career, including as the state-wide program director, and now faculty advisor and program coordinator for the Marshall University Nutrition Education Program (NEP). West Virginia has only one implementing agency for the program, the WVUES. The Department of Dietetics at Marshall University is a subcontracting agency and delivers nutrition education to low-income schools in a six-county radius in southwestern West Virginia through the NEP.

WHY IS NUTRITION EDUCATION IMPORTANT IN THIS REGION?

A recent study published in the Journal of the American Medical Association (Murray, 2018) paints a grim picture of the average life expectancy and healthy life expectancy for people residing in West Virginia. Based on the phenomenon of Burden of Disease, which is described

by the World Health Organization (WHO) as the loss of health due to diseases, injuries, and risk factors of morbidity and co-morbidities of lifestyle and disease (WHO, 2012), West Virginia was found to have the lowest healthy life expectancy at birth of all states. West Virginia's life expectancy is 18 years lower than the life expectancy of people living in Hawaii, the state with the highest life expectancy (Murray, 2018). Diet and exercise-related risk factors that reduce healthy life expectancy include having a high body mass index (BMI), a poor diet, and a high plasma fasting blood glucose, which is also a risk factor for type 2 diabetes (Murray 2018). Understanding the importance of how diet and exercise play a role in the development of a disease and shorten life expectancy is important when making policy decisions at the federal level, including prioritizing funding. Using established scientific evidence in nutrition and health education programming is key to improving West Virginia's public health (WHO, 2012). Providing continued funding for programs that aim to improve the public's health through behavioral-based diet and physical activity programing, such as SNAP-Ed, should remain a funding priority for the USDA (Trust for America's Health, 2017).

Childhood Obesity in West Virginia

Nationally, childhood obesity rates have tripled since 1980. In children ages 6-11, which includes the age range targeted by Marshall's NEP, obesity rates doubled from a low of 7 percent in 1980 to a current rate of 17.5 percent (Trust for America's Health, 2017). Additionally, obesity disproportionately impacts the region where Marshall's NEP is implemented more than most other areas of the US. In 2017, West Virginia had the highest rate of adult obesity in the nation at 37.7 percent. Nationally, the childhood obesity rate is 17 percent (Trust for America's Health, 2017). According to data from the Coronary Artery Risk Detection in Appalachian Communities Program (CARDIAC, 2017), West Virginia childhood obesity rates are

significantly higher for children in kindergarten, second, and fifth grades, with the highest rate of obesity occurring in fifth grade children, at 27.2 percent. In kindergarten and second grades, which are grades targeted by Marshall's NEP, obesity rates are also higher than the national average at 21 percent and 20.6 percent, respectively (CARDIAC, 2017).

Table 1. WV Childhood Obesity Statistics, from 2016-2017 CARDIAC Data
This table represents CARDIAC data showing the number of children screened for childhood overweight and obesity; a column reflecting percent of overweight children individually; a column reflecting the percent of obese children individually; and a column reflecting the combined total percent of overweight and obese children for grades kindergarten, second, and fifth in WV during the 2016-2017 school year.

Grade	Number of Children Screened 2016-2017	Percent Overweight 2016-2017	Percent Obese 2016-2017	Total Percent Overweight or Obese
5th Grade	3,648	19.3%	27.2%	46.5%
2nd Grade	10,314	15.5%	20.6%	36.1%
Kindergarten	1,193	16.9%	21.0%	37.9%

Children who are overweight or obese are at greater risk for high blood pressure, insulin resistance and type 2 diabetes, fatty liver disease, heart disease, and psychosocial issues, among others. The longer children remain obese throughout childhood, the more likely they are to become obese adults. Up to 80% of children who are obese will become obese adults (Center for Disease Control and Prevention [CDC], 2017).

SOCIETAL COST OF OBESITY

Childhood obesity also raises many concerns for communities. Obesity costs the US health care system $150 million per year. Obesity is a major financial concern for third-party health insurance payers, as well as government-funded insurance programs, such as Medicare

and WV Medicaid. It is estimated that Medicare and Medicaid costs would be 10.7 percent lower if obesity rates were normalized (Trust for America's Health, 2017).

Obesity is a national security issue too. A recent report, Mission: Readiness (2012), by a group of retired US generals and admirals, found that up to 70% of today's youth are not fit enough to serve in the military due to overweight, obesity, or other issues related to substance abuse. Overweight and obesity are the number one cause of medical disqualification in the military today and approximately twenty-three percent of applicants are rejected secondary to being obese or having excessive body fat (Mission: Readiness, 2012; Trust for America's Health, 2017). Today's children become tomorrow's armed services personnel, making the health and weight of children a top priority for the US government and many other stakeholders (Spoehr & Handy, 2018).

Obesity is also an equity issue, disproportionately impacting low-income and rural communities, as well as certain racial and ethnic groups, including blacks, Latinos, and Native Americans. Obesity rates vary by income, with an inverse correlation between low socio-economic status and obesity (Trust for America's Health, 2017). Individuals with incomes between 100-199 percent of the Federal poverty level, which include recipients of SNAP-Ed, have a higher obesity rate compared to higher-income individuals. A 2017 CDC report indicated that 27.4 percent of children living in households below the federal poverty level were obese, compared to only 10 percent of children living in households that exceeded 400 percent of the federal poverty level, indicating a strong inverse relationship between weight and income (Trust for America's Health, 2017).

Rural communities and communities where minorities reside are more likely to be a food desert, meaning they lack access to fresh, nutritious, and affordable foods at grocery stores.

Instead, residents of these communities often rely on fast food restaurants and small food stores, such as convenience stores and gas stations, to purchase foods (Gamm, Hutchinson, Dabney, & Dorsey, 2003; Trust for America's Health, 2017). Additionally, children in these communities often have lifestyles that contribute to an increased number of hours of media time, including television watching, each day. These children intake more calories and have lower rates of physical activity, including walking to school. They have less access to community pools, parks, and safe places to play (Gamm et al., 2003; Trust for America's Health, 2017). The region where Marshall's NEP is implemented is a disproportionately rural and low income area (K. Williams, personal communication, May 12, 2018).

Obese children are at increased risk for psychosocial issues, including depression and bullying. Evidence from cross-sectional and longitudinal studies suggests that obese children encounter more behavioral problems at school, including internalizing problems such as low self-esteem, depression, and being withdrawn; externalizing problems such as arguing, fighting, and insubordination; and school discipline problems such as suspension and detention. School engagement is lower in obese children and adolescents, with overall academic effort decreasing as BMI increases (Carey, Singh, Brown, & Wilkinson, 2015).

Finally, and perhaps most importantly, childhood obesity is a developmental and educational issue. Children who are obese are more likely to have poor educational performance (Carey et al., 2015). Results from the 2011-2012 National Children's Health Survey showed a statistically significant association between BMI and educational outcome. Obese children were more likely to have more school absences, have more school problems such as behavioral issues, were more likely to repeat a grade, and have lower school engagement than their normal-weight counterparts. The poor educational-attainment experienced by obese children can be attributed to

a function of their poor overall health status, which causes higher use of health services and increased absenteeism (Carey et al., 2015). Poor academic achievement, such as repeating a grade, indicates that children failed to gain the educational and social skills necessary to complete the current grade level, putting children at a greater disadvantage in terms of college acceptance and options for future employment (Carey et al., 2015).

SNAP-Ed and Food Insecurity

A total of 18 percent of the cost of raising children goes toward food (Trust for America's Health, 2017). Food insecurity is an issue for many people in the region where Marshall's NEP is implemented due to the devastating economic impact of the coal industry's decline. SNAP benefits reduce food insecurity by providing additional resources to spend on food. Research supports the health benefits of SNAP. Adults who received SNAP benefits as a child reported overall better health and reduced incidences of metabolic syndrome, which is a cluster of metabolic factors such as obesity, high blood pressure, insulin resistance, and high blood cholesterol levels, than their peers who did not receive SNAP (Trust for America's Health, 2017).

THE MARSHALL UNIVERSITY NUTRITION EDUCATION PROGRAM

The Marshall University Nutrition Education Program is an obesity prevention, grant-funded program through the USDA's FNS and SNAP-Ed. The program provides nutrition education to low-income children in needy schools where at least 50 percent of the children receive free or reduced meals from the National School Lunch Program (NSLP) and School Breakfast Program (SBP). NEP offers direct education through the use of an approved curriculum to children in needy schools in kindergarten through second grades. Direct education is provided through the use of an adapted version of the *Show Me Nutrition* curriculum,

developed by the University of Missouri. Lessons are reinforced through the use of extracurricular materials such as take-home recipes and newsletters, bulletin boards, posters, and nutrition-themed books. Instructors use taste-sampling experiences along with other hands-on materials such as activities, games, and food models to provide a well-rounded, interactive experience for children (Marshall University Nutrition Education Program [MU NEP], 2017).

In fiscal year 2018, the Marshall NEP received a total of $743,800 in SNAP-Ed funding. After deducting the required indirect rate of the Marshall University Research Corporation (MURC) of 26 percent, all funds are used to directly benefit nutrition education efforts. A yearly needs assessment is completed to determine how to best allocate the funding. The needs assessment provides data on which schools qualify for the direct education component and allows for decision making to support obesity-prevention efforts in the community-at-large (Williams, 2017).

Since 2010, SNAP-Ed has used a formula-funded approach to nutrition education and obesity prevention. With the passage of the 2010 Healthy, Hunger Free Kids Act, increased emphasis was placed on obesity prevention through a multi-level intervention including direct education and community and public health approaches that target efforts at the organizational and institutional level, aiming for policy, systems, and environmental (PSE) changes (USDA/SNAP-Ed, 2017). The increased effort in this area by Marshall's NEP have been implemented in all six counties where the program exists (K. Williams, personal communication, May 12, 2018).

PSE changes aimed at multi-level community and public health interventions provided by Marshall's NEP include leading efforts to help local food pantries provide healthier options to clientele through the use of targeted food drives to collect nutrient-rich foods, thereby improving

health and reducing food insecurity. Support is provided to local school wellness programs through serving in a leadership role on wellness councils and completing wellness needs assessments; by offering programs such as school gardens and behavioral economics through the Smarter Lunchroom movement; and supporting the Re-Think Your Drink social marketing campaign through a partnership with the WV Academy of Nutrition and Dietetics and the Marshall University Student Academy of Nutrition and Dietetics; and through the targeted use of nutrition-education campaign messages in lessons and activities (Williams, 2017).

The NEP staffing model is comprised of an administrative team who oversees the day-to-day operations of the program, and a field staff who implement direct-delivery lessons and employs PSE changes in schools and the community. The Chair of the Department of Dietetics serves as the principle investigator (PI) of the program. The grant director is a registered dietitian who oversees the program's daily operations and serves as a supervisor for the professional-level educators and as a preceptor for the dietetic interns. Dietetic interns are graduate students who have completed an undergraduate degree in a dietetics-related field, such as human nutrition and foods, food science, public health nutrition, or dietetics and are completing a dietetic internship supervised practice experience in order to sit for the registered dietitian board exam. Three faculty members in the Department of Dietetics serve as program coordinators and faculty advisors. The field staff consists of six professional-level, registered dietitian educators who work in Cabell, Wayne, Putnam, Kanawha, Mason, and Lincoln counties. The NEP professional-level RD educators have a skill set that falls between the competent and advanced level of practice, including a staff of practitioners with less than three years of experience, and practitioners with more than 20 years of experience. All but one of the professional-level

educators have earned a Master's Degree in Dietetics (A. Fox, personal communication, May 15, 2018).

In addition to having six professional-level educator field staff, a total of 12 dietetic interns complete six weeks of an NEP supervised practice rotation in needy schools throughout Cabell County. Needy schools have more than 50 percent of the student population qualify for free or reduced school meals through the USDA's National School Lunch and School Breakfast Program. Dietetic interns are precepted by the NEP director. Dietetic interns have little or no professional experience and are teaching nutrition education lessons for the NEP as part of their supervised practice experience. The interns receive a brief training on the basics of program implementation and lesson delivery during their internship orientation. During this training, there is an introduction of the curriculum and faculty observation of mock lessons taught in a controlled environment. Prior to this retrospective review, no evaluation of the differences between the effectiveness of dietetic intern program delivery and professional-level RD educator program delivery has been analyzed (M.K. Gould, personal communication, February 11, 2018).

Dietetic Internship

Since Marshall's NEP uses a model of professional-level registered dietitian educators and dietetic interns to deliver lessons and programming, it is important to understand the conceptual framework of dietetics education. Dietetic interns are graduate students who have completed an undergraduate degree in a dietetics-related field, such as human nutrition and foods, food science, public health nutrition, or dietetics. Undergraduate dietetics programs are known as a Didactic Program in Dietetics (DPD). DPDs are accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), an autonomous accrediting agency for education programs preparing students to become registered dietitians (ACEND, 2018).

A dietetic internship is a post-bachelor, supervised-practice program that provides students with the necessary hands-on experiences required for eligibility to become a Registered Dietitian. Dietetic interns at Marshall University are graduate students who are completing supervised practice experience in the field of Dietetics, through a dietetic internship in the Department of Dietetics. Interns have a preceptor in each supervised practice rotation who oversees his or her daily work and training (Marshall Dietetics, 2018). Dietetic internships are accredited by ACEND. ACEND requires that interns receive a minimum of 1,200 clock hours of supervised practice during the internship. All interns must have completed a bachelor's degree and ACEND accredited-coursework requirements through a DPD.

Most internships take 8-24 months to complete. Some are combined with graduate courses that can be applied toward earning a master's degree (ACEND, 2018). Marshall's dietetic internship meets all of the ACEND accreditation requirements and is completed in 10 months. Interns earn a total of 21 graduate credit hours during the internship, while completing rotations in the following areas: community outreach, long-term care, nutrition education, out-patient nutrition programs, Women Infants and Children's (WIC) Nutrition Program, School Foodservice, Foodservice Management, Clinical I, and Clinical II. Interns spend 24 hours per week during the fall and spring semesters completing supervised practice hours. In the summer months (May and June), interns spend 40 hours per week completing supervised practice rotations (Marshall Dietetics, 2018).

Interns complete a total of six weeks in the NEP rotation, where they plan and implement the delivery of nutrition education lessons and PSE interventions in qualifying elementary schools in kindergarten through second grades in Cabell County, WV. Interns learn many vital skills during the NEP and other community-based rotations where nutrition education occurs,

such as the Cooperative Extension Service or WIC. These skills include learning to complete needs assessments, participating in program planning, and developing a thorough understanding of evaluation concepts such as a Logic model (Chapman-Novakofski & Reiks, 2013).

The NEP rotation allows interns to interact with children from a variety of backgrounds, cultures, and socio-economic status, which enhances their public speaking skills and allows for a better understanding of grant-funded programs, program development, and program evaluation (Marshall Dietetics, 2018). During this experience, interns also improve communication, problem-solving, and time-management skills (Chapman-Novakofski & Reiks, 2013). Perhaps most importantly, the program is preparing 12 dietetic interns a year to begin practice as an entry-level practitioner with the knowledge and skills necessary to implement a grant-funded obesity prevention program. If interns continue working in the field of nutrition education and obesity prevention upon graduation, their efforts could potentially work toward reversing the childhood obesity epidemic in Appalachia.

THE MARSHALL NUTRITION EDUCATION PROGRAM CURRICULUM

Marshall's NEP utilizes an adapted version of the *Show Me Nutrition* curriculum, which was developed by the University of Missouri. *Show Me Nutrition* meets content standards and objectives for health, math, and communication arts, and is designed to be delivered in 45 to 60 minute sessions. Important health concepts are taught in each grade level, including nutrition, food safety, physical activity, and media influence. Age-appropriate content, activities, and handouts make learning about healthy eating fun for students in all grade levels (University of Missouri Extension Service, 2018). Faculty with Marshall's NEP adapted the lessons to fit in a 30 minute time period and to be culturally appropriate for low-income elementary students in Appalachia. Key messages for each lesson were retained in the adapted lesson. To create

program buy-in for schools, an accelerated reader book related to the lesson's key messages was added to every lesson (T. Bender, personal communication, May 25, 2018). Accelerated reading books are used to help students grow as readers and used to facilitate greater reading skills.

Marshall's NEP uses a model of professional-level, registered dietitian educators in all six counties in which the program operates (Cabell, Wayne, Putnam, Kanawha, Mason, and Lincoln counties). A total of 12 dietetic interns complete a supervised practice rotation in Cabell County, where they implement the program and deliver lessons in needy elementary schools. These schools differ from the schools where the professional-level educators deliver lessons. Dietetic interns are supervised by a preceptor, the NEP director who is a registered dietitian. Dietetic interns also complete weekly program reports that are evaluated by the preceptor and dietetic internship director (M.K. Gould, personal communication, February 11, 2018).

As illustrated in the Career Development Guide (see Figure 2), the professional-level RD educators who implement the NEP's lesson delivery have a skill set that falls between the competent and advanced level of practice, including a staff of practitioners with less than three years of experience and practitioners with more than 20 years of experience. Competent, proficient, and advanced-practice registered dietitians should be expected to demonstrate job performance and possess knowledge and skills within the appropriate dietetics-practice level. Professional-level registered dietitians should approach practice in accordance with the expected competency level (Charney & Peterson, 2013). This practice includes the implementation of the NEP lessons. Dietetic interns are in the beginner phase of dietetics practice. The beginner phase is considered a learning phase that requires many hands-on learning activities. Dietetic interns demonstrate knowledge and skills above those of an undergraduate student, but below that of a competent-level practitioner. The implementation of NEP lessons are a means for dietetic interns

to develop competent, entry-level skills in teaching and working with low-income children, while meeting the needs of the grant through delivery of lessons in needy schools (Charney & Peterson, 2013).

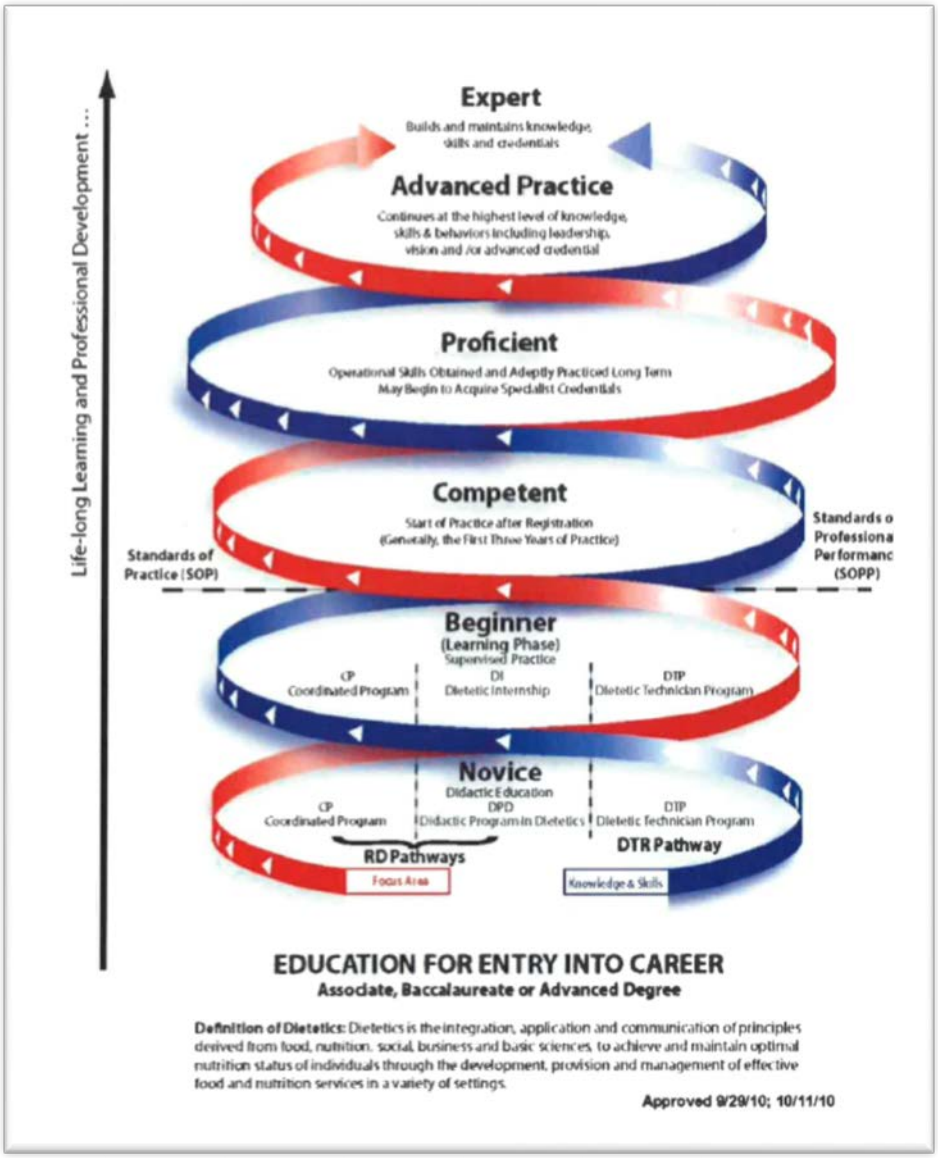

Figure 3. The Dietetics Career Development Guide
The Dietetics Career Development Guide appears in the Academy of Nutrition and Dietetics' Practice Paper: *Critical Thinking Skills in Nutrition Assessment and Diagnosis*, by Charney and Peterson (2013). The intent of the Guide is to allow practitioners to assess their own level of expertise. Retrieved from: https://www.eatrightpro.org/practice/position-and-practice-papers/practice-papers/practice-paper-critical-thinking-skills.

Nutrition Education Efficacy

A review of literature related to efficacy of nutrition education reveals that knowledge of healthy nutrition principles does not equate to behavior change. Research has shown that nutrition education is more likely to bring about healthy behavior change when it targets specific behaviors; capitalizes on the interests and motivating factors of children; is culturally diverse; uses age-and culturally-appropriate behavior-change strategies to provide knowledge and behavior-change skills; includes a method of self-assessment and realistic goal setting; includes growing and preparing food; delivers nutrition messages through a curricula linked to educational standards; uses active teaching methods, including multimedia technology; devotes adequate time and intensity in direct education lessons to achieve the desired behavioral change; and provides adequate instructor training and support (Hayes et al., 2018). With minimal training in nutrition education, and little or no teaching experience, it is unknown if lesson implementation by dietetic interns is as effective as the lesson implementation provided by professional-level educators.

Although the NEP curriculum meets most of the criteria needed to bring about healthy behavioral change, and descriptive statistical analysis has shown that the program is effective at modifying targeted eating behaviors (Williams, 2017), it is unknown if behavioral change is as effective with lesson implementation from dietetic interns when compared to their professional-level counterparts. There is a gap in the literature addressing the implementation of direct education lessons in SNAP-Ed from dietetic interns. It is my hope that this dissertation will contribute to that body of literature.

Professional and Paraprofessional Educators

Many nutrition education programs, similar to Marshall's NEP, employ a model utilizing professional and para-professional-level educators. Paraprofessional educators operate under a model of competency-based skills that are similar to the competencies and skills achieved by dietetic interns. Programs that utilize paraprofessional educators have many successful outcomes (Baker et al., 2009). One major difference between paraprofessional educators and dietetic interns is that paraprofessionals do not usually have an undergraduate degree in a dietetics-related field, and dietetic interns do. Thus, it should be assumed that dietetic interns possess a greater depth of knowledge in the field of dietetics compared to paraprofessional educators.

Nutrition education programs with a professional and paraprofessional staffing model have shown statistically significant results with regard to behavioral changes in programs similar to Marshall's NEP which were implemented in elementary schools. One example, the Building and Strengthening Iowa Community Supports (BASICS) and BASICS Plus Program implemented by the Iowa Nutrition Network, showed statistically significant behavioral changes when compared with a case control group (Hersey et al., 2014). The BASICS program is a traditional model of nutrition education, with the delivery of pre-set lessons from an established curricula. The pre-set lessons were delivered by professional and paraprofessional nutrition educators. The BASICS Plus Program has the added benefit of a social marketing program. Currently, SNAP-Ed programs nationwide are moving toward a model of PSE change strategies, including social marketing. The BASICS Plus Program is one example of this (Hersey et al., 2014).

The BASICS program increased daily consumption of fruit and vegetables at home by about one-quarter cup per day (0.24, $p < 0.05$) and consumption of fruit at home by 0.16 cups per

day ($p < 0.05$), compared to the control group. Additionally, the comparison group, BASICS Plus, increased consumption of fruit and vegetables at home combined by about one-third cup per day (0.31 cups, $p < 0.01$). The consumption of fruit was increased at home by 0.17 cups ($p < 0.05$), and consumption of vegetables at home was increased by 0.13 cups per day ($p < 0.05$) (Hersey et al., 2014).

Research shows that direct-delivery nutrition education methods should be supported by indirect nutrition education approaches, such as poster displays and bulletin boards. These should also be supported through the use of hands-on activities such as food demonstrations, gardening, culinary education, and farm-to-school activities (Hayes et al., 2018).

The Marshall NEP curriculum includes most of these components. Each lesson includes hands-on activities such as advanced-reading books and quizzes, coloring activities, taste-sampling experiences, and food demonstrations. When appropriate, the NEP provides funding and technical support for school gardens through the use of raised beds and container gardens. The Marshall NEP also regularly designs at least one bulletin board in each school, which is seasonally updated and culturally appropriate (A. Fox, personal communication, May 15, 2018). Both interns and professional-level educators work within all areas in the NEP curriculum, with the exception of school gardens. Dietetic interns do not facilitate the adoption of school gardens in the schools where they deliver nutrition education lessons. The only exception to this is the past use of small container gardens in several classrooms (A. Fox, personal communication, May 15, 2018).

Hayes et al. (2018) assert that direct-delivery nutrition education in schools should be augmented with wellness policies, other food and nutrition-related activities in schools,

reinforcement of nutrition concepts at home, and evidence-based interventions to support PSE community and public health changes, touching all spheres of the socio-ecological model.

Marshall's curriculum augments direct-delivery methods by having professional-level educators participate in school wellness committees and by having professional-level educators and dietetic interns participate in after-school and evening family events such as fall carnivals and wellness fairs. Additionally, each lesson in the curriculum is supported by a newsletter, which includes hands-on activities for children to do at home and easy, and inexpensive recipes that support the lesson. Interns gain experience by contributing research-based information to newsletters and developing recipes (Williams, 2017). Finally, all professional-level educators began implementing the Smarter Lunchrooms Movement in all counties, in fall 2017. The Smarter Lunchrooms Movement is a behavioral-economics, research-based intervention designed to facilitate healthy eating behaviors. The premise of the movement is making the healthy choice the easy choice (USDA/SNAP-Ed, 2017). Since the program is a new part of the NEP, dietetic interns were only able to assist with the initial assessment phases of the program implementation during the 2017-2018 school year. In future semesters, interns will have the opportunity to work with the program in a more detailed manner (A. Fox, personal communication, May 15, 2018).

THE MARSHALL NUTRITION EDUCATION PROGRAM'S EVALUATION

Like all grant-funded programs, Marshall's NEP stakeholders require a yearly program evaluation to assess program strengths, weaknesses, effectiveness, and overall implementation (K. Williams, personal communication, May 12, 2018). Most professional evaluators agree that no one approach to evaluation is always appropriate. Evaluation methods should be considered

with careful contemplation about evaluation questions, program context and characteristics, and the values and perspectives of funders and stakeholders (Fitzpatrick, Sanders, & Worthen, 2011).

The USDA requires that all SNAP-Ed implementing agencies complete a program evaluation to assess program effectiveness. The Marshall NEP's evaluation uses a mixed method design, which assesses knowledge and behavioral change through multiple formats, including both process and outcome evaluations. According to Fitzpatrick et al. (2011), process evaluations describe how the program is delivered and measured against a specific outlined model or plan. Process evaluation usually measures descriptive data, including the characteristics and numbers of clientele served, along with other characteristics and elements of program delivery. Outcome evaluation is oriented toward determining changes that occur in program participants or participant behaviors and are measured in short, medium, and long-term impacts (Fitzpatrick et al., 2011).

The NEP's mixed method design includes the following measures: dietetic intern teaching observations (process); teacher focus groups (outcome); student pre-/post-tests (outcome); teacher observation and behavioral surveys (outcome); program Logic Model indicators (process); and parental pre-/post-surveys (Williams, 2017). Logic models are a graphical evaluation that requires program planners to identify program inputs, activities, outputs, and outcomes as an extension of an objectives and process-oriented evaluation (Fitzpatrick et al., 2011). The NEP logic model (see Figure 4) provides an overview of the NEP's process evaluation used for the last five years. The NEP logic model is included in the program's yearly annual plan and year end summary evaluation that is submitted to the USDA and FNS (Williams, 2017).

Marshall University Nutrition Education Program Logic Model					
INPUTS	OUTPUTS		OUTCOMES		
PROGRAM INVESTMENTS	ACTIVITIES	PROCESS INDICATORS	SHORT TERM	MEDIUM TERM	LONG TERM
Multidisciplinary Team Graduate Student Requirement to Perform Nutrition Education Deep Knowledge of and Experience in Appalachia Financial Resources (e.g., SNAP-Ed) Show Me Nutrition Curriculum Variety of Fresh Foods	Classroom Interventions Provide curriculum through single session classes and series classes over 4-9 weeks Provide extension activities for teachers to contribute additional support of nutrition education Provide marketing and motivational tools and messages for awareness and repetition School Environment Assist and support school wellness coordinators and/or nurses to promote health Provide schools with bulletin board displays and daily announcement scripts Provide teachers with nutrition tips, recipes, & additional educational materials, to extend displays Operate electronic mailing list of school personnel to promote schoolwide messaging Caregiver Involvement Provide workshops, displays, food tastings at schoolwide events Distribute newsletters for caregivers Support school-sponsored health or wellness fairs Create Facebook page with monthly tips and recipes	Lessons taught # incentives distributed # students, classrooms, schools, counties reached through classroom interventions # extension activities conducted by teachers # days bulletin boards displayed # of electronic mailing list members, frequency and nature of list messages Audiences reached and to what extent through school events # schoolwide events with nutrition education information Frequency and type of support provided to school personnel Positive feedback from school staff on nutrition education services # kids in each classroom and school served who are receiving free or reduced lunch # of Facebook friends	*Immediate results…* Self-Efficacy Participating children believe they can exercise and eat healthy Knowledge Participating students improve recognition of healthy foods Outcome Expectations Participating children value the benefits of good behavioral choices related to diet and exercise Collective Efficacy School staff regularly spread messages of the importance of good nutrition and exercise Observational Modeling School staff change their eating and exercise behaviors	*Intermediate results…* Participating children eat fruits and vegetables, whole grains, fat-free or low-fat milk products, and lean protein every day Participating children balance caloric intake from food and beverages with calories expended Participating children are physically active every day as part of a healthy lifestyle Environmental Changes (e.g., introduction of salad bar) Participating schools are healthier (e.g., healthy living messages are shared regularly using multiple modes, children and staff physical activity is encouraged)	*Long-term impacts…* Decreased childhood obesity in communities served Healthier families in communities served

Figure 4. Marshall University NEP Logic Model
The Marshall University NEP Logic Model provides an overview of the NEP's process evaluation and is used as part of the USDA's required yearly program evaluation. It was adapted from: The Marshall University Supplemental Nutrition Assistance Education Final EARS Narrative Report (Williams, 2017).

Student pre-/post-tests, teacher focus groups, and teacher observation and behavioral surveys have been used as an evaluation method since the program began in 2007. Due to a

change in scope of the grant, the NEP changed the evaluation from student pre-/post-tests to parental pre-/post-surveys in fall 2017. The pre-/post-tests were developed and validated by Marshall faculty members and used to assess thousands of students during the ten-year assessment period of 2007-2017. The parental pre-/post-surveys were developed and validated by UC Davis Department of Nutrition. The parental pre-/post- surveys are used nationally in many SNAP-Ed programs. The pre-/post-parental surveys measure self-reported eating and food safety behaviors before and after the nutrition education intervention (K. Williams, personal communication, May 12, 2018). All student assessment pre-/post-test data have been collected and analyzed using SPSS statistical software by the NEP principle investigator and Marshall faculty.

Teacher focus groups are ongoing throughout the year. Focus group data through spring 2018 have been collected and transcribed by Marshall Dietetics faculty. Literature related specifically to evaluation of SNAP-Ed programs through teacher focus groups is lacking. However, a review revealed the use of focus groups in other SNAP-Ed program evaluations, including evaluation of PSE in farmers markets. The Stellar Farmers Market (SFM) Program was provided to low-income SNAP recipients in New York City in 2015. SFM is a SNAP-Ed funded, obesity-prevention and nutrition-education program. The main goal of the program was to increase fruit and vegetable consumption of participants (Dannefer et al., 2015). The program provided direct education through free cooking and nutrition workshops and also focused on PSE changes through improving the overall food environment and by cultivating the economic sustainability of farmers markets in low-income neighborhoods to make fruit and vegetables more affordable for low-income customers. Program participants were provided vouchers for free produce (Dannefer et al., 2015).

Program evaluators used a quasi-experimental mixed-method program evaluation through the use of post-surveys and focus groups. A total of 2,063 participants completed surveys and a total of 57 people participated in five focus groups. Results of the survey showed that class attendance was the most significant indicator of increasing fruit and vegetable consumption (Dannefer et al., 2015). Respondents who attended two or more classes reported consuming almost one-half more cups of fruit or vegetables daily, compared with the combined results of the control group (zero classes attended) and those respondents who attended only one class ($p < .001$). Key themes that emerged from the focus groups included increased knowledge of nutrition principles, the importance of eating fruits and vegetables, and knowledge of food preparation. Changes in attitude toward cooking and eating healthy foods, and improvements in healthy shopping, cooking and eating behaviors also emerged (Dannefer et al., 2015).

Much of the data collected for the NEP program evaluation is beyond the scope of this dissertation; however, student pre-/post-tests and teacher focus groups are important for this retrospective review. To date, the data has not been reviewed to determine the effectiveness of professional-level RD educators versus dietetic interns, in terms of program outcomes and student behavioral change (K. Williams, personal communication, May 12, 2018).

CONCLUSION

Nutrition education is an important part of the curriculum in many schools. Nutrition education initiatives are designed to facilitate the adoption of good eating and physical activity behaviors, that are supported through a healthy school environment (Hayes et al, 2018). The Marshall University NEP is an obesity prevention, grant-funded program through the USDA's FNS and SNAP-Ed. The program provides nutrition education to low-income children in needy

schools where at least 50 percent of the children receive free or reduced meals from the NSLP and SBP.

Nutrition education implemented by the Marshall NEP is important because childhood obesity rates have tripled since 1980. In children ages 6-11, which include the age range targeted by Marshall's NEP, obesity rates have more than doubled from a low of 7 percent in 1980 to a current rate of 17.5 percent (Trust for America's Health, 2017). Additionally, obesity disproportionately impacts the region where Marshall's NEP is implemented more than most other areas of the US. In 2017, West Virginia had the highest rate of adult obesity in the nation at 37.7 percent. Nationally, the childhood obesity rate is 17 percent (Trust for America's Health, 2017). According to CARDIAC data (2017), West Virginia childhood obesity rates are significantly higher for children in kindergarten, second, and fifth grades, with the highest rate of obesity occurring in fifth grade children, at 27.2 percent. In kindergarten and second grades, which are grades targeted by Marshall's NEP, obesity rates are also higher than the national average at 21 percent and 20.6 percent, respectively (CARDIAC, 2017).

Children who are overweight or obese are at greater risk for high blood pressure, insulin resistance and type 2 diabetes, fatty liver disease, heart disease, and psychosocial issues, among others. The longer children remain obese throughout childhood, the more likely they are to become obese adults. Up to 80% of children who are obese will become obese adults (CDC, 2017). Childhood obesity is also a developmental and educational issue. Children who are obese are more likely to have poor educational performance (Carey et al., 2015). Results from the 2011-2012 National Children's Health Survey showed a statistically significant inverse association between BMI and educational outcome.

Marshall's NEP directly addresses obesity through the implementation of direct-delivery lessons that are augmented by PSE changes. The NEP field staff consists of six professional-level RD educators who work in Cabell, Wayne, Putnam, Kanawha, Mason, and Lincoln counties. Additionally, a total of 12 dietetic interns complete six weeks of an NEP supervised practice rotation in needy schools throughout Cabell County. Dietetic interns are precepted by the NEP director, have little or no professional experience, and provide nutrition education lessons for the NEP as part of their supervised practice experience (A. Fox, personal communication, February 28, 2018).

Since the NEP relies so heavily on program implementation from dietetic interns who have no formal training in education, it is important to compare the results of the NEP professional-level RD evaluations to dietetic intern evaluations. The results of this comparison can be used to develop a more specific intern-training protocol for delivery of NEP lessons and to improve the overall program, with the ultimate goal of improving the health of the NEP participants and reducing overall obesity rates.

CHAPTER THREE: RESEARCH DESIGN

RESEARCH DESIGN

The USDA and FNS require SNAP-Ed programs to use strong program evaluations to determine overall program effectiveness and to assess whether or not program participants have improved eating and physical activity behaviors, thereby reducing long-term obesity prevalence (USDA/SNAP-Ed, 2017). Most professional evaluators agree that no one approach to evaluation is always appropriate. Evaluation methods should be considered without careful contemplation about evaluation questions, program context and characteristics, and in the case of large grant-funded programs, such as the Nutrition Education Program, perspectives of funders and stakeholders (Fitzpatrick et al., 2011).

The Marshall NEP's evaluation uses a mixed method design, which assesses knowledge and behavioral change through multiple formats, including both process and outcome evaluations. According to Fitzpatrick et al. (2011), process evaluations describe how the program is delivered and measured against a specific outlined model or plan. Process evaluations typically measure descriptive data, including the characteristics and numbers of clientele served, along with other characteristics and elements of program delivery. Outcome evaluation is oriented toward determining changes that occur in program participants or participant behaviors and are measured in short, medium, and long-term impacts (Fitzpatrick et al., 2011).

The NEP's mixed method design includes the following measures: dietetic intern teaching observations (process); teacher focus groups (outcome); student pre-/post-tests (outcome); teacher observation and behavioral surveys (outcome); program Logic Model indicators (process); and parental pre-/post-surveys (Williams, 2017). For the purposes of this dissertation, a retrospective review of teacher focus groups from fall 2017 and spring 2018, and

second grade student pre-/post-tests from fall 2016 were used to answer the research questions. This retrospective review was deemed as non-human subject research by the Marshall University Office of Research Integrity. A letter of research determination and approval is included in Appendix A.

POPULATION AND SAMPLE DESCRIPTION

The population for this study included second grade students who received nutrition education from Marshall NEP dietetic interns or professional-level educators. The population also included teachers from grades K-2 whose classes received nutrition education as part of the NEP. All children who were assessed by pre-/post-tests attended needy schools that met the SNAP-Ed and USDA qualifying criteria to receive nutrition education.

The NEP pre-/post-tests were administered to students in grades K-2 from a random selection of schools each semester. In order to participate in the program, teachers and school administrators agreed to participate in pre-/post-testing before the program began. Pre-/post-tests were administered in a blinded manner. Students were assigned a testing number so that neither the researcher, nor the teacher would know individual student results. The intent of the blinded process was to maintain student anonymity according to IRB protocol and to match pre-/post-tests. Issues existed with teachers not maintaining the correct student number for each child, thus many of the pre-/post-test results were not matched. A sample of 1,160 student pre-/post-tests for students in second grade were chosen for retrospective statistical analysis from fall 2016, which was the last semester that second grade students were assessed using the pre-/post-test. The following table (see Table 2) shows where and when pre-/post-testing occurred and whether the school was an intern school or a professional-educator school.

Table 2. Schools, County, Type of Educator, and Date for Pre- and Post-Tests
Demographic information to explain where and when pre-/post-testing occurred and whether the school was an intern school or a professional-level RD educator school.

School Name	County	Intern or Professional-Educator School	Date
	Pre-Test		
Lakeside Elementary	Putnam	Professional Educator	August 2016
Poca Elementary	Putnam	Professional Educator	August 2016
Cross Lanes Elementary	Kanawha	Professional Educator	August 2016
Dunbar Primary	Kanawha	Professional Educator	August 2016
Roosevelt Elementary	Mason	Professional Educator	August 2016
Leon Elementary	Mason	Professional Educator	August 2016
Wayne Elementary	Wayne	Professional Educator	September 2016
Lavalette Elementary	Wayne	Professional Educator	September 2016
Highlawn Elementary	Cabell	Intern	September 2016
Hite Saunders Elementary	Cabell	Professional Educator	September 2016
Village of Barboursville Elementary	Cabell	Professional Educator	September 2016
Midway Elementary	Lincoln	Professional Educator	September 2016
Duvall Elementary	Lincoln	Professional Educator	September 2016
	Post-Test		
Roosevelt Elementary	Mason	Professional Educator	October 2016
Leon Elementary	Mason	Professional Educator	October 2016
Cross Lanes Elementary	Kanawha	Professional Educator	October 2016
Dunbar Primary	Kanawha	Professional Educator	October 2016
Wayne Elementary	Wayne	Professional Educator	October 2016
Lavalette Elementary	Wayne	Professional Educator	October 2016
Lakeside Elementary	Putnam	Professional Educator	October 2016
Poca Elementary	Putnam	Professional Educator	October 2016
Ranger Elementary (no pre-test)	Lincoln	Professional Educator	November 2016
Highlawn Elementary	Cabell	Intern	November 2016
Richmond Elementary	Kanawha	Professional Educator	November 2016
Village of Barboursville	Cabell	Professional Educator	November 2016
Hite Saunders	Cabell	Professional Educator	November 2016
Midway	Lincoln	Professional Educator	November 2016
Duvall	Lincoln	Professional Educator	November 2016
Kenova Elementary (no pre-test)	Wayne	Professional Educator	December 2016
Ceredo Elementary (no pre-test)	Wayne	Professional Educator	December 2016

Teacher focus groups were conducted at schools chosen by the NEP director, based on programmatic need. The NEP director attempted to balance focus groups in 2017-2018 by requesting schools that received education from both dietetic interns and professional educators

participate in focus groups. Schools were chosen in Cabell, Wayne, and Putnam counties. To arrange focus groups, an email was sent by either the NEP director or this researcher to principals in schools that had participated in the NEP. A brief explanation of the purpose of the focus groups was provided in the email. If principals did not respond to emails, several follow up phone calls were made. If there was still no response, the NEP professional-level educator spoke directly with the principal to arrange the focus group.

The same process of contacting the principals to arrange focus groups was followed for both intern and professional-level educator schools, with the exception of having an intern speak directly with the principal, as the NEP director felt this would not be an appropriate arrangement. A total of three focus groups were scheduled for schools which received nutrition education from dietetic interns (Guyandotte Elementary in Cabell County, Highlawn Elementary in Cabell County, and Prichard Elementary in Wayne County). All three schools agreed to conduct focus groups in fall 2017 or spring 2018. However, secondary to the March 2018 teachers' strike, focus groups were ultimately not conducted at Highlawn and Prichard elementary schools. A total of four schools were contacted in Wayne, Cabell, and Putnam counties to conduct focus groups in schools which received nutrition education from a professional-level educator (Wayne Elementary in Wayne County, Village of Barboursville Elementary in Cabell County, and Hometown and Connor Street Elementary, both in Putnam counties). A make-up time could not be arranged with the Village of Barboursville Elementary after the teachers' strike. Therefore, only three of the original four professional-level educator schools were used for focus groups. A total of 31 teachers at four schools were interviewed for this study. A list of schools which conducted focus groups follows (see Table 3).

Table 3. Schools Where Focus Groups Were Conducted
Demographic information to explain where and when focus groups occurred and whether the school was an intern school or a professional-level RD educator school.

School Name	Number of Participating Teachers	County	Type of Educator	Date
Guyandotte Elementary	6	Cabell County	Dietetic Intern	September 13, 2017
Hometown Elementary	4	Putnam County	Professional Educator	March 12, 2018
Connor Street Elementary	8	Putnam County	Professional Educator	March 14, 2018
Ceredo-Kenova Elementary	13	Wayne County	Professional Educator	March 19, 2018

DESCRIPTION OF INSTRUMENTS

Multiple instruments were utilized for the retrospective review of data in this study, including a pre-/post-test, which assessed knowledge and behavioral change in children in second grade, and focus groups, which were used to assess teacher's perception of the NEP as a whole and to determine what differences existed in teacher's perception of professional-level RD educator and dietetic intern schools.

The pre-/post-test was developed by Marshall Dietetics faculty and a panel of elementary education experts. When faculty were initially searching for an evaluation tool, a review of materials for children in kindergarten through second grades did not yield a reliable pre-/post-test. Thus Marshall faculty and a team of experts in early elementary education developed a new testing instrument. The test was used from 2010-2017. The test was initially designed for questions to be read from a printed binder with colorful pictures used to augment words. Researchers read questions aloud from the binder and recorded answers on paper. After seven years of testing, the same questions were converted to electronic format and delivered via an

iPad. Pre-/post-tests for second grade were comprised of 25 questions that were structured to assess two domains - knowledge of nutrition and behavior change. Table 4 shows pre-/post-questions that fall into each domain, knowledge-based or behavioral-based questions.

Table 4. Second-Grade Pre-/Post-Test Questions
Knowledge and behavior-based questions that comprised the second grade NEP pre-/post-test.

Knowledge-Based Questions
1. How old are you?
2. Can you name this fruit? (peach)
3. Can you name this fruit? (pomegranate)
4. Can you name this vegetable? (yellow squash)
5. Can you name this vegetable? (asparagus)
6. Which picture shows MyPlate?
7. Which food belongs to the fruit group? Options: Red pepper; Pineapple; Peanuts; Cauliflower
8. Which food belongs in the protein group? Options: Green beans; American cheese; Tuna; Strawberries
9. What do protein foods do? Options: Help make your muscles strong; Help you see better; Help make your bones strong
10. What do grains foods do? Options: Help you see better: Help make bones strong; help heal your cuts and bruises
11. What do dairy foods do? Options: Help you see better; Help make your bones strong; Help heal your cuts and bruises
12. How many of your grains should come from whole grains each day? Options: None of them should be whole grains; One of them should be whole grains; One half of them should be whole grains; Five of them should be whole grains

13. How long should you wash your hands before eating meals and snacks?
    Options: All the time; Sometimes; Never
14. How long should you wash your hands to get rid of germs?
    Options: 10 seconds; 20 seconds; 1 minute; 5 minutes

15. Behavioral-Based Questions

16. When you wash your hands, how often do you use soap?
    Options: All the time; Sometimes; Never
17. Do you move your body everyday by doing things like running, jumping, or playing sports?
    Options: Yes; No; I don't know
18. How often do you eat grain foods?
    Options: All the time; Sometimes; Never
19. How often do you eat vegetables?
    Options: All the time; Sometimes; Never
20. How often do you eat fruits?
    Options: All the time; Sometimes; Never
21. How often do you drink milk?
    Options: All the time; Sometimes; Never
22. Point to the face that shows how you feel when I say: "Trying new foods is fun."
    Option: Three emojis representing happy, neutral, sad emotions
23. Point to the face that shows how you feel when I say: "I can choose healthy snacks."
    Option: Three emojis representing happy, neutral, sad emotions
24. Point to the face that shows how you feel when I say: "I like vegetables."
    Option: Three emojis representing happy, neutral, sad emotions
25. Point to the face that shows how you feel when I say: "I like eating whole grains."
    Remember, whole grains are foods like oatmeal, 100% whole wheat bread, brown rice
    Option: Three emojis representing happy, neutral, sad emotions

26. Point to the face that shows how you feel when I say: “Being active is fun.” Being active means doing things like running, jumping or playing sports.
Option: Three emojis representing happy, neutral, sad emotions

Focus group questions were initially designed in 2011 by the Assistant Dean of the College of Health Professions, who was the Co-PI of the grant at that time. These questions were reviewed by Dietetics faculty and used for approximately 10 years. In fall 2018, Dietetics faculty determined that the focus group questions needed to be updated to reflect recent program changes. Changes were made to limit ambiguity and narrow focus to specific aspects of the program. The new questions were developed by one Dietetics faculty member and reviewed by other faculty and the NEP director. Ultimately, the new focus group questions were increased in number by one question and written more concisely. The new focus group questions addressed curriculum and program-delivery issues more directly with more open-ended questions. A list of previous and new focus group questions are listed below (see Table 5).

Table 5. Previous and New Focus Group Questions
Previous and new focus group questions used in teacher focus groups.

Previous Focus Group Questions
1. Do you believe the NEP has been beneficial to the children in the class?
2. Do you feel that the NEP has in any way benefitted you directly within your class?
3. Would you recommend this program as a beneficial tool to be incorporated in other, similar schools? Can you share why or why you do not feel the students learn from the program?
4. What is the strong point of the program?
5. What do you feel is the weakest point of this program?
New Focus Group Questions
1. What is the greatest strength of the program? Why?
2. Do children benefit from the advanced reading books that are read at the beginning of each lesson? If so, how?
3. Do children benefit from the taste sampling experience provided with each lesson? If so, how?
4. Do you see a connection between the program and improved eating and physical activity habits of children after the program has ended? Please elaborate on your answer.
5. How can the program be improved? Please elaborate on your answer.
6. Have you been able to expand the gardening lesson into your classroom curriculum? If so, how?

VALIDITY

The pre-/post-test questions were developed by Dietetics faculty in 2010 and reviewed by a panel of early education elementary teachers. Teachers reviewed the questions and responses for clarity, reading level, appropriateness of wording for each grade level, and identifiability of graphics. Questions were amended based on teacher feedback and then tested with children from coordinating grade levels. Questions were then revised again and submitted to the Marshall

University IRB for approval in 2010. A statistical analysis of pre-/post-test content and face validity was not completed. Since content and face validity testing was not completed, issues of reliability and questionable interpretation of some behavioral-based questions existed, particularly with questions 14 and 17-20.

Responses for questions 14 and 17-20 included: All the Time; Sometimes; or Never. It is difficult to determine how children interpreted the response "all the time." For example, what does it mean to eat grains "all the time" (question number 17)? To remove ambiguity, this researcher collapsed both responses, "all the time" and "sometimes," into one answer, which was coded as a "yes" for purposes of statistical analysis. The other response for these questions, "never" was coded individually in the statistical program Statistical Package for Social Sciences (SPSS). Thus, this researcher was able to have a clearer picture of whether or not children chose more whole grain foods, more fruits and vegetables, more protein, and more dairy after the nutrition education intervention. Questions two through five and 21-25 also had issues related to validity and reliability, or were leading questions. These pre-/post-questions were not included in the data used for statistical analysis.

Focus group questions were developed in 2011 by the program Co-PI and were reviewed by Dietetics faculty for clarity. These focus group questions were approved by the IRB in fall 2011 and used through fall 2017. New focus group questions were developed in spring 2018 by Dietetics faculty. A thorough review of focus group literature was conducted before developing the new focus group questions. A panel of Dietetics faculty and the NEP director reviewed the questions and made changes to limit ambiguity and narrow focus to specific aspects of the program. The new focus group questions were approved by the IRB in spring 2018.

DATA COLLECTION PROCEDURES

This retrospective review was completed on pre-/post-tests that were administered to children between August 26, 2016 and November 29, 2016 by NEP faculty, staff, and dietetic interns. Researchers were instructed to read questions and answers to children from the iPad, but to not provide leading comments, or direct children to the correct response. Answers were depicted on the iPad with words and colorful, corresponding graphics. Each child was interviewed individually for each pre-/post-test. Each child's personal identification number, grade, and teacher's name was recorded before the test began, allowing the researcher to follow IRB protocol for the blinded procedure. Some teachers did not keep track of the child's individual research number, so most pre-/post-tests were not matched. Data was collected on the iPad and downloaded to a computer hard drive where it was stored in a database. Data was transferred to an Excel spreadsheet that was then downloaded into SPSS. Data was coded for each question in an appropriate manner to be used for purposes of statistical analysis.

Teacher focus groups were conducted in fall 2017 and spring 2018 as part of an undergraduate dietetics course, Research in Dietetics, DTS 460. Focus groups were arranged by the NEP director, RD educators, and this researcher. Groups of students in the DTS 460 course were each assigned to a school to complete the focus group each semester. Students asked questions and used a digital-audio method to record answers. Students also took notes on paper during the interviews. Dietetics faculty were present during the interviews. Digital audio recordings were reviewed afterward and a combined method of partial transcription and partial logging was used to find commonality and themes among the teacher responses. This researcher obtained the digital files for the focus groups and reviewed them again by methods of logging and partial transcription to reveal for common themes from the interviews.

PLANS FOR DATA ANALYSIS

The following research questions were investigated through retrospective analysis of existing pre-/post-data. A total of 1,160 student pre-/post-tests was analyzed.

Knowledge-Based Questions

1. Is there a difference in overall healthy eating *knowledge* for second grade students who participated in the Marshall University Nutrition Education Program?

An independent samples t-test was used to analyze the mean pre- and post-test knowledge scores for all student participants. The independent samples t-test was used as opposed to the t-test for dependent groups because it was not possible to exactly match student participants with their pre- and post-test scores.

2. Is there a difference in overall healthy eating *knowledge* for second grade students when comparing schools with a professional RD educator to schools with a dietetic intern educator?

A total score for knowledge questions was calculated for each post-test. A t-test for independent groups was used to compare the mean knowledge score of post-tests for students who were taught by dietetic interns compared to the mean knowledge scores of post-tests for students who were taught by professional-level RD educators. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare post-test scores for both types of educators because pre- and post-test scores could not be matched for participants.

Behavioral-Based Questions

3. Is there a difference in overall healthy eating *behavior* for second grade students who participated in the Marshall University Nutrition Education Program?

A t-test for independent groups was used to compare the mean behavior score of the participants on the pre-test and post-test. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare pre- and post-test scores because pre and post-test scores could not be matched for participants.

4. Is there a difference in overall healthy eating *behavior* for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern educator?

A total score for behavior was calculated for each post-test. A t-test for independent groups was used to compare the mean behavior score of post-tests for students who were taught by dietetic interns to the score of post-tests for students who were taught by RD educators. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare post-test scores for both types of educators because pre- and post-test scores could not be matched for participants.

Focus Group Questions

The following questions were explored with the use of teacher focus groups. A total of 30 teachers at four schools were interviewed for the focus groups.

5. What are the most effective aspects of the program from the participating teacher's point-of-view?
6. To what extent is there a difference between professional-level educator schools and intern schools with regard to teachers' perception of the Marshall University Nutrition Education Program?

One focus group was held at an intern-educator school in fall 2017 with six participants. Three focus groups were held at professional-level educator schools in spring 2018, with a total

of 25 participants. The digital audio file for each focus group was reviewed and a combined method of partial transcription logging was used to find commonality and themes among the teacher responses. Qualitative analysis was used to analyze the data collected in the focus groups to address these research questions and reveal emergent themes. The aim of the focus groups was to qualitatively provide the teacher's perspective of the pertinent aspects of the program.

CHAPTER FOUR: FINDINGS

OVERVIEW

The purpose of this study was to examine through retrospective review the differences in overall knowledge and behavior change of students in high-need schools based on pre-/post-test scores after an intervention of nutrition education lessons by either a professional-level registered dietitian (RD) educator or dietetic intern; and to compare the effectiveness of the education of professional-level educators to the effectiveness of dietetic interns by reviewing the evaluation results of pre-/post-tests and teacher focus groups. It is important to look at findings comparing professional-level RD educators to dietetic interns because dietetic interns have no formal training in education or pedagogical practice. Interns receive basic training on lesson delivery and curriculum implementation for three days during the orientation phase of the dietetic internship. According to the Dietetics Career Development Guide, dietetic interns are at the beginner phase of skill development (Charney & Peterson, 2013). Comparison of evaluation results can be used to develop a more specific intern-training protocol for delivery of NEP lessons and to provide overall program improvement.

The effectiveness of the nutrition education intervention as related to knowledge and behavioral change, and the comparison of educator outcomes were analyzed using both quantitative and qualitative methods through a retrospective review of existing data. This chapter reviews the details of the pre-/post-tests and focus group findings and explains the research population and sample demographics. Findings are presented as they relate to each of the six research questions. This chapter is organized into the following sections: overview of pre-/post-test and focus groups, population and sample, student demographics, major findings, ancillary findings, and summary.

Pre-/Post-Test Overview

The pre-/post-test was comprised of 25 questions that were structured to assess two domains - knowledge of nutrition and behavioral change. Question numbers 1-12, 13, and 15 assessed the knowledge domain. Questions 14, 16, and 17-25 assessed the behavior domain. Researchers (Dietetics faculty, professional-level RD educators, and dietetic interns) were instructed to read questions and answers directly from the iPad to children, but to not provide leading comments, or direct children to the correct response. Each child was interviewed individually for each pre-/post-test. Each child's personal identification number, grade, and teacher's name was recorded before the test began, allowing the researcher to follow IRB protocol for the blinded procedure. Some teachers did not keep track of individual research numbers, so pre-/post-tests were not matched.

Each student was asked all 25 questions on the pre-/post-test, but this retrospective review did not utilize every question. It was determined that questions 2-5 had issues related to validity and reliability, or were leading questions. These questions did not assess overall knowledge about fruit and vegetables as intended, but rather assessed the knowledge of whether students could identify that specific fruit or vegetable. Therefore, these questions were not used as part of the retrospective review. It was also determined that questions 21-25 had issues related to validity and reliability, or were leading questions. These questions did not assess behavioral change as intended, but rather addressed how students felt about that particular statement ("trying new foods is fun," "I can choose healthy snacks," "I like vegetables," etc.). Additionally, the responses to questions 14 and 17-20, All the Time; Sometimes; or Never, were found to be ambiguous. Upon review, it was difficult to determine how children interpreted the response "all the time." For example, what does it mean to eat grains "all the time" (question number 17)? To

remove ambiguity, this researcher collapsed both responses, “all the time” and “sometimes,” into one answer, which was coded as a “yes” for purposes of statistical analysis. The other response for these questions, “never” was coded individually in SPSS. This retrospective review analyzed questions 1 and 6-20 (see tables 6 and 7).

Table 6. Second-Grade Pre-/Post-Test Knowledge-Based Questions
A list of all knowledge-based questions included in the second grade pre-/post-test.

All Knowledge-Based Questions
1. How old are you?
2. Can you name this fruit? (peach)
3. Can you name this fruit? (pomegranate)
4. Can you name this vegetable? (yellow squash)
5. Can you name this vegetable? (asparagus)
6. Which picture shows MyPlate?
7. Which food belongs to the fruit group?
Options: Red pepper; Pineapple; Peanuts; Cauliflower
8. Which food belongs in the protein group?
Options: Green beans; American cheese; Tuna; Strawberries
9. What do protein foods do?
Options: Help make your muscles strong; Help you see better; Help make your bones strong
10. What do grains foods do?
Options: Help you see better: Help make bones strong; help heal your cuts and bruises
11. What do dairy foods do?
Options: Help you see better; Help make your bones strong; Help heal your cuts and bruises
12. How many of your grains should come from whole grains each day?
Options: None of them should be whole grains; One of them should be whole grains; One half of them should be whole grains; Five of them should be whole grains
13. How long should you wash your hands before eating meals and snacks?
Options: All the time; Sometimes; Never
15. How long should you wash your hands to get rid of germs?
Options: 10 seconds; 20 seconds; 1 minute; 5 minutes

Table 7. Second-Grade Pre-/Post-Test Behavior- Based Question
A list of all behavior-based questions included in the second grade pre-/post-test.

All Behavior-Based Questions
14. When you wash your hands, how often do you use soap?
Options: All the time; Sometimes; Never
16. Do you move your body everyday by doing things like running, jumping, or playing sports?
Options: Yes; No; I don't know
17. How often do you eat grain foods?
Options: All the time; Sometimes; Never
18. How often do you eat vegetables?
Options: All the time; Sometimes; Never
19. How often do you eat fruits?
Options: All the time; Sometimes; Never
20. How often do you drink milk?
Options: All the time; Sometimes; Never
21. Point to the face that shows how you feel when I say: "Trying new foods is fun."
Option: Three emojis representing happy, neutral, sad emotions
22. Point to the face that shows how you feel when I say: "I can choose healthy snacks."
Option: Three emojis representing happy, neutral, sad emotions
23. Point to the face that shows how you feel when I say: "I like vegetables."
Option: Three emojis representing happy, neutral, sad emotions
24. Point to the face that shows how you feel when I say: "I like eating whole grains." Remember, whole grains are foods like oatmeal, 100% whole wheat bread, brown rice.
Option: Three emojis representing happy, neutral, sad emotions
25. Point to the face that shows how you feel when I say: "Being active is fun." Being active means doing things like running, jumping or playing sports.
Option: Three emojis representing happy, neutral, sad emotions

Table 8. Knowledge-Based Questions Used in this Retrospective Review
A list of knowledge-based questions that were included as part of this retrospective review of data.

Knowledge-Based Questions Used in this Retrospective Review
6. Which picture shows MyPlate?
7. Which food belongs to the fruit group?
Options: Red pepper; Pineapple; Peanuts; Cauliflower
8. Which food belongs in the protein group?
Options: Green beans; American cheese; Tuna; Strawberries
9. What do protein foods do?
Options: Help make your muscles strong; Help you see better; Help make your bones strong
10. What do grains foods do?
Options: Help you see better: Help make bones strong; help heal your cuts and bruises
11. What do dairy foods do?
Options: Help you see better; Help make your bones strong; Help heal your cuts and bruises
12. How many of your grains should come from whole grains each day?
Options: None of them should be whole grains; One of them should be whole grains; One half of them should be whole grains; Five of them should be whole grains
13. How long should you wash your hands before eating meals and snacks?
Options: All the time; Sometimes; Never
15. How long should you wash your hands to get rid of germs?
Options: 10 seconds; 20 seconds; 1 minute; 5 minutes

Table 9. Behavior-Based Questions Used in this Retrospective Review
A list of behavior-based questions that were included as part of this retrospective review of data.

Behavior-Based Questions Used in this Retrospective Review
14. When you wash your hands, how often do you use soap?
Options: All the time; Sometimes; Never
16. Do you move your body everyday by doing things like running, jumping, or playing sports?
Options: Yes; No; I don't know
17. How often do you eat grain foods?
Options: All the time; Sometimes; Never
18. How often do you eat vegetables?
Options: All the time; Sometimes; Never
19. How often do you eat fruits?
Options: All the time; Sometimes; Never
20. How often do you drink milk?
Options: All the time; Sometimes; Never

Focus Group Overview

Focus group questions were designed in 2011 by the Assistant Dean of the College of Health Professions, who was the Co-PI of the grant at that time. These questions were reviewed by Dietetics faculty and used for approximately 10 years. In fall 2018, Dietetics faculty determined that the focus group questions needed to be updated to reflect recent program changes. A list of previous and new focus group questions are listed below (see Table 10).

Table 10. Previous and New Focus Group Questions

Previous Focus Group Questions
1. Do you believe the NEP has been beneficial to the children in the class?
2. Do you feel that the NEP has in any way benefitted you directly within your class?
3. Would you recommend this program as a beneficial tool to be incorporated in other, similar schools? Can you share why or why you do not feel the students learn from the program?
4. What is the strong point of the program?
5. What do you feel is the weakest point of this program?
New Focus Group Questions
6. What is the greatest strength of the program? Why?
7. Do children benefit from the advanced reading books that are read at the beginning of each lesson? If so, how?
8. Do children benefit from the taste sampling experience provided with each lesson? If so, how?
9. Do you see a connection between the program and improved eating and physical activity habits of children after the program has ended? Please elaborate on your answer.
10. How can the program be improved? Please elaborate on your answer.
11. Have you been able to expand the gardening lesson into your classroom curriculum? If so, how?

Teacher focus groups were conducted in fall 2017 and spring 2018 as part of an undergraduate dietetics course, Research in Dietetics, DTS 460. Focus groups were arranged by the NEP director, professional-level RD educators, and this researcher. Groups of students in the DTS 460 course were assigned to a school to complete the focus groups in fall 2017 and spring 2018. Focus groups were conducted by Dietetics faculty, this researcher, and undergraduate dietetics students. Students asked questions and used digital-audio to record answers. Students also took notes on paper during the interviews. Digital audio recordings were reviewed afterward

and a combined method of partial transcription and partial logging was used to find commonality and themes among the teacher responses. This researcher obtained the digital files for the focus groups and reviewed them again by methods of logging and partial transcription to reveal for common themes from the interviews.

POPULATION AND DEMOGRAPHICS

Pre-/Post-Tests

The population evaluated by pre-/post-tests for this study included second grade students who participated in the NEP and received nutrition education from either dietetic interns or professional educators. Schools met the SNAP-Ed and USDA qualifying criteria to receive nutrition education. The NEP pre-/post-tests were administered to students in grades K-2 from a random selection of schools. In order to participate in the program, teachers and school administrators agreed to participate in pre-/post-testing before the intervention began. Pre-/post-tests were administered in a blinded manner by Dietetics faculty, professional-level RD educators, and dietetic interns.

Students were assigned a testing number so that neither the researcher nor the teacher would know individual student results. The intent of the blinded process was to maintain student anonymity according to IRB protocol and to match pre-/post-tests. Issues existed with teachers not maintaining the correct testing number for each student, thus the pre-/post-test results in this review were not matched. The specific population of student pre-/post-tests chosen for this retrospective review included students in second grade from fall 2016, which was the last semester that second grade students were assessed using the pre-/post-tests. A total of 1160 pre-/post-tests were administered (657 pre-tests and 503 post-tests).

Demographics

The demographics relate to the students who took the pre-/post-test. Demographics in this retrospective review identify the following attributes: school grade (all students in this review were in second grade), sex (see Table 11), age (see Table 12), and socio-economic status (See Table 13), as it relates to the free and reduced lunch rate of the school where the student attended. The majority of students (74.3%) in this retrospective review were seven years old. A smaller percentage of students were eight years old (24.3%). An even smaller percentage of students (.7%) were very young for their grade at age six or old for their grade (.7%) at age 9. In addition, more students were male (53.7%) than female (46.3%) in this review.

Table 11. Demographic of Sample Population Sex
Demographics of the percent and frequency of the sample population's sex.

Sex	Frequency	Percent
Female	537	46.3%
Male	623	53.7%
Total	1,160	100.0%

Table 12. Demographic of Sample Population Age
Demographics of the percent and frequency of the sample population's age.

Age	Frequency	Percent
6	8	.7%
7	862	74.3%
8	282	24.3%
9	8	.7%
Total	1,160	100.0%

All schools met the SNAP-Ed and USDA qualifying criteria to receive nutrition education, meaning that at least 50 percent of the students in the school received free or reduced school lunch and breakfast meals as part of the National School Lunch and Breakfast Program. The percent of students who qualified for free and reduced meals varied per school. For data

analysis purposes, the school's free and reduced lunch rates were grouped according to percentage, with all schools that fell between 50 percent and 50.9 percent being grouped into category 1; all schools that fell between 60 percent and 60.9 percent being grouped into category 2; all schools that fell between 70 percent and 70.9 percent being grouped into category 3; all schools that fell between 80 percent and 80.9 percent being grouped into category 4; all schools that fell between 90 percent and 100 percent being grouped into category 5. Figure 5 shows the distribution of the sample population who fell within each category of free/reduced school meal rate.

As shown, over half of the students (50.8%) who participated in this intervention attended schools where 90 to 100 percent of student body received free or reduced priced school breakfast and lunch meals, indicating that the socio-economic status of this student population is disproportionally low (see Figure 5 and Table 13). As mentioned in Chapter two, the target population of Marshall's NEP is from a very rural, disproportionately low socio-economic status region of WV. The demographic analysis of the sample population used in this retrospective review is consistent with other participants who have received the NEP intervention.

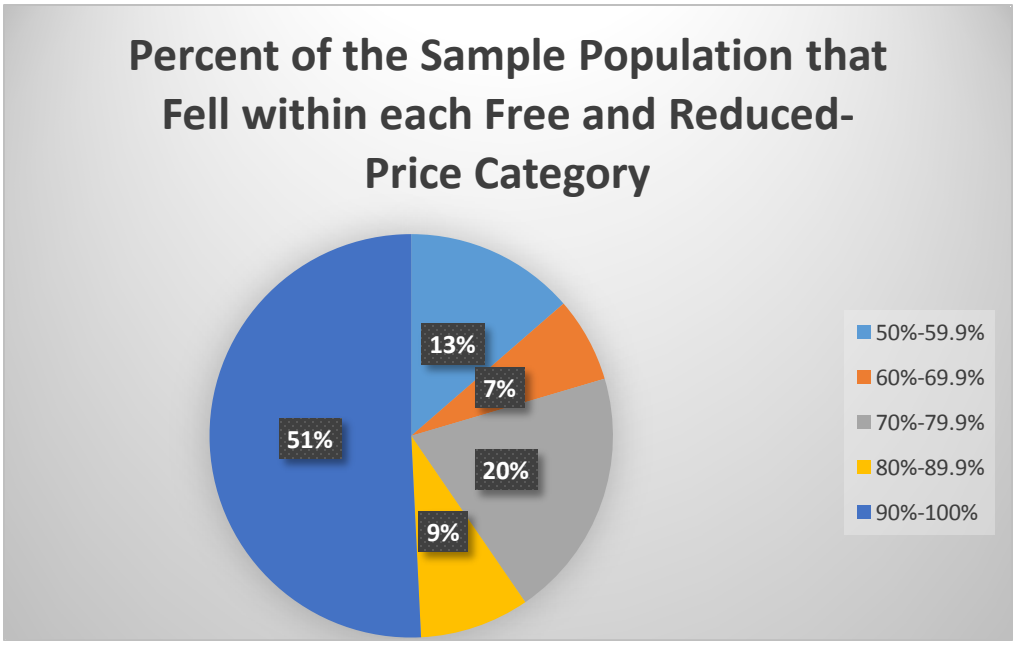

Figure 5. Free and Reduced Percentage Rate of the Marshall NEP Schools
This figure displays the free and reduced percentage rate of NEP schools in this sample population as it relates to socio-economic status of the sample population.

Table 13. Demographic of Sample Free and Reduced Rate Percentage
Demographics of the percent and frequency of the sample population's percentage of free and reduced school lunch and breakfast meals.

Free/Reduced School Meal Percentage Rate	Frequency of Population Sample	Percent of Population Sample that fell in each Category
50%-59.9%	158	13.6%
60%-69.9%	79	6.8%
70%-79.9%	232	20.0%
80%-89.9%	102	8.8%
90%-100%	589	50.8%
Total	1,160	100.0%

Teacher Focus Groups

The population also included teachers from grades K-2 whose classes received nutrition education as part of the NEP. Teacher focus groups were conducted at schools chosen by the NEP director, based on programmatic need. The NEP director attempted to balance focus groups

in 2017-2018 by requesting schools that received education from both dietetic interns and professional-level RD educators to participate in focus groups. Schools were chosen in Cabell, Wayne, and Putnam counties. A total of 30 teachers at four schools participated in the focus groups. Focus groups were conducted by Dietetics faculty, this researcher, and undergraduate Dietetics students. A list of schools where focus groups were conducted follows (see Table 14).

Table 14. Demographics of Teacher Focus Groups
Demographics of the school name, county, participating teachers, educator type, and date for each teacher focus group.

School Name	Number of Participating Teachers	County	Educator Type	Date
Guyandotte Elementary	6	Cabell County	Dietetic Intern	September 13, 2017
Hometown Elementary	3	Putnam County	Professional Educator	March 12, 2018
Connor Street Elementary	8	Putnam County	Professional Educator	March 14, 2018
Ceredo-Kenova Elementary	13	Wayne County	Professional Educator	March 19, 2018

MAJOR FINDINGS

Research Question 1: Overall Healthy Eating Knowledge

Research question one asked, "Is there a difference in overall healthy eating knowledge for second grade students who participated in the Marshall University Nutrition Education Program?" In order to answer this question, non-matched student pre- and post-tests from fall 2016 were coded and analyzed by SPSS. A total score for knowledge questions was calculated for each pre- and post-test. A t-test was analyzed to determine the probability results, which are shown in Table 15.

Table 15. T-Test for Independent Results of Overall Healthy Eating Knowledge for Research Question 1
Results of the independent t-test for overall healthy eating knowledge change that occurred from pre-test to post-test.

Type of Test	N	Mean	Standard Deviation	T-test Statistic	Probability Attained
Pre-Test	657	4.41	1.48	12.1	.000 *
Post-Test	503	5.53	1.58		

*Significance attained at the $p<0.05$ level

A t-test for independent groups was used to compare the mean knowledge score of the participants on the pre-test and post-test. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare pre- and post-test scores because pre- and post-test scores could not be matched for participants. The t-test results showed a statistically significant difference between the pre- and post-tests with a p value equal to .000; and when examining the means, the post-test mean score of 5.53 was higher than the pre-test mean of 4.41 score. Results indicate that participant improvement in nutrition knowledge was likely due to the intervention of nutrition education lessons.

Research Question 2- Differences in Overall Healthy Eating Knowledge by Comparing Professional RD Educators to Dietetic Intern Educators

Research question two asked, "Is there a difference in overall healthy eating knowledge for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern educator?" In order to answer this question, student post-tests from fall 2016 were coded and analyzed by SPSS. A total score for knowledge questions was calculated for each post-test. The results of scores for professional-level RD educators was

compared to the scores for dietetic interns. The t-test was analyzed to determine the probability results. Results are shown in Table 16.

Table 16. T-Test for Independent Results of Overall Healthy Eating Knowledge Comparing Educator Type for Research Question 2

Results of the independent t-test for overall healthy eating knowledge of mean post-test scores of professional-level RD educators compared to dietetic interns.

Type of Educator	N	Mean	Standard Deviation	T-test Statistic	Probability Attained
Dietetic Intern	42	5.21	1.53	1.359	.175
RD Educator	461	5.56	1.59		

*Significance attained at the $p<0.05$ level

A t-test for independent groups was used to compare the mean knowledge score of post-tests for students who were taught by professional-level RD educators compared to the scores of post-tests for students who were taught by dietetic interns. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare post-test scores for both types of educators because pre- and post-test scores could not be matched for participants.

The t-test results did not show a statistically significant difference between the post-test scores of the educator types, with a p value equal to .175; and when examining the means, the post-test mean score of 5.56 obtained by the students who were taught by the professional-level RD educators was higher than the post-test mean score of 5.21 obtained by students who were taught by dietetic interns. This lack of significance could be the result of several issues. It is likely that the participant's slight improvement in overall healthy eating knowledge was due to differences in the intervention of nutrition education lessons from professional-level RD educators or dietetic interns. The lack of statistical significance between educators is likely the

result of the previously described issues with the validity and reliability of the pre-/post-tests which were administered to students.

Research Question 3- Overall Healthy Eating Behavior

Research question three asked, "Is there a difference in overall healthy eating behavior for second grade students who participated in the Marshall University Nutrition Education Program?" In order to answer this question, non-matched student pre- and post-tests from fall 2016 were coded and analyzed by SPSS. A total score for behavioral questions was calculated for each pre- and post-test. The results of scores for professional-level RD educators was compared to the scores for dietetic interns. The t-test was analyzed to determine the probability results, which are shown in Table 17.

Table 17. T-Test for Independent Results of Overall Healthy Eating Behavior for Research Question 3

Results of the independent t-test for overall healthy eating knowledge change that occurred from pre-test to post-test.

Type of Test	N	Mean	Standard Deviation	T-test Statistic	Probability Attained
Pre-Test	657	6.84	.515	.372	.710
Post-Test	503	6.83	.495		

*Significance attained at the $p<0.05$ level

A t-test for independent groups was used to compare the mean behavior score of the participants on the pre-test and post-test. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare pre- and post-test scores because pre- and post-tests could not be matched for participants. The t-test results showed no significant difference between the pre- and post-tests. There was very little difference in the mean of the pre-test (6.84) and the mean of the post- test (6.83). The probability value of .710 shows there is very little difference in

participant behavior from pre- to post-test based on the intervention of nutrition education lessons.

As discussed in chapter three, there were several issues with the wording of the behavioral-based questions on the pre-/post- test used for this data, including reliability, validity, and questionable interpretation of some behavioral-based questions, particularly questions 14 and 17-20. Responses for these questions include: All the Time; Sometimes; or Never. It is difficult to determine how children interpreted the response "all the time." Thus, to remove ambiguity, responses of "all the time" and "sometimes" were collapsed into one answer, which was coded as a "yes" for purposes of statistical analysis. The other response for these questions, "never," was coded individually in SPSS. Since the format of the questions was confusing and, in some instances, leading, it is difficult to determine if children truly had no behavioral change, or if the wording of the pre- and post-test was too difficult for children to interpret during the testing.

Research Question 4- Differences in Overall Healthy Eating Behavior by Comparing Professional RD Educators to Dietetic Intern Educators

Research question four asked, "Is there a difference in overall healthy eating behavior for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern?" In order to answer this question, student mean post-test scores from fall 2016 were coded and analyzed by SPSS. A total score for behavior questions was calculated for each post- test. The t-test was analyzed to determine the probability results, which are shown in Table 18.

Table 18. Independent Results of Overall Healthy Eating Behavior Comparing Educator Type for Research Question 4
Results of the independent t-test for overall healthy eating behavior of mean post-test scores of professional-level RD educators compared to dietetic interns.

Type of Educator	N	Mean	Standard Deviation	T-test Statistic	Probability Attained
Intern	42	6.88	.452	.709	.479
RD Educator	461	6.82	.499		

*Significance attained at the $p<0.05$ level

A t-test for independent groups was used to compare the mean behavior score of post-tests for students who were taught by dietetic interns compared to the score of post-tests for students who were taught by professional-level RD educators. A t-test for independent groups was used (instead of a t-test for dependent groups) to compare post-test scores for both types of educators because pre- and post-test scores could not be matched for participants. The t-test results did not show a statistically significant difference between the post-test scores of the educator types, with a p value equal to .479; and when examining the means, the post-test mean score of 6.82 obtained by the students who were taught by the RD educators was actually lower than the post-test mean score of 6.88 obtained by students who were taught by dietetic interns. This lack of significance could be the result of several issues, and is likely the result of the previously described issues with validity and reliability of the pre-/post-tests, particularly with ambiguity of answers for questions 14 and 17-20.

Research Question 5- The most effective aspects of the program from the participating teacher's point-of-view

Research question five asked, "What are the most effective aspects of the program from the participating teacher's point-of-view?" In order to answer this question, a series of focus

groups were conducted in fall 2017 and spring 2018. One focus group was conducted in fall 2017, using the 'previous' focus group questions. There were three focus groups conducted in professional-level RD educator schools in spring 2018 using the 'new' focus group questions. The most effective aspects of the program became apparent after attending the focus groups and reviewing the audio files with a methodology of partial logging and transcription for each. Research question five was answered by reviewing responses to all of the questions asked during the focus groups, but most specifically, question four of the 'previous' focus group questions in the intern-educator school and questions one and four in the professional-level RD educator schools, using the 'new' focus group questions. The 'previous' and 'new' focus group questions used in the analysis to answer research question five are listed below.

- 'Previous' focus group questions 4: "What is the strong point of the program?"
- 'New' focus group question 1: "What is the greatest strength of the program? Why?"
- 'New' focus group question 4: "Do children benefit from the taste sampling experience provided with each lesson? If so, how"

Taste-Testing Experience is the Most Effective Aspect of the Program

Teachers in both intern and professional-level RD educator schools all agreed that the taste-testing experience was the most effective aspect of the program. This agreement was apparent in all of the interviews, and details about the importance of this experience were offered by almost every teacher. Understanding the significance of the taste-testing experience is important because a substantial portion of the program's resources are spent on providing taste-testing experiences. Realizing the value of the taste-testing experience provides affirmation that programmatic resources are used in an effective manner. As one teacher explained, "A lot of the foods [provided by the NEP] the kids have never tasted, or the combination of those foods

they've never tasted. These kids don't have a very wide base of things they eat, [and] I think for my kids, trying new things that they didn't know existed out there." Another teacher noted, "It's good for them to have a variety…just exposure to fruits and vegetables [and] things they've never had." The experience of trying new foods was noted over and over again. New tasting experiences help children learn to become healthy eaters. If a child tries a new food and likes it, he or she is more likely to ask their caregiver to purchase the food, which provides an opportunity for positive eating behavior change in the home.

One teacher in a professional-level RD educator school noted, "[The children] are a little more open to trying new things food-wise." Another teacher said, "The tastings provide 'new' experiences for children and they are enjoying the food. These foods are something that they will not otherwise experience." Another teacher in a professional-level RD educator school explained, "Children eat what's available and convenient, but this program helps [them] try new foods. Some [of the students] would never have been exposed to these foods, let alone try them. They get to see a lot of things they don't see at home."

Other comments from teachers in the professional-level educator schools that support the taste-testing experience as the most effective aspect of the program include, "Students are now branching out and trying new foods because of the tasting experiences." "Some children ask parents to buy new foods at home." "Children are more willing to try new foods." "Their parents tell me 'oh, they won't take the potato chips because those aren't healthy.' They go home and tell their parents what healthy snacks are."

Teachers in the intern schools commented, "It has absolutely been beneficial to children in the class." Another teacher explained, "Children don't eat well-balanced meals. Children are introduced to new foods that they enjoy. The children are really into what foods you are

bringing." Teachers in the intern-educator schools also discussed the food-tasting experiences as the strong point of the program, not only as a means for children to try new foods, but in connecting the tastings to the children's ability to learn and understand the material presented in the lessons.

Teachers in the intern-educator schools also responded, "I think its exposing children to different kinds of foods, really. Real foods too, not processed packaged foods. Fresh foods." Another teacher added, "And the different food groups…I don't know if they would understand those or anything like MyPlate, the food groups and what they do for your body. I don't think they would understand any of that if you guys didn't expose it to them." Another said, "We've had children who with fruit, you think they could identify fruit, but they can't even identify fruit on their lunch plate. They don't even know pineapple. They have no idea what it is. It's interesting."

Taste-Sampling Experience is Critical to Knowledge Gain and Behavior Change

These comments lead to another theme that emerged for research question 5 - the taste-testing experience is critical to connect learning and behavior change. The emergence of this theme is important because teachers not only connected the tasting experience to more acceptance of food in the cafeteria, but also made a connection between the taste experience and changes in the home food environment, which is the ultimate goal of the program. One teacher noted, "Oh absolutely. I think it's a critical part of it [the program] for my guys. It's learning about the food group and then sampling something from it." Another teacher explained, "One parent said, 'She tried several things Miss [professional-level RD educator] brought, and now they are staples in our home.'"

Several teachers made connections between what children learned from the taste-testing experience and what they choose to eat in the school cafeteria. One teacher explained, “The kids have been eating more fruit [in the school cafeteria]. They [now] have some fruit and vegetables on their plate almost every day.” “I think the children are now more willing to try other things on the salad bar [in the school cafeteria].” Finally, “Yes, we have a salad bar every day in the cafeteria and now children are eating that because of what you all have exposed them to.”

Professional-Level Educators Encourage Kids to Taste Foods

In addition to seeing the food-tasting experience as the most important aspect of the program, teachers in the professional-level educator schools were particularly pleased with the techniques the professional-level educators used to encourage children to taste the food samples. Teachers explained various techniques that professional-level RD educators used, including phrases of encouragement, providing small incentives such as stickers, or creating a ‘one bite’ rule. Teachers in both intern-educator and professional-level RD educator schools discussed their disbelief that children would be willing to try foods such as hummus, cabbage slaw, or three bean salad, which were out of the children’s comfort zone. Conversely, teachers in the intern-educator school did not discuss techniques used by interns as key to encouraging food tasting. One teacher explained, “I would say the food tastings are one of the things they most like. They’re like, ‘what did Miss [professional-level RD educator] bring us today? What is this’?” The teacher then went on to explain that the children actually tried the food, which was surprising to them. Another teacher explained, “She [the professional-level educator] is very good at convincing. Some children even ask her for more food once finished.”

Food tastings prepared during the 2017-2018 school year included items such as pumpernickel and light rye bread with herbed cream cheese; black bean salsa and baked scoops;

cottage cheese with pineapple chunks; celery with sunflower butter; fresh orange wedge, dried prunes, and canned, diced pears. Each lesson included a recipe to correlate with the theme of the lesson. Accommodations were provided for children with food allergies. As teachers discussed the importance of the taste-testing experience, many of them noted the connection between the socio-economic status of children and the importance of food exposure. Teachers often mentioned questionable issues of food insecurity for children who participated in the NEP. Many teachers noted that most children in their schools come from low-income homes and receive free and/or reduced-priced school meals. Thus, having exposure to new foods is critical because more often than not, parents cannot or do not provide the healthy foods at home that children are exposed to in the program.

Research Question 6- Teachers' perception of differences between professional-level RD educator schools and dietetic intern schools

Question six asked, "To what extent is there a difference between professional-level RD educator schools and intern schools with regard to teachers' perception of the Marshall University Nutrition Education Program?" In order to answer this question, a series of focus groups were conducted in fall 2017 and spring 2018. Secondary to the 2018 teacher's strike, only one focus group was conducted in an intern-educator school. This focus group was conducted in fall 2017, using the 'previous' focus group questions. Three focus groups were conducted in professional-level RD educator schools in spring 2018. These focus groups were conducted using the 'new' focus group questions.

Although there was only one intern-educator school focus group conducted, the teacher responses in the focus groups made differences, as well as similarities, between the two schools obvious. Themes which emerged for research question six were derived from several questions

from both the ‘previous’ and ‘new’ focus group questions. Teachers for both professional-level RD educator schools and dietetic intern schools felt children benefitted from the NEP food-tasting experiences through several mechanisms, including introducing children to new foods that they would likely not otherwise be exposed and by encouraging the development of healthy eating habits in children, further enhancing the findings for research question five.

Professional-Level Educators are Empowered in the Classroom

Differences between professional-level RD educator schools and intern schools with regard to teachers’ perception became apparent through analysis of question three of the ‘previous’ focus group questions: Would you recommend this program as a beneficial tool to be incorporated in other, similar schools? Although this question was not asked directly in the ‘new’ focus group questions, responses provided to other ‘new’ focus group questions support the theme of professional-level RD educators having a sense of empowerment in the classroom.

Kimwarey, Chirure, and Omondi (2014) define empowerment in the context of teaching as teachers having the right to participate in determining school policies and goals, and to exercise professional judgment about how and what to teach. The sense of empowerment in the classroom develops over time and entails developing the right knowledge, skills, and attitudes in order to attain a sense of competence, which enables the teacher to respond appropriately to the demanding needs of the classroom. Empowerment is a continuous process where individuals use lifelong experiences to enable themselves to exercise power over their own practices and circumstances (Kimwarey, Chirure, & Omondi, 2014).

Empowerment emerged as a theme after analyzing comments made by teachers from professional-level RD educator schools. Teachers identified professional-level educators as having empowerment in teaching as a whole, but specifically with classroom and lesson

management, using the food-tasting experience as a key learning opportunity, and keeping the attention of students. Classroom and lesson management were concepts that were mentioned many times in professional-level RD educator school focus groups. Analysis of comments from teachers showed that professional-level RD educators felt empowered to make the classroom their own. Professional-level RD educators managed the discipline needs of the classroom, as well as the pace of the lesson, without looking to the teacher for guidance. Professional-level RD educators were able to keep the children's attention throughout the lesson.

One teacher noted "Her [the professional-level RD educator] first time here I said, 'Did you start off in education and add to that [dietetics]? We see it and we know what we're looking at, but she is very much a teacher whether she wants to claim it or not'." Another noted the professional-level RD educator's ability to manage the classroom and the lesson, "I like the way she delivers the program. She does an overview and reviews what they [the students] learned the last time." Another noted, "Her teaching abilities and the way she reads aloud to the kids, she follows very well for what we were trained to do." Other comments included, "[The professional-level RD educator] does a really good job in this school. She would review before each lesson, so it was refreshing each week to remember what had been taught the previous week."

Teachers made statements supporting empowerment related to the enthusiasm the professional-level RD educators brought to the classroom, which kept children engaged in the lesson and held their attention. One teacher mentioned, "She is so passionate and it immediately transfers to the kids. They also get caught up in that passion and excitement," and "[The professional-level RD educator] is very good at convincing. Some even ask for more of the food once finished." Another teacher mentioned how the professional-level RD educator uses

enthusiasm to make the lessons enjoyable, “She makes it very enjoyable. She is very engaged with the kids. They laugh. They have such a fun time listening to her read the stories.” To piggy back on that comment, another teacher mentioned, “I like how she brings models of things. Some are real and some are fake fruits and vegetables. I also think the kids always benefit from her read aloud. It gives them something to remember. She is very good with the read aloud portion of the program. She does an excellent job with it.”

Professional-level RD educators teach in their individual counties at schools that qualify for SNAP-Ed. Professional-level RD educators are the only NEP educators who teach in the schools in their individual counties, so teachers develop a relationship with them. During the focus groups, it became apparent that teachers knew the names of the professional-level RD educator who taught in their schools. Not once during the intern-educator focus group did the teachers mention a single intern by name. Teachers never asked to be reminded the names of some of the previous interns who taught in their classroom, which could be related to the fact that several interns rotate through each classroom during the course of a lesson series, so teachers are not often able to get to know each intern individually. Each classroom teacher might see as many as four or five different interns in each lesson series.

Teachers in the intern-educator focus group consistently referred to interns as ‘students,’ while teachers in professional-level RD educator focus groups consistently referred to professional-level RD educators by their first names. Teachers in the intern-educator focus group even used the name of a former professional-level RD educator in comparison to her current intern educators, while referring to interns as ‘students.’ Teachers’ lack of regard to learning the dietetic interns’ names is likely related to the dearth of relationship teachers develop with the intern educators. However, a case can also be made that teachers’ lack of regard to learning

dietetic interns' names also supports the empowerment of professional-level RD educators and lack of empowerment for intern educators.

During the focus group analysis, it emerged that teachers and students also connected empowerment to the respect they possessed for professional-level RD educators. Respect in this context is powerful because it alludes to the professional-level RD educator's ability to make the classroom her own, if only for the short period of time she is teaching the lesson. The professional-level RD educator visits the classroom each week and the children get to know her, so they develop a sense of respect and admiration for her and the nutrition education lessons. Children look forward to the time they spend with her and are excited about each week's lesson.

When analyzing the differences between the intern and professional-level focus groups, the term 'respect' was not mentioned in the intern-educator focus group. However, it was mentioned several times during the professional-level focus groups. For example, when asked about the greatest strength of the program, a teacher from one of the professional-level RD educator schools commented, "They respect her. If we were to say, 'you have to try this,' they probably would not. When she says 'you have to try it, there are not allowed to be any yucks or grosses,' they actually put it in their mouth." Another teacher mentioned, "They respect her [the professional-level RD educator]. When she [professional-level RD educator] says, 'you have to try it,' they do it."

Comments made during professional-level RD educator focus groups also supported the theme of empowerment by explaining how professional-level educators leverage food-tasting experiences as a key learning opportunity. One teacher, noting how students change through the program each year stated, "The first year, kids like her animated enthusiasm. And by the time they get me, they still like her enthusiasm and they are connecting more with MyPlate and trying

new foods and then with yours they are seeing that there are new things in the world." Another teacher noted, "They definitely try more new foods. Kids will say they don't like it, but they will try it and end up liking it." Another explained, "We have even tried new foods with the children. I had pomegranates for the first time, took it home to show my family, and now my family loves them."

Conversely, the focus groups revealed that interns lacked empowerment with regard to teaching ability, classroom management, and with keeping children's attention throughout the duration of the lesson. During the intern-level educator focus groups, teachers made several comments related to the interns' lack of experience and lack of self-confidence related to classroom management. For example, when asked question number three of the 'previous' focus group questions, 'would you recommend this program as a beneficial tool to be incorporated in other, similar schools'?, teachers responded, "Absolutely. Because like we've said, kids of today aren't eating healthy foods. There's so much junk available at restaurants." Another explained, "I think they are learning. Yesterday's book was about bones. But, I think sometimes it's too rushed for the children."

This response led to a follow-up question, 'how would you fix that [the rushed lesson]?' To which the teachers responded, "…Come for a longer period of time. We would be willing to give more time, but we are dumped in a system and we don't have a lot of say." Another teacher added, "But sometimes I find it's just too rushed. I've got to read this book. Now it's time for me to go…you know. I just think with young children, they need more time." It should be noted that both the professional-level RD educators and the interns both deliver the same lessons, which are structured to be presented over a 30 minute period. Since they deliver the same lesson, and both have a 30 minute time period, it could be inferred that the professional-level RD educators are

better able to manage the time constraints of the lesson without rushing. It should be also noted that the issues of time constraint or rushing with lessons was not mentioned at all in the professional-level RD educator school focus groups.

This discussion prompted more questions about the length of the lessons. Sensing teachers were not totally forthcoming with answers, another follow-up question was asked, “Is there anything that you think is bad about it [the program] besides the time restraint that you have”? A lot of low-level, undeterminable chatter ensued among the teachers. Again, a similar follow-up was asked, but re-worded in a different way, “I know that we have graduate students working in this school. We have one professional educator in this county, [named educator]. And, because the University is here, we have lots of graduate students [intern educators] who also work in the program. It’s really critical that if you see things our graduate students could do better, you let us know so that we can better train them.”

There were several seconds of uncomfortable silence and finally one teacher spoke out, “I really think they did a great job for being fairly new. When I first stepped in the classroom, I didn’t know either. They seemed prepared to me and they know their material. I think it goes well.” Another teacher continued the conversation, “I guess when you all first started at this school, there was one lady who gave stickers out- [named the professional-level RD educator]. That like, really kept them motivated. She was like, on it, with the stickers. She was like very on with the classroom management with the stickers.” It was explained that [this person] was a former professional-level RD educator who had previously worked in the school. The teacher continued, “Well, there have been a few people who have been saying they [intern educators] didn’t keep their attention.”

A follow-up question was asked, “So were they just dull and un-engaging?” A teacher responded, “Well, they just didn’t keep their attention. I don’t know. They were timid maybe? Timid is the only word I can come up with. And then they didn’t do anything to keep their attention, like the stickers. They could like keep their attention for like 10-15 minutes. Then there was talking. They do better with an incentive to keep their attention.”

Another teacher added, “I don’t think it’s them being dull or unprepared or anything like that. I think it was the difference between...that was [the professional-level educator’s] job, versus a graduate student, who maybe doesn’t want to say anything to a student because you’re stepping on a teacher’s toes. And we don’t want to say anything because they are trying to do a lesson. So, you know. I think it was just that, I don’t think it was anything that they did wrong.”

A follow up question was asked, “Do you think if before they (interns) started teaching, communicating with the teacher would help make the lesson better?” One teacher responded, “Yeah, I just think, that if maybe we talked, and they, like [the teacher] said, it might be as simple as handing out a sticker or something like that. If you were raising your hand when you needed to answer a question. And just being able, I think we can all say that when you come into our rooms, if a child’s talking, it’s OK if you just need to calm them down, not in a harsh way, but you know, you’re allowed to do that. You’re doing the lesson, so you’re in charge, you know?”

The lack of empowerment among the dietetic interns provides evidence to support what was graphically displayed in the Dietetics Career Development shown in Chapter 2. Dietetic interns practice in a beginner phase of dietetics practice. The beginner phase is considered a learning phase that requires many hands-on learning activities. Dietetic interns demonstrate knowledge and skills above those of an undergraduate student, but below that of a competent-

level practitioner. Dietetic interns' lack of empowerment with regard to formally teaching nutrition education lessons is reasonable and somewhat expected. On the other hand, most of the NEP professional-level educators fall in either the competent or proficient level of professional practice. NEP professional-level educators are either in, or moving toward, the ability to adeptly practice with operational skills, and have specialized credentials or practice (Charney & Peterson, 2013).

The professional-level educator's sense of empowerment with regard to classroom teaching has developed over time and has allowed a sense of competence to develop, enabling the professional-level educator to respond appropriately to the needs of the classroom (Kimwarey, Chirure, & Omondi, 2014). Given that empowerment is a continuous process where individuals use lifelong experiences to enable their ability to exercise power over their own practices and circumstances, it is very plausible that professional-level educators have empowerment in the classroom. Since dietetic interns are in a beginner phase of professional practice, with little or no experience, they are not empowered in the classroom.

Professional-Level Educator Enhances Lesson Engagement and Activities

During the focus groups, teachers were asked what they thought was the most effective aspect of the program (question 1). Many of the responses addressing question one were integral in the development of this sub-theme. Some of the themes also emerged from answers to question two (do children benefit from the advanced reading books that are read at the beginning of each lesson? If so, how?), and from question three (do children benefit from the taste-sampling experience provided with each lesson? If so, how?). Although it seems counter-intuitive, when teachers were providing responses to question five (How can the program be improved? Please elaborate on your answer.), they indirectly provided responses about the

professional-RD educators' enthusiasm for teaching by explaining they did such a good job, there was not much that could be improved with the program.

Quotes which support this theme include:

- "She [RD educator] is so passionate, and it immediately transfers to the kids. They also get caught up in that passion and excitement."
- "If she [RD educator] just read the advanced reader books, there would be a problem, but she takes them to the level of comprehension, very good."
- "Her first time here I said, 'Did you start off in education and add to that [dietetics]? We see it and we know what we're looking at, but she is very much a teacher whether she wants to claim it or not."
- "I like the way she delivers the program. She does an overview and reviews what they [the students] learned the last time."
- "Her teaching abilities and the way she reads aloud to the kids, she follows very well for what we were trained to do."
- "The children love her [RD educator]. She makes it enjoyable and is very engaged with the kids. They laugh and they just have such a fun time listening to her read the story. She's very good with the read-a-loud part of the program."
- "They [the students] animate enthusiasm."
- "Well, by the time they get to me and Miss [professional-level RD educator], they still like her enthusiasm, but they [the students] connect more to MyPlate and trying foods."
- "I like how she brings in models of things; some are real and some are fake fruits and vegetables. She would also review before each lesson, so it was refreshing each week to remember what had been taught the previous week."

In addition to discussing the taste-testing experience as the most important aspect of the program, teachers at professional-level educator schools also spent a significant amount of time discussing the effectiveness of the professional-level RD educators with regard to classroom management, lesson delivery, and enhancing the overall learning environment by engaging children during lessons. Teachers were not unhappy with the intern-educators with regard to the program implementation, but they did not have as many positive comments about the interns. Some teachers even went as far as to mention constructive criticism for the intern-educators' lesson delivery, including one teacher who noted, "the lessons are too rushed. There needs to be a longer period of time for our lessons. Young children need more time to learn everything presented." Another teacher noted, "what they need [the interns] is just more time."

ANCILLARY FINDINGS

In addition to the research findings which emerged from this retrospective review, some interesting observations were made with regard to the socio-economic status of the sample population. As previously noted, a geographic and economic disparity exists for participants of the NEP. Many of the schools that participate in the program are located in a very rural area. Over half (50.8 percent) of the 1160 participants attended schools with the lowest socio-economic status, where 90-100 percent of the students in the school received free or reduced-priced meals through the National School Lunch and School Breakfast Program. Rural and low income communities are more likely to be a food desert, meaning they lack access to fresh, nutritious, and affordable foods at grocery stores. Instead, residents of these communities often rely on fast food restaurants and small food stores, such as convenience stores and gas stations, to purchase foods (Gamm, et al., 2003; Trust for America's Health, 2017).

Obesity rates vary by income, with an inverse correlation between low socio-economic status and obesity (Trust for America's Health, 2017). Individuals with incomes between 100-199 percent of the Federal poverty level, which include recipients of SNAP-Ed and Marshall's NEP, have greater obesity rates compared to higher-income individuals. Additionally, obese children are more likely to have more school absences and problems such as behavioral issues at school. Obese children are more likely to repeat a grade, and have lower school engagement than their normal-weight counterparts. The poor educational-attainment outcome experienced by obese children can be attributed to a function of their poor overall health status, which causes higher use of health services and increased absenteeism (Carey et al., 2015). This disparity was supported through comments made during focus groups and by the results of statistical analysis when answering the research questions.

There was a statistically significant difference in how well children performed on the post-hoc review of post-test data, based on their socio-economic status as it related to the percentage of children in the school who received free and reduced-priced meals. The Bonferroni post-hoc ANOVA analysis showed a significant difference between the 50-59.9% socio-economic status level compared to the 90-100% socio-economic status level. The mean post- test score of children who attended schools in the 50-59.9% socio-economic status level was higher (mean score of 6.17) than the mean post-test score of children who attended schools in the 90-100% socio-economic status level (mean score of 5.53). This result was statistically significant with a p value equal to .016, as shown in Table 19.

Table 19. Post-Hoc ANOVA Analysis which Compared Post-Test Scores to Free and Reduced-Priced School Lunch and Breakfast Rate of Individual Schools
Results of the post-hoc analysis which compared post-test scores to the free and reduced rates for the National School Lunch and Breakfast Program for each school.

Free and Reduced Rate of the School	N	Mean	Standard Deviation	F value	Probability attained
50%-59.9%	45	6.1778	1.38644	3.066	.017
60%-69.9%	32	5.8438	1.39375		1.000
70%-79.9%	89	5.6517	1.65214		1.000
80-89.9%	48	5.4167	1.54139		1.000
90-100%	289	5.3806	1.60092		1.000
Total	503	5.5328	1.58756		

*Significance attained at the $p<0.05$ level

As previously explained, when teachers discussed the importance of the taste-testing experience, many of them noted the connection between the socio-economic status of children and the importance of food exposure. Many teachers noted that most children who attend NEP schools come from low-income homes and receive free and/or reduced school meals. Thus, having exposure to new foods is critical because more often than not, parents cannot or do not provide the same kinds of healthy foods at home that children are exposed to in the program. One teacher expressed concern about the expense of fruits and vegetables, while another stated the importance of exposing children to different fruits and vegetables that they do not get at home, thus making the exposure of new foods as part of the nutrition education lesson of critical importance.

CHAPTER FIVE: CONCLUSION, IMPLICATIONS, RECOMMENDATIONS

This chapter presents the summary and discussion of the retrospective review of data from pre-/post-tests that assessed the knowledge and behavior change of students who participated in the Marshall University Nutrition Education Program. A discussion of the teacher focus group findings comparing effectiveness of professional-level RD educators to the effectiveness of dietetic interns will also be reviewed. Implications for action as well as recommendations for future research will be provided.

SUMMARY OF PURPOSE

The purpose of this study was to examine the differences in overall knowledge and behavior change of students in needy schools based on pre-/post-test scores after an intervention of nutrition education lessons by either a professional-level registered dietitian (RD) educator or dietetic intern; and to compare the effectiveness of program implementation from professional-level RD educators to the effectiveness of program implementation from dietetic interns by analyzing teacher focus groups.

SUMMARY OF POPULATION

The population evaluated by pre-/post-tests for this study included second grade students who participated in the NEP and received nutrition education from either dietetic interns or professional-level RD educators. All schools met the SNAP-Ed and USDA qualifying criteria to receive nutrition education, meaning that at least 50 percent of the students in the school received free or reduced school lunch and breakfast meals as part of the National School Lunch and Breakfast Program. Over half of the students (50.8%) who participated in this intervention attended schools where 90 to 100 percent of the student body received free or reduced priced school breakfast and lunch meals. The specific student population chosen for this retrospective review included children in second grade who participated in the program evaluation by

completing a pre- and/or post-test in fall 2016. A total of 1160 pre-/post-tests were administered as part of the standard NEP evaluation and results of the evaluation were analyzed for this retrospective review.

The population of focus group participants included teachers from grades K-2 whose classes received nutrition education as part of the NEP. A total of 30 teachers at four schools (Guyandotte Elementary, Hometown Elementary, Connor Street Elementary, and Ceredo-Kenova Elementary) participated in the focus groups in Cabell, Putnam, and Wayne counties.

MAJOR FINDINGS

Research Question 1- Overall Healthy Eating Knowledge

Summary

Research question one asked, "Is there a difference in overall healthy eating knowledge for second grade students who participated in the Marshall University Nutrition Education Program?" A t-test for independent groups was used to compare the mean knowledge score of the participants on the pre-test and post-test. Analysis revealed a statistically significant difference between the pre- and post-tests with a p value equal to .000; and when examining the means, the post-test mean score of 5.53 was higher than the pre-test mean of 4.41. The increase in mean post-test score shows a growth in participant nutrition knowledge, which was likely due to the intervention of nutrition education lessons.

Literature and Discussion

The results of the statistical analysis showed very strong statistical significance between the intervention and knowledge gain, which was likely due to the intervention of nutrition education lessons. Marshall's NEP utilizes an adapted version of the *Show Me Nutrition* curriculum, which was developed by the University of Missouri. *Show Me Nutrition* meets content standards and objectives for health, math, and communication arts and is designed to be

delivered in 45 to 60 minute sessions. Important health concepts are taught in each grade level, including nutrition, food safety, physical activity, and media influence. Age-appropriate content, activities, and handouts make learning about healthy eating fun for students in all grade levels (University of Missouri Extension Service, 2018). Faculty with Marshall's NEP adapted the lessons to fit in a 30 minute time period, but key messages for each lesson were retained in the adapted lesson.

Results of this retrospective review related to knowledge change are consistent with the results of similar SNAP-Ed nutrition education programs and curricula. *Body Question: Food of the Warrior* (*BQ*) is a school-based, 17-class nutrition education, blended learning curriculum that is implemented with traditional and non-traditional approaches, such as direct-delivery lessons and implementation of policy, systems, and environmental changes, respectively. *BQ* is developed and implemented by the University of Alabama Extension Service and is designed to impact nutrition knowledge and change eating and physical activity behaviors of participants (Struempler, Parmer, & Funderburk, 2016).

In 2013-2014, *BQ* was implemented in third grade needy schools in Alabama using an untreated control group and a quasi-experimental mixed-model intervention design with dependent pre-, intermediate- and post-assessment, and independent treatment and control conditions. A total of 2,564 students participated in the study with a total of 1,335 receiving the *BQ* intervention. Identical assessments were used to measure nutrition knowledge of the intervention and control groups. The *BQ* assessment consisted of 14 knowledge questions. Data were reported as percentage of mean nutrition knowledge scores based on a maximum of 100% total score. Changes in nutrition knowledge of students were analyzed by use of a repeated-measures ANCOVA. ANCOVA analyses indicated higher mean knowledge scores in treatment students than in control students ($p < .001$) (Struempler, Parmer, & Funderburk, 2016).

Like Marshall's *Show Me Nutrition Curriculum, BQ's* main goal is to achieve behavior change (Struempler, Parmer, & Funderburk, 2016), but knowledge gain was measured as a short-term outcome of effective education. There were similarities and differences between the University of Alabama *BQ* curriculum and Marshall's NEP *Show Me Nutrition Curriculum.* Both used SNAP-Ed approved curricula that were culturally and age appropriate. Both interventions took place in needy schools that qualified for SNAP-Ed. However, the *BQ* educators adhered to curriculum fidelity and followed the original curriculum exactly as it was written (Struempler, Parmer, & Funderburk, 2016). As previously mentioned, Marshall's NEP follows a shortened version of *Show Me Nutrition* designed to be implemented in a 30 minute time period (T. Bender, personal communication, May 25, 2018; K. Williams, personal communication, May 12, 2018).

Both curricula were assessed using pre-/post-tests which addressed both knowledge and behavior change. The pre-/post-test for *Show Me* Nutrition assessed knowledge change through a series of eight questions with three to four possible responses per questions; *BQ* assessed knowledge change through a series of 14 questions, with four responses per question. Both assessments used questions comprised of domains that evaluated food identification and food placement. The *BQ* assessment was assessed with Cronbach's alpha testing, which demonstrated acceptable reliability for the 14 items. As previously mentioned, the *Show Me Nutrition* pre-/post-test was not statistically validated for reliability. A control group is not used as part of the Marshall NEP (Struempler, Parmer, & Funderburk, 2016; T. Bender, personal communication, May 25, 2018; K. Williams, personal communication, May 12, 2018). Research shows that the use of a control group is an essential component of an evaluation where a variable such as behavior change is in question. The use of the control group allows extraneous variables to be

isolated, providing evidence that the change in the independent variable was indeed a result of the intervention and not caused by confounding variables (Fitzpatrick, et al., 2011).

In summary, the Marshall University NEP successfully increased knowledge gain for students who received the nutrition education intervention. This knowledge increase is consistent with findings of evaluations from similar nutrition education programs and should be considered an indicator of short-term success of the nutrition education intervention.

Research Question 2- Differences in Overall Healthy Eating Knowledge by Comparing Professional RD Educators to Dietetic Intern Educators

Summary

Research question two asked, "Is there a difference in overall healthy eating knowledge for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern educator?" In order to answer this question, a total score for knowledge questions was calculated for each post-test. A t-test for independent groups was used to compare the mean behavior scores of post-tests for students who were taught by dietetic interns to the mean scores of post-tests for students who were taught by professional-level RD educators.

When examining the means, the post-test mean score of 5.56 obtained by the students who were taught by the professional-level RD educators was higher than the post-test mean score of 5.21 obtained by students who were taught by dietetic interns. However, a p value equal to .175 indicated that the t-test results did not show a statistically significant difference between the two groups of students.

Literature and Discussion

Charney and Peterson (2013) assert that professional-level RD educators have the competency, knowledge, and skills to teach nutrition education lessons and administer nutrition

education programs to ensure that all children and adolescents have a healthy food intake for optimal growth and development (Roy & Stretch, 2018). Although the literature on the effectiveness of dietetic interns in school-based nutrition education programs is lacking, there is an established base of evidence showing significant change (in both knowledge and behavior) for nutrition education programs that employ a paraprofessional staffing model. Paraprofessional educators operate under a model of competency-based skills that are similar to the competencies and skills achieved by dietetic interns. Programs that utilize paraprofessional educators often have successful outcomes (Baker et al., 2009).

A recent review of Child and Adolescent Federally Funded Nutrition Programs showed that programs such as the Expanded Food and Nutrition Education Program (EFNEP), which is designed to assist low income families in acquiring the knowledge, skills, attitudes, and behavior change necessary to adopt nutritionally sound diets, have reached more than 32.5 million low-income families since 1969. In 2015, EFNEP educators reached 377,702 children and adolescents directly (Roy & Stretch, 2018). Dietetic interns who complete rotations with preceptors employed by Cooperative Extension Service often participate in the implementation of EFNEP nutrition education lessons (M.K. Gould, personal communication, December 19, 2018). EFNEP's model of education employs trained paraprofessional educators to deliver tailored curricula and facilitate behavior change using hands-on education in families with low income. Marshall's NEP uses a similar staffing structure, but instead of employing paraprofessionals, the NEP relies on a staffing model of dietetic interns (K. Williams, personal communication, December 18, 2018). Research on the effectiveness of EFNEP and the paraprofessional model shows that the program has helped improve diet quality by increasing participants' ability to buy, prepare, and store foods that meet their nutritional needs (Roy & Stretch, 2018).

According to the literature (Baker et al., 2009), one major difference between paraprofessional educators and dietetic interns is that paraprofessionals do not usually have an undergraduate degree in a dietetics-related field, and dietetic interns do. Thus, it should be assumed that dietetic interns do possess more comprehensive knowledge in the field of nutrition and dietetics when compared to paraprofessional educators (Charney & Peterson, 2013), but are not yet as competent as seasoned, professional-level RD educators. As demonstrated in the Career Development Guide (Charney & Peterson, 2013), dietetic interns are in the beginner phase of dietetics practice. The beginner phase is considered a learning phase that requires many hands-on learning activities. Dietetic interns demonstrate knowledge and skills above those of an undergraduate student, but below that of a competent-level practitioner. The implementation of NEP lessons is a means for dietetic interns to develop competent, entry-level skills in teaching and working with low-income children, while meeting the needs of the grant through delivery of lessons in needy schools (Charney & Peterson, 2013).

The results of the t-test showed that the mean post-test scores (5.56) for students who were taught by professional-level RD educators was higher than the mean post-test score (5.51) for students who were taught by dietetic interns, but it was not statistically significant. The mean score of the students who were taught by professional-level RD educators was likely higher due to the experience and expertise that professional-level educators demonstrate in teaching. This finding is consistent with literature from the Dietetics Career Development Guide (Charney & Peterson, 2013), which explains that professional-level RD educators have a skill set that falls between the competent and advanced level of practice, likely relating to the higher mean post-test score of the students who were taught by this group (Charney & Peterson, 2013). The lack of statistical significance is likely the result of the previously described issues with the validity of the pre-/post- tests, the unbalanced number of students in the professional-level RD educator

group (n= 461) compared to the dietetic intern group (n=42), and lack of process evaluation questionnaire refinement after pilot testing. These issues will be further explored in the literature discussion for research questions three and four.

In summary, although the lack of statistical significance is surprising, the most important implication of these data are an overall knowledge gain for students for both groups of educators. Additionally, interns gain significant knowledge and skill through experience with federally-funded nutrition education programs (Roy & Stretch, 2018). Based on knowledge of the literature and professional experience, Dietetics faculty expect that dietetic interns lack the level of competence and skill that have been acquired by professional-level RD educators over the course of their career. The issue of intern competence in teaching nutrition education lessons for federally-funded nutrition education programs has value. This is an important issue to explore with further research (Roy & Stretch, 2018). The lack of statistical significance is most likely related to factors other than the skill that professional-level RD educators used when they implemented the nutrition education lessons, such as those previously mentioned.

Research Question 3- Overall Healthy Eating Behavior

Summary

Research question three asked, "Is there a difference in overall healthy eating behavior for second grade students who participated in the Marshall University Nutrition Education Program?" A t-test for independent groups was used to compare the mean behavior score of the participants on the pre-test and post-test. The t-test results showed no significant difference between the pre- and post-tests. There was very little difference in the mean of the pre-test (6.84) and the mean of the post-test (6.83). The probability value of .710 shows the results lacked statistical significance and there is very little difference in participant behavior from pre- to post-test.

Literature and Discussion

Research has shown that nutrition education is more likely to bring about healthy behavior change when it targets specific behaviors; capitalizes on the interests and motivating factors of children; is culturally diverse; uses age- and culturally-appropriate behavior-change strategies to provide knowledge and behavior-change skills; includes a method of self-assessment and realistic goal setting; includes growing and preparing food; delivers nutrition messages through a curricula linked to educational standards; uses active teaching methods, including multimedia technology; devotes adequate time and intensity in direct education lessons to achieve the desired behavioral change; and provides adequate instructor training and support (Hayes et al., 2018).

The main goal of SNAP-Ed is to reduce and prevent obesity in targeted audiences through increased consumption of fruit, vegetables and low fat dairy products (Hersey et al., 2014). While Marshall's NEP showed very significant knowledge change from pre- to post-tests, change related to eating behaviors was not shown. Literature related to efficacy of nutrition education reveals that knowledge of healthy nutrition principles does not equate to behavior change (Hayes et al., 2018). Programs with a delivery structure and research-based curriculum similar to Marshall's NEP have consistently shown positive results in behavior change among youth participants (Hersey et al., 2014; Roy & Stretch, 2018; Wolfe, Scott-Pierce, & Dollahite, 2018). Given this discrepancy, it is important to delve further into the literature to determine why this retrospective review of Marshall's NEP data did not show similar results related to behavior change of participants.

Youth nutrition education is one of many strategies to reduce the high rates of childhood obesity. Research suggests that youth nutrition education can be effective in changing behaviors related to low intake of fruits, vegetables, whole grains, and high intakes of sugar-sweetened

beverages (Wolfe et al., 2018). *Choose Health: Food, Fun and Fitness (CHFFF)* is a six-lesson curriculum developed by the Eat Smart New York (ESNY), New York State Expanded Food and Nutrition Education Program (EFNEP). Similar to Marshall's NEP *Show Me Nutrition* curriculum, the *CHFFF* is a youth nutrition education curriculum that uses experiential learning to teach healthful eating and active play. Like *Show Me Nutrition,* the main goal of *CHFFF* is to improve eating and physical behaviors to prevent obesity and chronic disease by emphasizing the importance of eating more fruit, vegetables and whole grains; consuming less sweetened drinks and high-fat/high-sugar foods; and increasing physical activity through active play. The *CHFFF* curriculum was developed in 2010 and is used in the EFNEP through the ESNY program (Wolfe et al., 2018).

A program evaluation published in the *Journal of Nutrition Education and Behavior* (2017) showed that the practice-based results of the ESNY *CHFFF* curriculum were effective at modifying eating and physical activity behaviors. Paired t-tests from the program evaluation showed significant ($p < .01$) positive behavioral changes from pre-test to post-test based on the *CHFFF* curriculum implementation for all measured behaviors, including consumption of fruit, vegetables, sweetened drinks, nutrition label reading, and other food and activity behaviors (Wolfe et al., 2018).

The Marshall NEP *Show Me Nutrition* curriculum and the ESNY program *CHFFF* curriculum align with established evidence-based interventions required by EFNEP and SNAP-Ed. Both programs employ a multicomponent, behavior-focused, theory-driven approach to nutrition education. Even though both programs align with regard to program implementation, major differences exist in the program evaluations. Although both programs used a pre-/post-test to evaluate knowledge and behavior change among youth participants, the development and

components of the evaluation were very different (Wolfe et al., 2018 and K. Williams, personal communication, December 18, 2018).

The evaluation for the *CHFFF* curriculum was based on a national-standard EFNEP evaluation that was used by all EFNEP programs nationwide. Specific questions for *CHFFF* curriculum items were developed by a multi-state expert committee, working with national USDA leadership for the EFNEP, and added to the national standard EFNEP evaluation. The specific *CHFFF* questions were based on existing evaluation tools, a literature review related to the evaluation topics, and an expert review committee. *CHFFF* evaluation items were limited in number to keep respondent burden low. Respondent burden is defined as how the research subject perceives his or her participation in an evaluation survey as difficult, time consuming, or emotionally stressful. Respondent burden also takes interview length, cognitive complexity, respondent effort, and stress of psychological invasive questions into account. Researchers should consider the impact of respondent burden when developing surveys as a high burden is more likely to yield lower-quality data (Wolfe et al., 2018).

Questions on the *CHFFF* evaluation also underwent cognitive testing to enhance face and content validity. Face validity is an assessment of the evaluation that determines how well a survey measures the phenomenon or construct that it is intended to measure (Schwandt, 2007). Content validity refers to how well a survey measures all aspects of a specific construct (Schwandt, 2007). Most nutrition education curricula experts agree that content analysis, evaluation of content validity, and cognitive testing are all critical components of evaluation tool questionnaire development. Content analysis allows researchers to include survey measures that match the learning objectives and nutrition education content of the curriculum with the evaluation. Content validity and cognitive testing are crucial steps to inform the development of survey questions related to retained, deleted, and modified questionnaire items (Hernandez et. al,

2011). Without these critical steps, a researcher cannot be certain that the survey is actually measuring what it is intended to measure.

In line with these recommendations, developers of the *CHFFF* curriculum evaluation pilot tested the survey for two years with the target audience. After that time, more behavior-specific questions were added to enhance content validity. The new questions were administered in five counties. Then, based on new literature, educator input, and cognitive testing, the question set was again revised. Ultimately, researchers felt the survey measures were feasible, brief enough to limit respondent burden, reliable, and able to adequately document participant behavior change. However, even after extensive testing and adaptation, the authors of the published report recommended further testing of questions in an effectiveness trial, or with a control group (Wolfe et al., 2018).

In contrast to the development of the *CHFFF* curriculum, the Marshall NEP pre/post-test evaluation did not take respondent burden into account or assess the face and content validity through statistical analysis. As described in chapter 3, the *Show Me Nutrition* pre-/post-test questions were developed by Marshall Dietetics faculty and a panel of elementary education experts. When faculty were initially searching for an evaluation tool, a review of materials for children in kindergarten through second grades did not yield a reliable pre-/post-test, thus Marshall faculty developed pre-/post-test questions in 2010 and had them reviewed by early elementary educators. Teachers reviewed the questions and responses for clarity, reading level, appropriateness of wording for each grade level, and identifiability of graphics. Questions were amended based on teacher feedback and then tested with children from coordinating grade levels. Questions were then revised again and submitted to the Marshall University IRB for approval. A statistical analysis of pre-/post-test face or content validity was not completed (K. Williams personal communications, December 18, 2018).

The *Show Me Nutrition* pre-/post-test was used from 2010-2017. While the pre-/post-test clearly met the program evaluation guidelines of the funding agency, questions were not revised based on new literature, educator input, and cognitive testing during this period for research purposes (K. Williams, personal communication, December 18, 2018). The test was initially designed for questions to be read aloud from a printed binder with colorful pictures used to augment words. Researchers recorded answers on paper. After seven years of testing, the same questions were converted to electronic format. Questions were still read aloud to children, but delivered via an iPad instead of paper. Pre-/post-tests for second grade were comprised of 25 questions structured to assess two domains - knowledge of nutrition and behavioral change (K. Williams personal communications, February 1, 2018).

As discussed in Chapter 3, there were several issues with the wording of the behavioral-based questions on the pre-/post-test used for this data, including validity and questionable interpretation, particularly related to questions 14 and 17-20. Responses for these questions included: All the Time; Sometimes; or Never. It was difficult to determine how children interpreted the response "all the time." Thus, to remove ambiguity, responses of "all the time" and "sometimes" were collapsed into one answer, which was coded as a "yes" for purposes of statistical analysis. The other response for these questions, "never," was coded as "no" for purposes of statistical analysis. Since the format of the questions was confusing, and in some instances leading, it was difficult to determine if children truly had no behavioral change, or if the wording of the pre- and post-test was too difficult for children to interpret during the testing.

In comparison to the wording of the behavior-based questions in the *Show Me Nutrition* evaluation, the *CHFFF* behavior-based questions had responses that were less ambiguous and directly answered the question being asked. An example of one behavior-based question is: "I eat vegetables…," with responses: 1= never or almost never; 2= some days; 3= most days; 4= every

day. The same responses were used for all behavior-based questions, including those targeting consumption of fruit, vegetables, choosing healthy snacks, participating in physical activity, and consumption of sugar-sweetened beverages (Wolfe et al., 2018). When comparing responses to the *Show Me Nutrition* questions: All the Time; Sometimes; or Never to the responses to the *CHFFF* questions: 1= never or almost never; 2= some days; 3= most days; 4= every day, it is apparent that the ambiguity of the *Show Me Nutrition* responses could have played a role in the results of the findings of this retrospective review.

In addition to these issues, there are several other important issues to note regarding the *Show Me Nutrition Evaluation.* One issue is related to matching of the pre-/post-tests. Each child was interviewed individually for the pre-/post-test, and each child's personal identification number, grade, and teacher's name was recorded before the test began with the intent to matching the tests for analysis. However, some teachers did not keep track of individual research numbers, so pre-/post-tests could not be matched, which limits the impact of the data (Fitzpatrick et al., 2011). Since it was not possible to match the pre-/post-tests, a total aggregate score was calculated for both the pre- and the post-tests and used in the statistical calculation. Additionally, the pre-test group (n=657) was slightly larger (by 154 students) than the post-test group (n=503), which means there could be a question of group equivalency when comparing the results of the testing (Fitzpatrick et al., 2011). In comparison, the *CHFFF* evaluation had matching pre-/post-tests with a mean and p value calculated for each behavior-based question.

In summary, the t-test for independent groups did not show significant improvement in behavior. When Marshall's NEP was compared with other nutrition education programs it was determined that both programs had similar program delivery, number of lessons, and a research-based curriculum. What differed between the two programs was the program evaluation. The NEP *Show Me Nutrition* evaluation met the criteria for SNAP-Ed funding, but lacked analysis

for cognitive testing to evaluate face and content validity for research purposes. Additionally, responses to behavioral-based questions were ambiguous and the three response options were collapsed into two choices for statistical testing. Finally, pre-/post-tests could not be matched and there was greater difference in n=154 students between pre- and post-tests. These factors likely contributed to the lack of statistical significance found in the results of question three.

Research Question 4- Differences in Overall Healthy Eating Behavior by Comparing Professional RD Educators to Dietetic Intern Educators

Research question four asked, "Is there a difference in overall healthy eating behavior for second grade students when comparing schools with a professional-level RD educator to schools with a dietetic intern educator?" In order to answer this question, non-matched student post-tests from fall 2016 were coded and analyzed using SPSS. A total score for behavior questions was calculated for each post-test. The t-test was analyzed to determine probability results. The t-test results did not show a statistically significant difference between the post-test scores of the educator types, with a p value equal to .479; and when examining the means, the post-test mean score of 6.82 obtained by the students who were taught by professional-level RD educators was actually lower than the post-test mean score of 6.88 obtained by students who were taught by dietetic interns.

Literature and Discussion

Professional-level RD educators have the competency, knowledge, and skills to teach nutrition education lessons and administer nutrition education programs to ensure that all children and adolescents have a healthy food intake for optimal growth and development (Roy & Stretch, 2018). The literature on the effectiveness of dietetic interns in school-based nutrition education programs is lacking. However an established base of evidence shows significant behavioral change for nutrition education programs employing a paraprofessional staffing model

(Baker et al., 2009). Evidence of effectiveness of paraprofessional staffing models can be used in comparison to a staffing model that employs dietetic interns to deliver nutrition education. As previously mentioned, one major difference between paraprofessional educators and dietetic interns is that paraprofessionals do not usually have an undergraduate degree in a dietetics-related field, and dietetic interns do. Thus, it should be assumed that dietetic interns possess a broader level of knowledge of nutrition and dietetics when compared to paraprofessional educators, but are not as competent as a seasoned, professional-level RD educator (Charney & Peterson, 2013).

The program evaluation published in the *Journal of Nutrition Education and Behavior* (2017) showed the practice-based results of the ESNY *CHFFF* curriculum were effective at inducing behavior change among participants; paired t- tests from the program evaluation showed significant ($p < .01$) positive behavioral changes from pre-test to post-test based on the *CHFFF* curriculum implementation for all measured behaviors, including consumption of vegetables, fruits, sweetened drinks, nutrition label reading, and other food and activity behaviors (Wolfe et al., 2018). Although it is not specifically stated what staffing model the ESNY program employs, considering that EFNEP provides funding for the program, it should be assumed that a model of paraprofessional staffing is used (K. Williams, personal communication, December 18, 2018).

It is important to recognize that the lack of statistical significance in behavior change for research question four was not just related to the difference in comparison of professional-level RD educators to dietetic intern educators. As addressed in question 3, there was an overall lack of statistically significant behavior change. The Career Development Guide (Charney & Peterson, 2013) clearly demonstrates that dietetic interns are in the beginner phase of dietetics practice, which is a learning phase. Dietetic interns demonstrate competency in practice below

that of a competent-level practitioner. Thus, the results found in this analysis are opposite of what was expected to occur. These results are likely not due to the teaching competency or skill of professional-level educators or dietetic interns, but are more likely the result of the previously described issues with validity, issues of question construct, and number of participants in each subject group as it relates to the pre-/post-tests.

Since the pre-/post-evaluation failed to show any overall behavior change, it would not be expected to detect any differences in behavior of students when comparing those who were taught by professional-level RD educators or dietetic interns. As previously noted, there was particular difficulty with the ambiguity of answers for questions 14 and 17-20, which were related to behavior change, on the pre-/post-test. Responses for these questions included: All the Time; Sometimes; or Never. It was difficult to determine how children interpreted the response "all the time." Additionally, the number of participants in each group was unbalanced. There were 461 participants in the post-test analysis of the professional-level RD educator group and only 42 participants in the post-test analysis of the dietetic intern educator group. The discrepancy in the number of participants in each is an issue of group equivalency and could ultimately limit the generalizability of the research findings (Fitzpatrick et al., 2011).

In summary, the t-test for independent groups did not show significant difference in behavior of students when comparing professional-level RD educators to dietetic interns. There was also no overall significant behavior change among students when comparing pre-test to post-test. The major difference between Marshall's NEP and other similar nutrition education programs is not the basic components of the program, such as the number of lessons, lesson implementation, curriculum, or staffing model (professional-level RD educator, dietetic intern educator, or paraprofessional educator), but the program evaluation, particularly as it relates to the questions which were intended to test behavior change.

The NEP *Show Me Nutrition* evaluation lacked the testing needed on the front-end of the evaluation design to ensure external validity, defined as the extent to which a question or evaluation measures the variable that it is intended to measure (Fitzpatrick et al., 2011). Without initial analysis for cognitive testing to evaluate face and content validity, it was never determined whether or not the behavior-based questions were actually measuring behavior change. Without further revision of questions based on pilot testing, new literature, educator input, and cognitive testing, there was no way to determine if the behavior-based questions had responses that were ambiguous and needed to be re-worded (Wolfe et al., 2018).

The expert committee recommendation of continuous testing of questions ensures that constructs are adequately documenting participant behavior change while remaining feasible for program evaluation. Recommendations include continuous, extensive testing and adaptation of questions, with the ultimate goal testing questions in an effectiveness trial or with a control group (Wolfe et al., 2018). While the NEP *Show Me* Nutrition pre-/post-test evaluation met the SNAP-Ed evaluation requirements for funding, it did not actually do what was intended, to measure behavior change of the participants. This issue will be further explored in the Implications for Action section of this chapter.

Research Question 5- The Most Effective Aspects of the Program from the Participating Teacher's Point-of-View.

Summary

Research question five asked, "What are the most effective aspects of the program from the participating teacher's point-of-view?" In order to answer this question, a series of five focus groups were conducted in fall 2017 and spring 2018. The most effective aspects of the program became apparent after leading the focus groups and reviewing the audio files with a methodology of partial logging and transcription for each. Research question five was answered through

analysis of all of the questions asked during the focus groups, but most specifically, question four of the 'previous' focus group questions in the intern-educator school and questions one and four in the professional-level RD educator schools, using the 'new' focus group questions. The 'previous' and 'new' focus group questions used in the analysis to answer research question five are listed below.

- 'Previous' focus group questions 4: "What is the strong point of the program?"
- 'New' focus group question 1: "What is the greatest strength of the program? Why?"
- 'New' focus group question 4: "Do children benefit from the taste sampling experience provided with each lesson? If so, how?"

Literature and Discussion

In analyzing teacher responses used to address question five, three themes related to the most effective aspects of the program became apparent. The first theme identified taste testing as the most effective component of the program. The link between food tasting and knowledge and behavior change among participants was the second theme, while the third theme highlighted the professional-level RD educators' ability to provide encouragement for food-tasting.

During focus group interviews, teachers in both intern and professional-level RD educator schools agreed that the taste-testing experience was the most effective aspect of the program. Details about the importance of this experience were offered by almost every teacher. A substantial portion of the program's resources are spent on providing taste-sampling experiences. Thus the finding that teachers think the taste-testing experience is effective provides affirmation that programmatic resources are used in an effective manner (A. Fox, personal communication, May 15, 2018).

New tasting experiences help children become healthy eaters. If a child tries a new food and likes it, he or she is more likely to ask the caregiver to purchase the food, providing an

opportunity for positive eating behavior change in the home. As one teacher noted, “It’s good for them to have a variety…just exposure to fruits and vegetables [and] things they’ve never had.”

The experience of trying new foods was noted over and over again. New tasting experiences teach children to become healthy eaters. Research supports taste testing of foods as a means of experiential learning. The sensory exposure offered to children through nutrition education and exposure to new foods increases the acceptance of vegetables among children (Poelman, Cochet-Broch, Cox, & Vogrig, 2017). Taste samplings prepared during the 2017-2018 school year provided exposure of foods that many children had not before tried, including foods such as pumpernickel and light rye bread with herbed cream cheese; black bean salsa and baked scoops; cottage cheese with pineapple chunks; celery with sunflower butter; fresh orange wedge, dried prunes, and canned, diced pears (A. Fox, personal communication, May 15, 2018).

The literature supports that taste testing of foods during the nutrition education lesson is an important kinesthetic experience for children. Exposure to fruits and vegetables with activities such as cooking, gardening, and traditional nutrition education lessons reduces children’s reluctance to try new foods. The literature specifically indicates that direct experience with cooking and sampling vegetables has a positive impact on children’s preference for vegetables, which is generally considered to be lower than the preference for fruit (Cunningham-Sabo & Lohse, 2014). A review of school-based programs that focus on improving fruit and vegetable intake among children notes that programs focused on food preparation and food tasting result in greater improvements in consumption of these foods as opposed to programs focused more on non-experiential activities such as food distribution programs (Cunningham-Sabo & Lohse, 2014; Poelman et al., 2017).

Most of the teachers noted that the taste-testing experience is critical to connect learning and behavior change. The emergence of this theme is important because teachers not only

connected the tasting experience to more acceptance of food in the cafeteria, but also made a connection between the taste experience and changes in the home food environment, which is the ultimate goal of the program. One teacher noted, “Oh absolutely. I think it’s a critical part of it [the program] for my guys. It’s learning about the food group and then sampling something from it.” Several teachers made connections between what children learned from the taste-testing experience and what they choose to eat in the school cafeteria. One teacher explained, “The kids have been eating more fruit [in the school cafeteria]. They [now] have some fruit and vegetables on their plate almost every day.”

Research supports a strong positive association with willingness to try new foods and cooking and taste-sampling experiences as part of nutrition education opportunities. In one published report (Gibbs et al., 2013), researchers concluded that extensive, recurring exposure to new foods was necessary to achieve behavior change related to food preferences. Research also indicates that kinesthetic aspects of nutrition education such as gardening and taste-testing can increase willingness to taste vegetables or increase overall preference for vegetables. Literature from focus groups related to nutrition education, gardening, and cooking support children’s willingness to try new foods based on taste-sampling experiences (Gibbs et al., 2013). According to teachers who participated in focus groups on the topic, children who were introduced to new ingredients and tastes during lessons were more willing to try new foods within a short period of time. Similar to what was reported by teachers who participated in Marshall’s NEP, the literature corroborated reports of teachers noticing improvements in the nutritional quality of the food that children brought to school since participating in the nutrition education program (Gibbs et al., 2013).

Teachers in the professional-level RD educator schools were particularly pleased with the techniques the professional-level RD educators used to encourage children to taste the food

samples. Teachers explained various techniques that professional-level RD educators used, including phrases of encouragement, providing small incentives such as stickers, or creating a 'one bite' rule. These techniques provide a learner-centered environment, focusing on the student's learning needs and involving the student in decision making and problem solving. In this case, the professional-level RD educators were using methods of extrinsic motivation to encourage a learner-centered environment with children (California WIC, 2002).

Based on literature derived from the Career Development Guide (Charney & Peterson, 2013), it is expected that professional-level RD educators demonstrate job performance in a competent, proficient, and advanced-practice manner. Professional-level RD educators were better able to use advanced teaching methods, such as learner-centered approaches to nutrition education, and successfully implement extrinsic rewards for student motivation secondary to their advanced level of dietetics practice (Charney & Peterson, 2013). Dietetic interns are in the beginner phase of dietetics practice, which means they demonstrate skills below that of a competent-level practitioner. Thus, findings of the teacher focus groups corroborated what the literature supports regarding the lifelong learning process and professional development of dietetics professionals (Charney & Peterson, 2013).

Finally, many teachers noted the relationship between the socio-economic status of children and the importance of food exposure. Teachers mentioned issues of food insecurity for NEP participants. Teachers observed that most children come from low-income homes and receive free and/or reduced-priced school meals. Teacher's observation of the relationship between children's socio-economic status and food exposure was supported by the ancillary findings described in Chapter 4. Over half (50.8 percent) of the 1,160 participants attended schools with the lowest socio-economic status, with 90-100 percent of the students in the school receiving free or reduced-priced meals through the National School Lunch and School Breakfast

Program. Additionally, rural and low income communities, such as those where NEP schools are located, are more likely to be food deserts, meaning they lack access to fresh, nutritious, and affordable foods at grocery stores (Gamm et al., 2003; Trust for America's Health, 2017). Thus, having exposure to new foods is critical because, more often than not, parents cannot or do not provide the healthy foods at home that children are exposed to in the program.

In summary, teachers who participated in focus groups provided many notable benefits of participation in Marshall's NEP, including the benefit of tasting experiences and the increased likelihood of accepting new foods; the link between food tasting experiences and knowledge and probable behavior change; and the teaching competence and skill demonstrated by professional-level RD educators with encouraging children to participate in the taste-sampling experience through the use of a learner-centered environment. A well-established body of evidence asserts that children who participate in federally-funded nutrition assistance programs such as SNAP-Ed and EFNEP are more likely to be food insecure and have negative health consequences associated with poor nutritional intake. Programs like SNAP-Ed and EFNEP not only enhance overall diet quality for children, but when considering long-term impacts, these programs also act as food safety nets, decrease health care costs, and improve academic performance (Roy & Stretch, 2018).

Research Question 6- Teacher's Perceptions of Differences of Professional-Level RD Educator Schools and Intern Schools.

Summary

Research question six asked, "To what extent is there a difference between professional-level RD educator schools and intern-educator schools with regard to teachers' perception of the Marshall University Nutrition Education Program?" In order to answer this question, a series of five focus groups was conducted in fall 2017 and spring 2018. Although there was only one

intern-educator school focus group conducted, the teacher responses in the focus groups made differences, as well as similarities apparent. Research question six was answered by reviewing responses to all of the questions asked during the focus groups, but most specifically, question three of the 'previous' focus group questions in the intern-educator school and questions one and four in the professional-level RD educator schools, using the 'new' focus group questions.

- 'Previous' focus group question 3: "Would you recommend this program as a beneficial tool to be incorporated in other, similar schools?"
- 'Previous' focus group question 4: "What is the strong point of the program?"
- 'New' focus group question 1: "What is the greatest strength of the program? Why?"

Literature and Discussion

After exploring the methodology for question six, two themes related to the differences between professional-level RD educator schools and dietetic intern schools became apparent. The themes were related to the advanced-practice manner in which the professional-level RD educators demonstrated teaching skill and job performance. Professional-level educators were better able to use advanced teaching methods, such as learner-centered approaches to nutrition education to enhance lessons and encourage student engagement. Professional-level educators also demonstrated a sense of empowerment in the classroom, which many teachers referred to as having "greater classroom control" or "making the classroom her own." As expected based on the findings of the Dietetics Career Development Guide (Charney & Peterson, 2013), the finding of teacher empowerment was not found in the intern-level educator focus group.

Kimwarey, Chirure, and Omondi (2014) described teaching empowerment as having the right to participate in determining school policies and goals and to exercise professional judgment about how and what to teach. The sense of empowerment in the classroom develops over time and entails developing the right knowledge, skills, and attitudes in order to attain a

sense of competence, which enables the teacher to respond appropriately to the demanding needs of the classroom (Kimwarey, Chirure, & Omondi, 2014).

There are many similarities between the spiral learning implicated by the Dietetics Career Development Guide, which is based on the Dreyfus Model of Skill Acquisition (Charney & Peterson, 2013), and the sense of empowerment that teachers feel in the classroom. As demonstrated in the Dietetics Career Development Guide (Charney & Peterson, 2013, there are six levels of continuous learning for the dietetics professional, beginning with novice and progressing through beginner, competent, proficient, advanced practice, and expert level of life-long learning and professional development. Similarly, empowerment is a continuous process where individuals use lifelong experiences to enable their ability and exercise power over their own practices and circumstances (Kimwarey, Chirure, & Omondi, 2014).

Teacher empowerment allows professional-level RD educators to make pedagogical transitions from reliance on a scripted lesson to making informed decisions about pedagogy autonomously. Similar to traditional dietetics practice, empowerment in teaching requires a conscious effort to address many barriers in professional development. Achieving efficiency and empowerment in education requires a lifelong learning and years of professional development, just as it takes time and years of practice to reach the advanced levels of dietetics practice (proficient, advanced practice, expert levels) (Fang, Fu, & Lamme, 2004).

Empowerment emerged as a theme after analyzing comments made by teachers at professional-level RD educator schools. Teachers identified professional-level RD educators as having empowerment in teaching as a whole, but specifically with classroom management and lesson engagement. Teachers observed that the taste-sampling experiences are used as a key learning opportunity to enhance the learner-centered environment, which kept student's attention. Classroom and lesson management were concepts that were mentioned many times in

professional-level RD educator focus groups. Analysis of comments from teachers showed that professional-level RD educators felt empowered to make the classroom their own. Professional-level RD educators managed the discipline needs of the classroom, as well as the pace of the lesson, without looking to the teacher for guidance. Professional-level RD educators were able to keep the children's attention throughout the lesson. One teacher noted "Her [the professional-level RD educator] first time here I said, 'Did you start off in education and add to that [dietetics]?' We see it and we know what we're looking at, but she is very much a teacher whether she wants to claim it or not."

The focus group analysis revealed that teachers and students also connected empowerment to the respect they possessed for professional-level RD educators. Respect in this context is powerful because it alludes to the professional-level RD educator's ability to make the classroom her own, if only for the short period of time she is teaching the lesson. When analyzing the differences between the intern and professional-level RD educator focus groups, the term 'respect' wasn't mentioned in the intern-educator focus group. Teachers knew the names of the professional-level educators who taught in their schools; however not once during the intern-educator focus group did the teachers mention a single intern by name. Teachers in the intern-educator focus group consistently referred to interns as 'students,' while teachers in professional-level focus groups consistently referred to professional-level RD educators by their first names.

The focus groups revealed that interns lacked empowerment. During the intern-educator focus groups, teachers made several comments related to the interns' lack of experience and lack of self-confidence related to classroom management. For example, when asked question number three of the 'previous' focus group questions, 'would you recommend this program as a beneficial tool to be incorporated in other, similar schools?' one teacher explained, "Well, they

just didn't keep their attention. I don't know. They were timid maybe? Timid is the only word I can come up with. And then they didn't do anything to keep their attention, like the stickers. They could like keep their attention for like 10-15 minutes. Then there was talking. They [students] do better with an incentive to keep their attention."

Teachers in focus groups at professional-level RD educator schools also spent a significant amount of time discussing the effectiveness of the professional-level RD educators with regard to classroom management, lesson delivery, and enhancing the overall learning environment by engaging children during lessons. One teacher noted, "I like the way she delivers the program. She does an overview and reviews what they [the students] learned the last time. Her teaching abilities and the way she reads aloud to the kids, she follows very well for what we were trained to do." Another teacher said, "The children love her [professional-level RD educator]. She makes it enjoyable and is very engaged with the kids. They laugh and they just have such a fun time listening to her read the story. She's very good with the read-a-loud part of the program."

Teachers did not have as many positive comments about the interns. Some teachers even went as far as to mention constructive criticism for the intern-educators' lesson delivery, including one teacher who noted, "The lessons are too rushed. There needs to be a longer period of time for our lessons. Young children need more time to learn everything presented." Another teacher noted, "what they need (the interns) is just more time."

It is important to further examine the process of earning respect in the classroom and what it take to develop a sense of empowerment with teaching. As explained by Kimwarey, Chirure, and Omondi (2014), individuals develop a sense of empowerment over time. Earning respect and developing empowerment in the classroom is a gradual process where knowledge is acquired in a spiral manner, from general information to the development of specific knowledge,

skills, information, and attitudes that allow the development of greater reasoning and judgment in day-to-day teaching experiences. As part of the process, educators constantly learn, unlearn, and relearn over the course of a career and lifetime. Empowerment is a multidimensional process that is accomplished over time (Kimwarey, Chirure, & Omondi, 2014). Advanced-level dietetics practice also develops over time, which in this case, allows professional-level RD educators to enhance lessons and increase student engagement through more hands-on activities and advanced teaching practice.

The lack of empowerment among dietetic interns provides evidence to support findings in the Dietetics Career Development shown in Chapter 2. Dietetic interns perform in a beginner phase of dietetics practice. The beginner phase is considered a learning phase that requires many hands-on learning activities. Dietetic interns demonstrate knowledge and skills above those of an undergraduate student, but below that of a competent-level practitioner. The dietetic interns' lack of empowerment with regard to formal teaching of nutrition education lessons is reasonable and expected. On the other hand, most of the NEP professional-level RD educators fall in either the competent or proficient level of professional practice. Dietetic interns are either in, or moving toward, developing the ability to adeptly practice with operational skills, and have specialized credentials and practice (Charney & Peterson, 2013).

In summary, the professional-level RD educator's sense of empowerment with regard to classroom teaching has developed over time and has allowed a sense of competence to emerge, enabling the professional-level RD educator to respond appropriately to the needs of the classroom (Kimwarey, Chirure, & Omondi, 2014). Given that empowerment is a continuous process where individuals use lifelong experiences to exercise power over teaching practices and circumstances, professional-level RD educators should have empowerment in the classroom.

Since dietetic interns are in a beginner phase of professional practice, with little or no experience, they should not be empowered in the classroom.

Advance-practice RD practitioners emphasize that dietetic interns can benefit from building relationships at every stage of their education. Dietetic interns should learn from the advice of practitioners with more experience. With continued observation and time, interns and beginner practitioners alike can learn new techniques and strategies that will help form their own style. Additionally, participating in short-term learning opportunities, such as professional development, and during formal phases of education like a dietetic internship, enhances knowledge and skills and provides more opportunities to work with other professionals. Targeted and continuous learning, along with mentor support, is helpful to interns and advanced-practice professionals alike, as new skills are developed and empowerment is achieved through the lifelong learning and professional development that occurs over the course of a career and lifetime (Charney & Peterson, 2013).

IMPLICATIONS OF EXISTING DATA

When planning this dissertation, I received some sage advice from a fellow doctoral student and colleague, "If possible, do something with existing data…it will save you so much time." Using existing data seemed like a great idea; to quote a figure of speech, I thought this would allow me to "kill two birds with one stone." I could use all of the data that I had collected for the NEP, as well as examine and possibly publish data that had previously not been used- a win-win. What could possibly go wrong?

Indeed. What could possibly go wrong?

In the beginning of this journey, I did not give a second thought to the quality of the pre-/post-test or the data that had been collected. I assumed (and we all know what happens when we assume) the data that had been collected was of good quality and could be easily analyzed. I also

assumed that since the pre-/post-test had been used to assess thousands of children over the course of a decade, it was collecting exactly what the program needed in order to show good programmatic impacts. As in many assumptions, I was wrong.

The first indication of my wrong assumption of the data quality came when I started reviewing the Excel spreadsheet of pre-/post-data. Several answers to questions were completely out-of-line for the category of question. For example, question 10 asked: How many of your grains should come from whole grains each day? Responses included: "None of them should be whole grains; one of them should be whole grains; one half of them should be whole grains; five of them should be whole grains." Instead, the response on my spreadsheet was "peach." Errors with question and answer coding happened with several other questions and with several other responses. In order to rectify this, I had to work with the NEP data programmer and investigate the testing server to resolve the errors that had occurred. It turned out that some questions had been miscoded on the programming end, so that even though children had chosen a specific response on the pre-/post-test pertaining to grains, it was downloaded as an entirely incorrect and misplaced response. Additionally, I had to fix issues dealing with missing and non-matched pre-/post-tests and other missing information, such as testing date and time or tester name. None of these were uncorrectable issues, but they did create additional and time consuming work. On the plus side, the extra time spent with the data also allowed me to become much, much more familiar with it, which is an advantage since this was a retrospective review.

Additionally, once I started working with Dr. Edna Meisel to determine which statistical calculations I would use to analyze the data for questions 1-4, I discovered the issues with question wording. Although the existing pre-/post-test had been through a validation process with NEP faculty, expert elementary educators, and appropriately-aged children, many issues still existed with regard to validity of the questions, particularly as they related to the way in

which behavioral-focused questions were asked. With Dr. Meisel's input, I soon realized that since the pre-/post-tests had not been statistically validated, many questions were not actually measuring the behavior or knowledge item that they were intended to measure. Thankfully, Dr. Meisel was very knowledgeable and agreed to help me complete the statistical analysis based on the existing data.

Ultimately, I ended up having to throw out several questions from the pre-/post-test. Finally, since there were so many issues related to the validity and reliability of the pre-/post-test, as well as issues related to the means in which teachers lost student identification numbers for testing purposes, I was not able to match the pre-/and post-tests. Instead of calculating a score for individual participants to determine behavioral and knowledge change, I had to calculate a score for overall behavior and overall knowledge questions, which made the data less impactful, but still meaningful. Rather than use a t-test for a dependent variable, I used a t-test for an independent variable instead. Using a t-test for an independent variable allowed the statistical analysis to be completed based on the parameters of the data that were available, which in turn, allowed me to move on and complete the dissertation.

With regard to the focus group questions, I also realized there were problems with the questions after conducting focus groups as part of the NEP evaluation team for several semesters. However, it was not until I took the doctoral-level qualitative research class that I was able to understand the issues at hand. By that point, I had already collected some of the data that I had planned to use as part of this retrospective review. I revised the focus group questions, but this also led to unforeseen implications: I then had to analyze comments and find themes from two related but separate sets of focus group questions. Additionally, the spring 2018 WV teacher's strike happened during the time that my undergraduate students and I were conducting the focus groups for this review. Although initially I had an equal number of professional-level

RD educator and intern educator school focus groups scheduled, the teachers' strike caused many of the focus groups to be cancelled. The intern educator school focus groups could not be re-scheduled. I ultimately was able to adequately analyze all of the focus group transcripts and, since I had participated in collecting the NEP data for so long, I had a very solid foundation of knowledge when it came to understanding the implications of the focus group findings.

Overall, there are many implications of using retrospective data for a dissertation, including some barriers and many positive outcomes. In hindsight, I was not familiar enough with the strengths and weaknesses of the data when I decided to use a retrospective review for my dissertation. I was very familiar with the program, the curriculum, the pre-/post-test and focus group questions, as well as the implementation of testing. I took for granted that the existing data was going to answer the questions that I had developed for the dissertation. In the future, if I were to analyze existing data again, I would probe to find out more about how the testing questions were developed and what exact type of data had been collected. I would also meet with a statistician before deciding to use existing data to ensure that what I wanted to accomplish could be achieved.

If I had it to do all over again, I would still continue with the path of using retrospective data. There is some value in all data, even when on the surface it appears there are obstacles at every turn. Had I not taken the time to explore the existing data set, I would not have realized the results of the positive knowledge change among participants, or been able to recognize the other valuable implications that occurred as a result of reviewing the data. I am certain my experience of reviewing existing data will be valuable to me as an administrator, teacher, and researcher in the future.

IMPLICATIONS OF FINDINGS

Despite the issues that occurred with the existing data, many valuable findings were identified as part of this process. I now fully understand the negative impact of lack of statistical reliability and validity testing in the beginning stages of the evaluation development. Expert committee recommendation for program evaluation through pre-/post-testing includes continuous testing of questions to ensure they adequately measure participant behavior change, while remaining feasible for program evaluation. The literature supports that recommendations include continuous, extensive testing and adaptation of questions. Ultimately, while the NEP *Show Me Nutrition* pre-/post-test met the SNAP-Ed evaluation requirements, it did not actually do what was intended - measure behavior change of the participants. Understanding the value of continuous and extensive testing of questions will be important as Dietetics faculty continue to improve the NEP evaluation in years to come.

Additionally, the NEP participant knowledge gain has many implications. This impact is magnified when taking the socio-economic status of NEP participants into consideration. More than 90 percent of children enrolled in NEP schools receive free and reduced meals through the National School Lunch and Breakfast Program. When children face issues such as extreme poverty, other implications like increased rates of obesity and food insecurity co-exist. Thus, NEP educators need to remove as many barriers to learning as possible. This can be accomplished through a variety of methods, including providing more incentive items to motivate change, providing new taste testing-sampling opportunities, and by working with other community-based programs, like food pantries and SNAP agencies, to reduce food insecurity and eliminate obstacles to accessing healthy foods.

Implications for Dietetics faculty and NEP administrators include the need to further develop and refine the existing training protocol for dietetic interns. Currently, dietetic interns

receive a brief training on the basics of the NEP implementation and lesson delivery during the internship orientation. Interns are introduced to the curriculum and faculty observe mock lessons taught by interns in a controlled environment. Interns participate in a variety of supervised practice opportunities during the NEP rotation. But, until this review there had never been an evaluation of the effectiveness of NEP implementation comparing professional-level RD educators and dietetic interns. Results of this review established specific differences between the two types of educators. The internship orientation should be revised to include more field time with professional-level RD educators and to include opportunities for mentorship beyond the initial training period. More training should be provided on issues such as classroom management and control, keeping the children's attention, and leveraging the food tasting experience as a hands-on learning opportunity for children in the program.

It would also be beneficial for interns to spend time shadowing professional-level RD educators during the internship orientation. Shadowing would provide an opportunity for interns to learn from the experience of seasoned practitioners. With continued observation and time, interns and beginner practitioners alike may learn new techniques and strategies that will help form their own professional style of teaching. Targeted and continuous learning, along with mentor support, is helpful to interns and advanced-practice professionals alike as new skills are developed. Empowerment is achieved through the lifelong learning and professional development that occurs over the course of a career and lifetime (Charney & Peterson, 2013).

Finally, the implications of these findings are also important on a more global scale. The implication of these findings have an effect on the profession of Dietetics as a whole. The Academy of Nutrition and Dietetics (AND) acknowledges the important role that registered dietitians play in federally-funded nutrition education and assistance programs for children and adolescents in the position paper, *Position of the Academy of Nutrition and Dietetics: Child and*

Adolescent Federally Funded Nutrition Assistance Programs (Roy & Stretch, 2018). It is the position of AND that registered dietitians have the competencies, knowledge, and skills to administer and provide nutrition education programming that ensures all children and adolescents have access to a safe, nutritious, and adequate food supply for optimum, life-long health.

As part of NEP supervised practice rotation, dietetic interns learn valuable lessons and gain a skillset that positions them to have an impact on the role and responsibilities of registered dietitians in federal nutrition education assistance programs in their future careers. According to Roy and Stretch (2018), as interns learn about the guidelines and funding for SNAP-Ed, they gain the knowledge and skills needed to advocate for funding to support nutrition education for needy children and adolescents. As interns participate in the full implementation of the NEP, including the process of policy, systems, and environmental change necessary to make a program holistic, they become advocates for a national health curriculum that includes nutrition education; they learn to promote stronger school wellness plans, and learn to implement evidence-based practice guidelines when developing programs and policies related to nutrition education (Roy & Stretch, 2018). When interns participate in data collection of pre-/post-tests and parental surveys, they learn valuable program evaluation skills and understand how to collect nutrition surveillance data. As interns work with professional-level RD educators to develop and implement policy, systems, and environmental changes in their schools, they develop crucial new communication skills. Interns also learn fundamental lessons in leadership when they work with school administrators and teachers. Interns are provided with opportunities to work with community-based programming to ensure that all foods and beverages served and sold to children are nutritious and contribute to the child's overall well-being and health (Roy & Stretch, 2018). Finally, as interns learn about the ways in which public policy influences local nutrition

education programming, they are developing new knowledge related to providing leadership on emerging local and national public policy issues. Knowledge related to leadership on local and national policy issues enables them to connect the paths of public policy, program planning, evaluation, and communication in nutrition education programs (Roy & Stretch, 2018).

In summary, many important implications developed from the retrospective review used to answer the research questions for this dissertation, including having a better understanding of the need for rigorous testing of evaluation questions before initial use and throughout the evaluation process, and the importance of ongoing data monitoring to ensure that all data is captured correctly and in a timely manner. The findings of this review explain specific differences that exist between professional-level RD educators and dietetic interns in the classroom. Understanding these differences will enable Dietetics faculty and NEP administrators to design a training protocol for interns to meet their unique learning needs. Having a better understanding of the socio-economic status of the NEP population will allow a more adept design of programming related to policy, systems, and environmental change to meet the needs of our participants.

Finally, and perhaps most importantly, the implication on the dietetics profession and the Tri-State region should be stated. Every year, Marshall Dietetics trains 12 dietetic interns to deliver nutrition education through SNAP-Ed, an obesity prevention program. Most of the interns stay in the local Tri-State region upon graduation and become practitioners, treating the needy people of the region. Given the extreme health needs of this population, the current obesity crisis, and the issues related to poverty and food insecurity, these interns are poised to make a positive impact on the health behaviors of the people of this region. Hopefully, they will also become advocates for funding and public policy that supports federally-funded nutrition education programs, having a long-term impact on the profession of Dietetics as a whole.

RECOMMENDATIONS FOR FURTHER STUDY

The goal of this study was to complete a retrospective review of the NEP data to determine if the program was having the desired impact on knowledge and behavior change of participants after the program intervention, and to determine what differences exist between professional-level RD educators and dietetic interns. The results of this review will be used to improve intern training and the overall experience with the nutrition education rotation. The results revealed a significant improvement in overall knowledge from pre- to post-test. Based on the results of the statistical analysis of the existing data, no statistical significance was found in behavioral change. It is undetermined why there was no difference in behavior as intended. A major finding of the review includes issues with the validity and reliability of the NEP pre- and post-test, which likely contributed to the lack of significance. This finding provides much opportunity for further study.

The results of teacher focus groups included many positive outcomes of the program, as well as highlighted differences between professional-level RD educators and dietetic interns. These findings will refine the orientation process and training for interns and positively impact the program overall. Several other important areas for further research also emerged as a result of the focus group findings. Recommendations for further study include:

1. In order to determine whether or not real behavior change has occurred as a result of the intervention, it is important to use a control group for future evaluation. Although it might be difficult to find a school willing to participate in the evaluation component without having the intervention, the only way to know for sure whether the program truly has an impact on behaviors is to compare the results of the intervention group with a control group.
2. Since this retrospective review of NEP data was initiated, the program has altered evaluation methods from the student pre-/post-test to a standardized parental survey. The parental

survey was developed by the UC Davis Department of Nutrition's SNAP-Ed program, Healthy Kids. This survey was revised by administrators at West Virginia University Extension Service to fit the needs of SNAP-Ed programming in WV. Since the evaluation was revised from the original design, additional reliability and validity testing should be completed to ensure that it is measuring behavior change of the NEP participants

3. Parent survey data should be reviewed and analyzed on a bi-annual basis to ensure there are no problems with the data. Review of data on a bi-annual basis would allow Dietetics faculty and NEP administrators to continuously monitor data collection and program results.
4. The results of this focus group analysis should be used to develop improved focus group questions. It would be feasible to have specific questions related to professional-level RD educator schools and other questions related to intern-educator schools, as well as questions assessing overall programming at both types of schools.
5. An evaluation of intern orientation for the NEP rotation, as well as the shadowing and mentoring experience with professional-level educators should be evaluated by interns after the orientation phase of the NEP rotation. Additionally, since the NEP rotation is a significant part of the internship experience, it is important to thoroughly evaluate this experience. The evaluation could be completed through a series of evaluations, including orientation evaluation, a process evaluation of the intern's experience with direct education lessons, and an evaluation of the experience related to policy, systems, and environmental change.
6. Since the data derived from a process evaluation is limited in scope, a focus group evaluating both interns and professional-level RD educators every year is important. As evidenced by the results of this retrospective review, interns and professional-level educators have different impacts on the program. The thoughts, feelings, and impressions of the

program from interns and professional-level RD educators alike are important and would be a valuable tool for continuous program improvement.

SUMMARY

Nutrition education implemented by the Marshall NEP is important because childhood obesity rates have tripled in the past 40 years. Obesity disproportionately impacts the region where the NEP is implemented more than most other areas of the US. Children who are overweight or obese are at greater risk for high blood pressure, insulin resistance and type 2 diabetes, fatty liver disease, heart disease, and psychosocial issues. The longer children remain obese throughout childhood, the more likely they are to become obese adults. Obese children are more likely to have poor educational performance. Results from the 2011-2012 National Children's Health Survey showed a statistically significant inverse association between BMI and educational outcome (Carey et al., 2015).

Marshall's NEP directly addresses the childhood obesity issue through the implementation of direct-delivery lessons that are augmented by PSE changes. Since the NEP relies so heavily on lesson implementation from dietetic interns who have no formal training in education, it will be important to use these results to develop a more specific intern-training protocol for delivery of NEP lessons and to improve the overall program, with the ultimate goal of improving the health of the NEP participants and reducing obesity rates.

A well-established body of evidence asserts that most children who participate in federally-funded nutrition assistance programs such as SNAP-Ed are more likely to be food insecure. Federal nutrition education programs for low income children not only enhance overall diet quality, but when considering long-term impacts, also act as food safety nets, decrease health care costs, and improve academic performance. This consideration is critical when examining the data from this retrospective review. An ancillary finding of this review was a

statistically significant difference in how well children performed on post-tests, based on their socio-economic status, as it related to the percentage of children in the school who received free and reduced-priced meals. The mean post-test score of children who attended schools with 50-59.9% of children receiving free and reduced meals was higher (mean score of 6.17) than the mean post-test score of children who attended schools with 90-100% of children receiving free and reduced meals (mean score of 5.53). Additionally, many teachers in the focus groups noted the connection between the socio-economic status of children and the importance of food exposure, as most NEP participants are from low-income homes and receive free and/or reduced school meals. Having exposure to the new foods offered by the NEP is critical to acceptance of new foods as most parents cannot or do not provide the same kinds of healthy foods at home that children are exposed to in the program.

The results of this review showed that the Marshall University NEP successfully increased knowledge gain for students who received the nutrition education intervention, despite the economic and food insecurity barriers of program participants. This knowledge gain is consistent with findings of evaluations from similar nutrition education programs and should be considered an indicator of short-term success of the intervention. However, further statistical analysis showed there was no change in participant behavior, based on the results of the pre-/post-testing. Although it is unclear why there was no behavioral change, it is likely related to factors associated with the pre-/post-test design and lack of validity and reliability testing during the evaluation's initial development. In comparison with other nutrition education programs, Marshall's NEP has a similar program delivery, number of lessons, and research-based curriculum, but there is a difference in the method of program evaluation. The NEP *Show Me Nutrition* evaluation lacked analysis for cognitive testing to evaluate face and content validity,

whereas other, similar programs showing behavior change included evaluations with this critical component.

Expert committee recommendation of program evaluation through pre-/post-testing includes continuous testing of questions to ensure questions adequately measure participant behavior change, while remaining feasible for program evaluation. Recommendations also include continuous, extensive testing and adaptation of questions with the ultimate goal having testing of questions in an effectiveness trial, or comparison with a control group.

Although it was found that the NEP pre-/post-test evaluation did not adequately measure the behavior change of participants, it is important to emphasize that there were many other valuable program components realized through this review. Teachers who participated in focus groups provided many notable benefits of participation, including the taste-sampling experiences and the increased likelihood of acceptance of new foods; the link between food tasting experiences and knowledge and potential behavior change; and the competence and skill demonstrated by professional-level RD educators through the use of a learner-centered environment.

It was found that the professional-level RD educators had a sense of empowerment with regard to their classroom teaching. This empowerment developed over time and allowed a sense of competence in the classroom. Given that empowerment is a continuous process where individuals use lifelong experiences to exercise power over their own practices and circumstances, this finding was expected. Since dietetic interns are in a beginner phase of professional practice, with little or no experience, it was also expected that they would not be found to be empowered in the classroom.

The experience of participating with the NEP has many benefits for the interns, including learning valuable lessons and gaining a skillset that positions them to work in federal nutrition

education assistance programs in the future. Other benefits included gaining the knowledge and skills needed to advocate for funding of federal programs to support nutrition education for needy children and adolescents; understanding the process of policy, systems, and environmental change necessary to make a program holistic; learning how to implement evidence-based practice guidelines when providing programming; learning to develop policies related to nutrition education; learning valuable skills with regard to program evaluation and the collection of nutrition surveillance data; developing new skill sets, including imperative professional communication skills; and developing new leadership skills on providing guidance regarding emerging public policy.

Finally, it is important to mention that using existing data for a dissertation is sometimes frowned upon. Although the value of developing and investigating new research questions is appreciated, the role of evaluating existing data should not be undervalued. As intended, the findings of this review will be used to improve the intern NEP training experience during the orientation phase of the internship. The improvement in the interns' training will have a ripple effect for the whole program, the overall program implementation for all program stakeholders - participants, funders, educators, interns, administrators, and Dietetics faculty alike, further reinforcing that all research, including retrospective data, has value.

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PERSONAL INTERVIEWS

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APPENDICES

APPENDIX A: IRB APPROVAL LETTER

MARSHALL UNIVERSITY
www.marshall.edu

Office of Research Integrity

October 31, 2018

Amy M. Gannon, MS, RD, LD
Department of Dietetics
Marshall University

Dear Ms. Gannon:

This letter is in response to the submitted dissertation abstract entitled *"The Effectiveness of Nutrition Education: Comparing Professional-RD Educators and Dietetic Interns."* After assessing the abstract it has been deemed not to be human subject research and therefore exempt from oversight of the Marshall University Institutional Review Board (IRB). The Code of Federal Regulations (45CFR46) has set forth the criteria utilized in making this determination. Since the study does not involve human subjects as defined in DHHS regulation 45 CFR §46.102(f) it is not considered human subject research. If there are any changes to the abstract you provided then you would need to resubmit that information to the Office of Research Integrity for review and determination.

I appreciate your willingness to submit the abstract for determination. Please feel free to contact the Office of Research Integrity if you have any questions regarding future protocols that may require IRB review.

Sincerely,

Bruce F. Day, ThD, CIP
Director

APPENDIX B: AMY GANNON CURRICULUM VITAE

Amy M. Gannon, MS, RDN, LD
Curriculum Vitae

Home Address:
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304.941.2440
amy.gannonRD@gmail.com

Work Address:
Marshall University
Department of Dietetics
One John Marshall Drive
Huntington, WV 25755
304.696.6641
amy.gannon@marshall.edu

Education:

Doctoral Program in Education
Marshall University (anticipated graduation May 2019)
- Major: Curriculum and Instruction
- Emphasis: Dietetics Education

Master of Science in Dietetics
Marshall University, (July 2004)
- Nutrition and Healthcare Management emphasis

Dietetic Internship
Marshall University, (July 2000)

Bachelor of Science in Family and Consumer Science- Human Nutrition and Foods
West Virginia University, (May 1999)

Work Experience:

Higher Education:

Marshall University
Academic Rank: Assistant Professor
Title: Didactic Program Director (DPD) and Assistant Professor, Department of Dietetics
Huntington, WV. (August 2006 to August 2009) (August 2015-Present)
- Serve as undergraduate academic instructor, Department of Dietetics
- Serve as faculty advisor to the Marshall University Nutrition Education Program.
- Serve as academic advisor to undergraduate dietetics students.
- Serve as nutrition advisor and spokesperson for the Department of Dietetics and College of Health Professions in the Huntington and Charleston communities.

West Virginia University Extension Service
Academic Rank: Assistant Professor
Title: Supplemental Nutrition Assistance Program- Education (SNAP-Ed) Coordinator, Youth Extension Specialist- WVU Extension Service, Family Nutrition Program (FNP)
Charleston, WV. (August 2009-August 2015) (September 2004 to August 2006)

Additional work experience available upon request.

Professional Certifications:

- Recognition as a Registered Dietitian granted by the Commission on Dietetic Registration
- Recognition as a Licensed Dietitian granted by the WV Board of Licensed Dietitians
- Certificate of Training in Leadership; granted by the American Dietetic Association and Commission on Dietetic Registration- Scottsdale, AZ. June 2011
- Certificate of Training in Pediatric Weight Management granted by the American Dietetic Association and Commission on Dietetic Registration- San Jose, CA. February 2005

Grants and Contracts:

- 2015- US Department of Agriculture, Food and Nutrition Service, Washington, DC $3,314,961, *Lead Author & Reviewer*
- 2014- US Department of Agriculture, Food and Nutrition Service, Washington, DC $3,215,205, *Section Author & Reviewer*
- 2013-US Department of Agriculture, Food and Nutrition Service, Washington, DC $3,260,351, *Section Author & Reviewer*
- 2012- US Department of Agriculture, Food and Nutrition Service, Washington, DC $3,106,686, *Section Author & Reviewer*
- 2010- US Department of Agriculture, Food and Nutrition Service, Washington, DC $2,680,800, *Section Author & Reviewer*
- 2008- American Dietetic Association, Strategic Planning for the WV Dietetic Association, Charleston, WV, $6000, *Author*
- 2005- West Virginia Community Action Partnerships, Charleston, WV, $10,000, *Section Author & Reviewer*

Research Projects:

- Serve as Co-Investigator for the Marshall University Department of Dietetics Nutrition Education Program Assessment (On-Going). Assessment of the Marshall University Nutrition Education program through pre/post- parent assessments and teacher focus groups. (2015-Present).
- Served as co-investigator for the Re-Think Your Drink Social Media Evaluation. Charleston, WV. (February 2015-August 2016).
- Served as primary investigator for the EFNEP Youth Evaluation Project: *Impact of the Family Nutrition Program on Children's Health Knowledge and Skills.* Charleston, WV. (September 2012-2016).
- Served as primary investigator for the *Pre-School Pilot Project, Prospective and Retrospective.* Charleston, WV. (March-September 2012 and April 2013-2016).
- Served as primary investigator for the "FNP Evaluation Project"- secondary analysis of process-oriented information and aggregate pre/post- test scores to demonstrate impact on knowledge and behavior. Charleston, WV. (2011-2016)

Professional Publications and Peer Reviews

- *Author*- What's cooking in the Kitchen? The future of dietetics education at Marshall University. (2016): Gannon, A. *Nutrition and Dietetic Educators and Preceptors (NDEP) Line Newsletter:* (Summer 2016). pp. 9-12.
- *Poster Presentation*- WV Academy of Nutrition and Dietetics Annual Conference,

Huntington, WV Marshall University DPD Accreditation Self-Study: A Process Review, Gannon, A. (May, 2017).

- *Poster Presentation*- WV Academy of Nutrition and Dietetics Annual Conference, Huntington, WV. Use of Technology in a Youth Nutrition Education Program Improves Efficiency of the Evaluation and Leads to Improved Staff Satisfaction, Gannon, A. (Poster Presenter & Author), Mount, M. (Poster Presenter & Author), Williams, K. (Author Only), Bender, T. (Author Only). (May, 2017).
- *Poster Presentation*- Food and Nutrition Conference & Expo, Academy of Nutrition and Dietetics, Boston, MA. Use of Technology in a Youth Nutrition Education Program Improves Efficiency of the Evaluation and Leads to Improved Staff Satisfaction, Gannon, A. (Poster Presenter & Author), Mount, M. (Poster Presenter & Author), Williams, K. (Author Only), Bender, T. (Author Only), (October 16, 2016).
- *Poster Presentation*- Food and Nutrition Conference and Expo, 2014, Atlanta, GA. Nutrition and Physical Activity Policies and Environments: Evaluating Impact as an Obesity Prevention Model in Early Childcare. Gannon, A., and Jeffrey, J. (2013, September). *Journal of the Academy of Nutrition and Dietetics,* Vol. 114, Issue 9, Supplement, Page A81.
- *Poster Presentation*- Society for Nutrition Education and Behavior 2013 Annual conference, Portland, OR. Assessing the Effectiveness of Preschool Nutrition Education: A Pilot Program. Gannon, A. (2013, July/August). *Journal of Nutrition Education and Behavior, 45*(4S) S12.
- *Poster Presentation*- Joint Council of Nutrition Education Professional Galaxy Conference in Pittsburgh, PA. Assessing the Effectiveness of Preschool Nutrition Education: A Pilot Program. Gannon, A. (September 2013).
- *Poster Presentation*- Food and Nutrition Conference and Expo 2013, Houston, Texas. Assessing the Effectiveness of Pres-School Nutrition Education in West Virginia: A Pilot Program. Gannon, A. (2013, September). *Journal of the Academy of Nutrition and Dietetics,* Vol. 113, Issue 9, Supplement, Page A77.

Additional professional publications and peer reviews available upon request.