

5-2016

## An Evaluation Of College Students' Use Of Social Media In Nutrition Education For Lifestyle Behavior Changes

Cassandra Crawford-Ciglar  
*University of New England*

Follow this and additional works at: <https://dune.une.edu/theses>



Part of the [Educational Assessment, Evaluation, and Research Commons](#), [Educational Leadership Commons](#), [Educational Methods Commons](#), [Higher Education Commons](#), and the [Public Health Commons](#)

© 2016 Cassandra Crawford-Ciglar

---

### Preferred Citation

Crawford-Ciglar, Cassandra, "An Evaluation Of College Students' Use Of Social Media In Nutrition Education For Lifestyle Behavior Changes" (2016). *All Theses And Dissertations*. 51.  
<https://dune.une.edu/theses/51>

This Dissertation is brought to you for free and open access by the Theses and Dissertations at DUNE: DigitalUNE. It has been accepted for inclusion in All Theses And Dissertations by an authorized administrator of DUNE: DigitalUNE. For more information, please contact [bkenyon@une.edu](mailto:bkenyon@une.edu).

AN EVALUATION OF COLLEGE STUDENTS' USE OF SOCIAL MEDIA IN NUTRITION  
EDUCATION FOR LIFESTYLE BEHAVIOR CHANGES

By

Cassandra Crawford-Ciglar

A.A.S. (Tulsa Community College) 1997

B.S. (Oklahoma State University) 1998

M.A. (University of Oklahoma Health Sciences Center) 2008

A DISSERTATION

Presented to the Faculty of

The College of Graduate and Professional Studies

at the University of New England

In Partial Fulfillment of Requirements

For the Degree of Doctor of Education in Educational Leadership

Portland & Biddeford, Maine

May, 2016

Cassandra Crawford-Ciglar © 2016

Cassandra Crawford Ciglar

May 2016

Educational Leadership

AN EVALUATION OF COLLEGE STUDENTS' USE OF SOCIAL MEDIA IN NUTRITION  
EDUCATION FOR LIFESTYLE BEHAVIOR CHANGES

Abstract

Behavior change is a process. College students routinely have poor eating habits during a time of life that can negatively impact health outcomes for the adult years. While knowledge of nutrition is essential to promote health and wellness, other components are required to change behavior. Specifically, nutrition education must be paired with behavior change skills or goal setting strategies in order for a change to occur. In a college classroom setting, many examples of such strategies already exist. Literature supports evidence that interventions combining social media and behavior change techniques incorporating online social networks may be effective. The purpose of this comparative analysis, quantitative study is to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. The course was supported with social media and 108 participants were invited to participate in the study from ages 18-50 years old, living in rural, Mid-western United States. Eligible participants were currently enrolled in a general education nutrition course and completed a required 24 hour food diary assignments at Week 2 and Week 14, and a social media participation survey. Data was compared to archival data from a previous course not supported with social media (N=90). Significant results were seen in two of six areas as college students did alter dietary intake of dairy and protein food groups as a result of participation in this study. Further research is warranted to continue to

develop best practice approaches for nutrition education using social media and its intended audiences for the promotion of healthy lifestyle behavior changes.

*Keywords:* nutrition education, behavior change, social media, college students

University of New England

Doctor of Education  
Education Leadership

This dissertation was presented  
by

Cassandra Crawford-Ciglar

It was presented on  
April 24, 2016  
and approved by:

Carey Clark, Ph.D,  
Lead Advisor  
University of New England

John Lustig, Ed.D  
Secondary Advisor  
University of New England

Jerrid Freeman, Ed.D  
Affiliate Committee Member  
Northeastern State University

## ACKNOWLEDGEMENTS

This study is the conclusion of a remarkable journey I would not have been able to complete were it not for the support and guidance of my committee members, feedback from my research group, help from friends, and unconditional love and support from my husband and children.

I would like to thank Dr. Carey Clark for her guidance, patience, and support throughout the research process and being an advocate for my goals. I would like to thank Dr. John Lustig for his contributions to my committee and edits to my research. I would like to thank Dr. Diana Mashburn, Dr. Lucas Foster, and Dr. Dorothy Radin for their time and contributions to my dissertation. Thank each of you for “paying it forward”. Special thanks to goes to Dr. Jerrid Freeman who was willing to participate in my committee at the last minute and for graciously editing my drafts. My research would not have been possible without their assistance.

To my technical editor, Julia Carlo, your expertise and expedience helped to assure my successful completion.

To my research / email support group from Cohort 2, words cannot express how thankful I am to have experienced this journey with you. There are many days that your support, advice, and feedback are what propelled me to continue.

To my children, Jared and Maleah, heartfelt thanks for your understanding as you have sacrificed to make my dream a reality.

Finally, to my husband, Dr. Steven Ciglar, the man who chose to marry me at the beginning of this journey, supported me through every high and low, and championed this

endeavor, thank you. It is because of your love, devotion, and unwavering beliefs that I will now share both your name and title.



## TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
Statement of the Problem .....	2
Purpose of the Study .....	4
Research Questions.....	4
Conceptual Framework.....	5
Assumptions, Limitations, and Scope.....	6
Significance of the Study .....	7
Definition of Terms.....	8
Conclusion .....	11
CHAPTER 2: REVIEW OF THE LITERATURE .....	12
Nutrition Education and Information.....	14
Knowledge of nutrition.....	14
Nutrition education interventions .....	19
Nutrition Education and Behavior Change.....	21
Changes in health behaviors of college students .....	22
Changes in nutrition-related behaviors of college students .....	25
Application of Technology in Nutrition Education and Health Interventions.....	27
Technology in nutrition education and health interventions.....	28
Social media in health interventions .....	31
Social media interventions with college-aged students .....	34
Conceptual Framework.....	38

Conclusion .....	40
CHAPTER 3: METHODOLOGY .....	42
Research Design.....	43
Purpose.....	44
Research Questions .....	44
Participants.....	45
Setting .....	46
Data Collection .....	46
Archival data.....	49
Data Management .....	50
Data Analysis .....	50
Participants Rights .....	52
Limitations of the Study.....	53
Conclusion .....	54
CHAPTER 4: RESULTS .....	55
Archival Data Analysis .....	56
Convenience Sample Data Analysis .....	59
Findings for Research Question 1.....	64
Findings for Research Question 2.....	67
Conclusion .....	71
CHAPTER 5: SUMMARY AND DISCUSSION .....	73
Interpretations of Findings.....	74
Implications of Limitations on Research .....	76

Implications for Future Practice.....	77
Recommendations for Future Study .....	78
Conclusion .....	79
REFERENCES .....	81
APPENDIX A. COVER LETTER .....	91
APPENDIX B. INFORMED CONSENT.....	93
APPENDIX C. CHOOSE MY PLATE ASSIGNMENT .....	97
APPENDIX D. COMPREHENSIVE DIETARY AND PHYSICAL ACTIVITY ANALYSIS ...	99
APPENDIX E. IRB APPROVAL LETTER UNE .....	102
APPENDIX F. UNE DISSERTATION PROPOSAL APPROVAL LETTER .....	103

## LIST OF TABLES

Table 1: Algorithm for Stage of Change Based on Student's Overall Dietary Pattern .....	52
Table 2: Week 2 and Week 14 Alterations in Dietary Intake for Archival Data Group.....	57
Table 3: Week 2 and Week 14 Stage of Change Assessment for Archival Data Group .....	59
Table 4: Week 2 and Week 14 Alterations in Dietary Intake for Convenience Sample Group ....	60
Table 5: Week 2 and Week 14 Stage of Change Assessment for Convenience Sample Group....	62
Table 6: Social Media Used by Participants in Convenience Sample Group from Weeks 3-Weeks 14.....	63
Table 7: Week 2 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group: Group Statistics.....	65
Table 8: Week 2 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group: Independent Samples Test.....	65
Table 9: Week 14 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group .....	66
Table 10: Week 14 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group: Group Statistics.....	68
Table 11: Week 14 Alterations in Dietary Intake Comparison for Archival Data Group Versus Convenience Sample Group .....	69

## CHAPTER 1

### INTRODUCTION

The college years are a time of transition, often resulting in a deterioration of dietary habits. Many factors contribute to these changes including stress, changes in physical activity patterns, study schedules, and overall changes in eating patterns (Ha & Caine-Bish, 2009; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Sealey-Potts, Alfaro, Horine, & Kallus, 2009). Eating patterns established in childhood carry on into adulthood (Contento, 2011). The college years are the last years of adolescence, so they present an opportunity to influence eating behaviors, implement healthy behaviors, and support positive self-esteem for the adult years (Ha & Caine-Bish, 2009; Woekel et al., 2013).

Nutrition education is comprised of any combination of educational strategies and environmental support designed to encourage individuals to make healthier food and lifestyle choices. For college students, nutrition education can be delivered via numerous methods including coursework, seminars, social norms marketing campaigns, and technology including social media (Killos, Hancock, McGann, & Keller, 2010; Lockwood, & Wohl, 2012; Tyma, 2011). Social media is a relatively low-cost, direct approach for nutrition educators to reach target audiences (Tobey & Manore, 2014; Torgan & Cousineau; 2012). Searches of health related topics rank third only below general search engine use and email (Korda & Itani; 2013; Tobey & Manore, 2014). Using social media as a tool for nutrition specific behavior change is a practical solution as evidence presents effectiveness of social media interventions, though minimal research has been done in this field (Maher et al., 2014).

Changing behavior is not simple, as individuals may set goals that are too difficult to reach or lack motivation to reach. Research validates the effectiveness of nutrition education in all populations; however, it is more impactful when combined with behavior change techniques (Contento, 2011; Contento, Randell, & Basch, 2002; Woekel et al., 2013). While documentation of social media's impact on behavior change exists and scientists agree it has greater impact when paired with a behavior change theory (Maher et al., 2014; Webb, Joseph, Yardley, & Michie, 2010), additional research is warranted as little prevails pertaining to the use of social media with long-term healthcare and behavioral improvements (Centola, 2013; Maher et al., 2014). As a researcher and educator working daily with college students, influencing nutrition education for this focus group remains of utmost importance. College students are (a) interested in nutrition education, and (b) will use technology as a resource to meet specific nutritional needs (Contento, 2011; Cousineau, Goldstein, & Franko, 2004; Duffrin, Eakin, Bertrand, Barber-Heidel, & Carraway-Stage, 2011; Ha & Caine-Bish, 2009). Evaluating the effects of social media on college-aged students in a general education nutrition course can generate new practices and approaches for this target audience. Transformative technology leaders should make responsible decisions regarding technology, focusing on student-centered learning opportunities (Papa, 2011). The purpose of this study is the introduction of free technology (social media) to a college-level course, highlighting its influences on nutrition-related behavior changes. Influence of change can be measured as changes are implemented by assessing alterations in individuals' behaviors (Wheatley, 2006).

### **Statement of the Problem**

Research demonstrates college students are forming poor eating habits during a time of life that can negatively affect health outcomes as adults (Lockwood & Wohl, 2012). Given that

four of the top ten causes of death in adults directly relate to nutrition, influencing the lifestyle choices of college students is crucial as nutrition has a cumulative effect over one's lifespan (Byrd-Bredbenner, Moe, Berning, & Kelley, 2016). The literature clearly emphasizes that knowledge of nutrition is not enough to change behavior. In order for behavior change to occur, nutrition education must be paired with behavior change skills or goal setting strategies (e.g., motivational interviewing, the Nutrition Care Process, action plans) (Contento, 2011; Contento et al., 2002; Lockwood & Wohl, 2012). Additional research in the literature supports evidence that interventions combining social media and behavior change techniques incorporating online social networks may be effective, which is what this study proposed to determine (Maher et al., 2014; Webb et. al, 2010).

Nutrition educators did not readily embrace the use of social media at its onset, thus research is lacking and struggling to catch up with other health professions (Leak, Benavente, Goodell, Lassiter, Jones, & Bowen; 2014; Lohse, 2013). Facebook and Twitter, being identified as preferred social media sites for college students, have both been successful in enhancing student engagement (Clauson, Singh-Franco, Sicar-Ramsewak, Joseph, & Sandars, 2013; Mckay, Sanko, Shekhter, & Birnbach, 2014; Tyma, 2011). There is limited research demonstrating social media as an effective tool for nutrition education that results in behavior change (Leak et al., 2014; Lohse, 2013). The study evaluated nutrition related behavior changes in a specific student population using social media in a general education nutrition course.

Currently, research is its infancy in the fields of social media integrated with nutrition education. As nutrition education is under the realm of health promotion, research does show social media as a preferred method for reaching multiple target audiences in the broader field of health promotion, though many of these studies involve health promotion interventions with

emphasis on smoking cessation, alcohol abuse, physical activity, and safe-sex practices (Korda & Itani, 2013; Tobey & Manore, 2014; Tyma, 2011). While research demonstrates successful strategies for using some social media for behavior change (Story & Bonica; 2014; Webb et al., 2010), evidence is lacking using social media as an effective tool for nutrition educators (Balatsoukas, Kennedy, Buchan, Powell, & Anisworth, 2015; Leak et al., 2014; Lohse, 2013). It is the responsibility of current nutrition educators to fill in this gap by providing invaluable information, displaying how social media can be utilized as a means to heighten healthy lifestyle choices relating specifically to nutrition.

### **Purpose of the Study**

The purpose of this comparative analysis, quantitative study is to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. The course was supported with social media and offered in 2016 at a regional Division II higher education institution located in a rural, mid-western region of the United States. The theoretical frameworks of social cognitive theory and the transtheoretical model describe the motivational strategies of behavior change employed using social media in the nutrition education course (Contento, 2011; Frimming, Polsgrove, & Bower, 2011; Ha & Caine-Bish, 2009; Mihaly, Altit, & Coccia, 2015).

### **Research Questions**

Through the guiding lenses of the transtheoretical model and social cognitive change theories, this research endeavored to investigate the following questions: (1) What influence does the use of social media have modifying a college student's readiness to change regarding nutritional lifestyle behaviors? and (2) How does the use of social media in a general education nutrition course relate to a college student's alterations in dietary intake?



Social cognitive theory proposes that behavior change occurs because of personal, behavioral, and environmental factors (Contento, 2011). The measurement of a college student's alterations in dietary intake is an efficacy of a social-media based intervention (Mihaly et al., 2015). Previous research completed by Richards, Kattlemann, and Ren (2006) used web-based interventions to increase fruit and vegetable consumption in 18- to- 24 year-olds and assessed stage of change using an algorithm based on an individual's consumed number of fruits and vegetables servings per day. The research used social media to increase a college student's overall nutrient intake of the five food groups represented in MyPlate: grains, vegetables, fruits, proteins, and dairy (Byrd-Bredbenner et al., 2016). Stage of change assessment occurred using an algorithm adapted from the research completed by Richards et al. (2006).

### **Conceptual Framework**

Merriam (2009) stated that a theoretical framework is the foundation for the scientific study. It allows one to present research from a particular perspective or theoretical lens. The principles of the transtheoretical model and social cognitive theory assist in explaining this investigation. The transtheoretical model looks at behavior change by assessing an individual's readiness to change based on Prochaska and DiClemente's stages of change model (Contento, 2011). The six stages in this model include (1) precontemplation – not currently considering a change, (2) contemplation – ambivalent about change; not making a change within the next month, (3) preparation – some experience with change and trying to make some changes; planning to make changes in the next month, (4) action – practicing a new behavior for three to six months, (5) maintenance – continued commitment to new lifestyle behavior for six months to five years, and (6) relapse – resumption of old behaviors, “falling off the wagon” (Contento,

2011). Before an individual can commit to making goals, the individual has to be ready to make changes.

Social cognitive theory supports research combining traditional nutrition education materials with interactive activities (the use of social media). Social cognitive theory suggests behavior change occurs because of personal, behavioral, and environmental factors (Contento, 2011). By exposing students to both information and interactive technology, social cognitive theory can assist in explaining how students achieve new dietary behaviors. One strength of this study is how social cognitive theory is demonstrated in an existing college nutrition course, serving as a cost-effective means to address positive nutrition behavior change in the target population.

### **Assumptions, Limitations, and Scope**

It is assumed that students will complete assignments correctly, and report information accurately. Additionally, it is understood that students will engage in the use of social media both in and out of the classroom environment to further emphasize normal class assignments, activities, and lectures tied to social cognitive theory in which students use their own dietary choices and lifestyle behaviors as a reference for learning course materials. Students not completing assignments correctly or not engaging in the use of social media due to lack of technology access, limits the scope of social media influence on nutrition interventions and behavior change.

The limitations of the study include a small sampling size of college students at a regional Division II higher education institution located in a rural, mid-western region of the United States. While the use of college students for a sample population is appropriate for the nutrition study, college students do not represent the general population, thus additional studies

using social media as a nutrition education promotional tool are warranted (Maher et al., 2014). As participation is voluntary, there is an effect on the overall sample size for the study. Students participating in this study may not be representative of all college student populations participating in a general education nutrition course. Students participating in the study did not have the same course instructor; however, course curriculum design is the same for all participants. Reliability of data is limited as all participant data is self-reported; additionally, archival data was used for control group data. Sample size was affected by a few students who did not complete both scheduled course assignments.

Previous experiences as a Registered Dietitian and as a university instructor influence the views and approaches to this research (Denzin & Lincoln, 2011). The researcher was watchful for bias throughout the study process. By employing quantitative research methods, data collection, and analysis, the researcher endeavored to maintain the highest quality of scholarship and credibility of results.

### **Significance of the Study**

Change is inevitable. Change in education and learning resources is occurring at an exponential rate. Papa (2011) emphasized the importance of keeping up with trends and changes in technology to ensure effective curricular assessment for all learners. Academia meets this challenge in its use, management, and evaluation of technology to improve student learning. Transformative technology leaders "...emphasize the importance of keeping up with the trends and changes in technology to ensure effective curricular assessment for all learners" (Papa, 2011, p. 254). The use of social media in a college nutrition course is proposed as a means to do so (Korda & Itani, 2013; Tobey & Manore, 2014; Tyma, 2011).

Transformative leaders seek to make changes that benefit their students, organizations, and society (Shields, 2010). University professors, as transformative leaders, have a vital role in the education of college students, preparing individuals for their future life's roles. As a nutrition educator, a primary responsibility to students is ensuring quality educational experiences in preparation for dietetics internships, but more importantly, to prepare students for careers as active and contributing members of society. Nutrition education is one of the pivotal tools college students require to increase both knowledge and skills for future lifestyle success.

While the literature clearly favors the use of social media as a tool for behavior change (Tobey & Manore, 2014; Torgan & Cousineau, 2012), more focused research is needed demonstrating the use of social media as an effective behavior change tool for nutrition education and interventions (Maher et al., 2014). Evaluating the effects of social media on college students in a general nutrition education course can generate new practices and approaches for this target audience by expanding on existing nutritional studies of Richards, Kattleman, Cuirong (2006), Story and Bonica (2014), and Webb et al., (2010). Future research may explore innovative new approaches for nutrition educators to reach target audiences in multiple markets in order to help influence health behaviors now and those of future generations (Tobey & Manore, 2014; Torgan & Cousineau, 2012).

### **Definition of Terms**

For the purposes of this study, the following terms are defined.

**Behavior change.** The central objective in nutrition education interventions with an increased focus on prevention prior to the onset of chronic nutrition related diseases (Contento, 2011).

**Body Mass Index (BMI).** A person's weight in kilograms divided by the square of height in meters; measurement can be used to screen for weight categories that may lead to health problems, but is not a diagnostic tool of body fatness or of overall health of an individual (Byrd-Bredbenner et al., 2016).

**Calorie dense foods.** Foods containing high levels of calories per serving, often high-fat and high-sugar foods, also known as empty calorie foods (Contento, 2011).

**Dietary guidelines for Americans.** Published jointly every five years by the USDA and DHHS to assist the public in making food choices that provide adequate amounts of essential nutrients and reduce risk of chronic diseases (Contento, 2011).

**Health promotion.** Often interchanged with health education; described as any combination of learning experience used to bring about a voluntary change in health (Contento, 2011).

**Macronutrients.** Nutrients that provide calories or energy in the diet and needed for growth, metabolism, and other body functions (Byrd-Bredbenner et al., 2016).

**Micronutrients.** Vital nutrients required in small amounts essential to development, disease prevention, and well-being (Byrd-Bredbenner et al., 2016).

**MyPlate.** A healthy eating plan designed by the USDA emphasizing the five food groups using portion control (Byrd-Bredbenner et al., 2016).

**MyPyramid.** A former representation of the USDA healthy eating plan shaped in a pyramid containing the food groups used from 1992-2011 (Byrd-Bredbenner et al., 2016).

**Nutrient dense foods:** Foods that contain many nutrients and few empty calories (Byrd-Bredbenner et al., 2016).

**Nutrition education.** Any combination of educational strategies combined with environmental supports, designed to facilitate voluntary food choice changes conducive to health and well-being (Contento, 2011).

**Nutrition intervention.** Any set of planned educational activities or learning experiences that is provided to an individual or group along with environmental supports (Contento, 2011).

**Portion size.** How much one chooses to eat at a particular time, whether it be at home, a restaurant, or from a package (Byrd-Bredbenner et al., 2016).

**Social cognitive theory.** A theory developed by Bandura that proposes that behavior is a result of personal, behavioral, and environmental factors that influence each other in a dynamic fashion (Contento, 2011).

**Serving size.** The amount of food listed on a product's Nutrition Facts label; the recommend serving size from the manufacturer or amount of food recommended in consumer education materials such as MyPlate (Byrd-Bredbenner et al., 2016).

**Social media.** A group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 allowing for the creation and exchange of user-generated content with the most common applications: Facebook, Twitter, Pinterest, Instagram, Snapchat, Vine, LinkedIn, Tumblr, YouTube, and Reddit (Kaplan & Haenlein, 2010).

**Transtheoretical model.** A theoretical model proposing that health behavior change is a gradual, continuous, and dynamic process that occurs in stages based on an individual's readiness to change (Contento, 2011).

**Web 2.0.** The term that describes World Wide Web sites that emphasize user-generated content from site including social media, blogs, wiki, video sharing sites, Web applications, and mashups (O'Reilly, 2009).

## **Conclusion**

If social media is the new frontier in technology applications, then technology leaders and educators need to embrace the possibilities it offers. Social media provides an outlet for connectedness, social support, and communication, and some platforms, for example, Facebook, have been used successfully for health promotion and behavior change (Korda & Itani, 2013). Social media has been shown to improve course engagement and interaction with peers, but studies are limited in focusing on nutrition related behavior change interventions (Bristol, 2010; Clauson et al., 2013; McKay et al., 2014). It is the intent of this research to fill this gap by displaying how social media can be utilized in a general nutrition education class as a means to heighten healthy lifestyle choices as a behavior change tool.

The introduction of the study is delineated in Chapter One including the problem statement, the purpose of the study, questions for research, theoretical and conceptual frameworks, as well as goals and the significance of the study. Chapter Two consists of a comprehensive integrative literature review expanding on the topic introduced in Chapter One, further strengthening the argument for the research and identifying gaps in research. Chapter Three, Methodology, describes the research design and methodology, using both transtheoretical model and social cognitive theory, and includes methods of data collection and analysis. Chapter Four includes results collected and analysis of the data. Chapter Five includes the conclusions surrounding all research questions, implications for the target population and future research, and recommendations for future studies.

## CHAPTER 2

### REVIEW OF THE LITERATURE

The dietary habits of college students have been of interest to researchers for many years. Research has shown that college-aged students are forming poor eating habits during this time of life that can negatively affect their health as adults (Lockwood & Wohl, 2012). Given that four of the top ten causes of death in adults directly relate to nutrition, influencing the lifestyle choices of college-aged students is imperative, as nutrition has a cumulative effect over the lifespan (Byrd-Bredbenner, Moe, Berning, & Kelley, 2016). The literature clearly emphasizes the importance that knowledge of nutrition is not enough to change behavior. Research validates the effectiveness of nutrition education in all populations; however, it is more influential when combined with behavior change techniques (Contento, 2011; Contento, Randell, & Basch, 2002). In order for life style changes to occur, nutrition education must be paired with behavior change skills or goal setting strategies (Contento, 2011; Contento et al., 2002; Lockwood & Wohl, 2012). Nutrition education for college-aged students can be delivered via numerous methods including college courses, seminars, social norms marketing campaigns, and technology including social media (Killos, Hancock, McGann, & Keller, 2010; Lockwood & Wohl, 2012; Tyma, 2011). Currently, research is its infancy in the fields of social media integrated with nutrition education. In this technological age, it is crucial to further explore social media relevant to nutrition education, examining the literature, and determining how it can be utilized as a behavior change tool in an era when today's college students are "plugged in" as early as the toddler years. As nutrition education is under the realm of health promotion, research does show social media as a preferred method for reaching multiple target audiences (Korda & Itani, 2013; Tobey & Manore,



2014; Tyma, 2011). Facebook and Twitter have been identified as two of the top three preferred social media platforms for college-aged students, and both demonstrate success in enhancing student engagement (Clauson, Singh-Franco, Sicar-Ramsewak, Joseph, & Sandars, 2013; Mckay, Sanko, Shekhter, & Birnbach, 2014; Tyma, 2011). Research demonstrates health promotion interventions (e.g., smoking cessation, alcohol abuse, physical activity, safe-sex practices) being effective from the use of social media; however, evidence based practices and research lacks correlating its use in nutrition-specific behavior change interventions (Leak, Benavente, Goodell, Lassiter, Jones, & Bowen; 2014; Lohse, 2013). It is the responsibility of current nutrition educators to fill in this gap by displaying how social media can be utilized as a means to heighten healthy lifestyle choices.

The intent of this integrative literature review is to look at scientific research pertaining to nutrition education, behavior change theories, and social media use in a college nutrition course. Information discussed in this literature review includes the importance of both technology and social media and knowledge increase pertaining to nutrition education and behavior change. Important topics covered are general nutrition education with a focus on nutrition knowledge for college students, as existing literature identifies general nutrition knowledge as a deficit in this target population (Duffrin, Eakin, Bertrand, Barber-Heidel, & Carraway-Stage, 2011; Sealey-Potts, Alfaro, Horine, & Kallus, 2009; Turley, 2009). This focus then transitions to the topic of behavior change, as many studies focus on nutrition education, readiness to change, behavior change theories, and alterations in dietary intake. The final section of the literature review addresses the use of social media (and other technologies) in educational classrooms and the results seen from its implementation. The use of an integrative literature review allows for

presentation of emergent research in social media use in the classrooms and nutrition education in order to create a new framework for research.

### **Nutrition Education and Information**

Nutrition education is an educational technique or strategy used (in a variety of settings) to encourage individuals to make healthier food and lifestyle choices. Nutrition education relies on six basic educational principles: consonance, relevance, individualization, feedback, reinforcement, and facilitation (Boyle & Holben, 2013). Regardless of the technique or strategy employed, the goals of nutrition education are the promotion of healthy eating behaviors and long-term, lifestyle changes. Eating patterns established in childhood tend to carry into adulthood. As a result, foods consumed during childhood and adolescence can have a cumulative effect on health later in life, including increased risk of nutrition-related diseases (Lockwood & Wohl, 2012). Racette et al. (2005) indicate in a cross-sectional survey of college freshman, 69 percent of students had an increase in BMI by their sophomore year. This study serves as evidence that college students are not adopting behaviors that are in alignment with favorable health outcomes. Poor dietary choices linked to chronic diseases include obesity, cardiovascular disease, stroke, diabetes, and hypertension. The converse argument exists for healthy eating patterns established during childhood; demonstration of healthy eating patterns during childhood through nutrition education and modeling theoretically should continue into adulthood. The college years are the last years of adolescence to influence eating behaviors and implement healthy behaviors for the adult years, thus reducing risk of chronic diseases. Previous research demonstrates positive health outcomes are associated to healthy eating habits (Contento, 2011).

**Knowledge of nutrition.** As with any program plan, nutrition education programs follow a basic format: planning, implementation, evaluation or measurement, and conclusion.

Measurement of nutrition education can be seen through knowledge increase, behavior change, attitudes, or change of food preferences (Contento, 2011; Contento et al., 2002). Nutrition education for college students typically exists as a 16-week instructional course. Students learn a variety of topics including macronutrients, micronutrients inclusive of vitamins and minerals, and water. As previously mentioned, one of the essential components of nutrition education is relevance. Cousineau, Goldstein, and Franko (2004) completed a qualitative study with college students to determine their nutritional concerns. The results showed college students' nutritional interest being: healthy eating on a budget, healthy meal planning, student personalization features, basic nutrition facts, body image or weight concerns, and expert nutrition information (Cousineau et al., 2004). While college students may not be interested in nutrition education aspects of long-term health implications at this stage of their lives, they are interested in relevant nutrition information. Nutrition education will support these interests by providing these individuals with the foundational knowledge necessary to make positive choices regarding their interests. Most college students are receptive to information pertaining to improving poor eating habits, shopping and dining on a budget, and improving body image or weight (Cousineau et al., 2004).

Many students enter college never having been away from home or experiencing life as an adult for the first time. This venture includes making decisions about when to study, whether to attend class, washing laundry, and even where and what to eat. Research completed by Racette, Deusinger, Strube, Highstein, and Deusinger (2005) looked at weight changes, dietary, and exercise patterns of college students during the first year of college to the second year. Students' height and weight were recorded. Students also filled out a questionnaire about dietary and physical activity behaviors. Results indicated that initially 84 percent of students had a

normal BMI, and 14 percent were overweight or obese (Racette et al., 2005). Of the students who participated in the follow-up survey, BMI increased in 69 percent of individuals, fried food consumption declined, and aerobic exercise declined (Racette et al., 2005). The literature reviewed brings into focus nutrition education for the college student, physically, academically, and long-term effects. The literature does demonstrate that college-aged students are receptive to nutrition education (Cousineau et al., 2004), but BMI increased in spite of receiving nutrition education, which might question its effectiveness in changing student behavior (Racette et al., 2005). Therefore, these results question whether the knowledge of nutrition can be used to implement behavior change in this target population.

While college-aged students have exposure to media and risks associated with the obesity epidemic, this has not decreased the prevalence of obesity in this age group. According to the American College Health Association (2011), the percent of overweight and obese college students increased from 27.4 percent in 2006 to 29.2 percent in 2011. Duffrin et al. (2011) assessed 130 college-aged students' knowledge of their own weight status. Results showed that 44 percent of participants were overweight or obese with 42 percent of males' incorrectly identifying weight status and only 5 percent of females incorrectly identifying weight status (Duffrin et al., 2011). This study demonstrates college students' lack of knowledge of weight status. When taken in context of social cognitive theory, a theory formed on the basis that personal, behavioral, and environmental factors all influence individuals' health behaviors, college students are more concerned with physical appearance and athletic ability than how changing their weight status will impact their health (Contento, 2011; Cousineau et al., 2004; Duffrin et al., 2011). The college years present an excellent opportunity to change life style habits affecting nutrition, weight status, and physical activity.

Many students participate in a college level nutrition education course to meet general education requirements. A study completed by Sealey-Potts et al. (2009) looked at knowledge of recommended portion sizes and typical food and beverage intake of college students, demonstrating that previous participation in a nutrition education course did not increase student's knowledge of recommended serving sizes. Students were unable to identify serving sizes of six different foods, and based on the USDA's reference-serving sizes, over-estimated amounts by as much as one-half to double (Sealey-Potts et al., 2009). Additional results from this study correlated increased BMIs to college students who consume larger portions of calorie dense foods (Sealey-Potts et al., 2009). Research indicates that colleges and universities are ideal settings to affect lifestyle changes (Racette et al., 2005; Sealey-Potts et al., 2009). The questions that remain are how to address portion confusion among college students, making this topic easy to understand, and teaching this target population how to make long-term lifestyle changes.

One method of providing nutrition information and assisting in comprehension of nutrition information is via menu labeling. Fast food menus began posting nutrition information in the mid-2000s. Often the information could be found inside a restaurant near the menu, on a printed handout, or on the company's website. Turley (2009) assessed that while individuals had access to this information via display, handout, or company website, most chose to ignore the availability of the information. Individuals routinely ordered meals high in fat, sodium, sugar, and calories (Turley, 2009). Many meals at fast food restaurants easily add up to over 1000 calories, containing one-half the recommended daily energy intake for adults. Having nutrition information available on menus could help individuals make healthier choices as availability of healthy options has increased at many fast food restaurants (Turley, 2009). With obesity on the rise, and two-thirds of adults overweight or obese, Turley chose to teach high school and college-

aged students how to make more informed food choices at fast food restaurants. While posting caloric content is important information at fast food restaurants, it may not be enough to persuade individuals to make a healthier food selection (Gordon & Hayes, 2012).

Knowledge of nutrition is essential, as it is the foundation for making healthy lifestyle choices (Byrd-Bredbenner et al., 2016). The literature demonstrates college-aged students' interests in nutrition knowledge (Cousineau et al., 2004); however, students are more concerned with physical appearance and athletic ability than how changing their weight status will affect their health (Contento, 2011; Cousineau et al., 2004; Duffrin et al., 2011). As opportunities to present nutrition education to college students exists through college level nutrition education courses, instructors should be aware of existing knowledge deficits in ability to identify portion sizes and correctly classify weight status (Duffrin et al., 2011; Sealey-Potts et al., 2009).

Colleges and universities are ideal settings to affect lifestyle changes in students as this population is leaving home for the first time and is at risk for higher energy intake due to the availability of calorie dense foods (Racette et al., 2005; Sealey-Potts et al., 2009). While the literature discussed demonstrates the importance of nutrition knowledge for college-aged students, it does not address the importance of assessing how nutrition education is used as an interventional tool in college-aged students.

**Nutrition education interventions.** As previously discussed, the college years are a time of significant change for students when eating patterns established can result in long-lasting consequences on future health outcomes. Dietary intake of college students shows high intake of calorie dense foods and low nutrient dense foods is known to be associated with reducing risk of cancer and heart disease (Ha & Caine-Bish, 2009; Racette et al., 2005; Sealey-Potts et al., 2009). Ha and Caine-Bish (2009) presented an intervention combining traditional nutrition education

materials with interactive activities to promote fruit and vegetable consumption in college students. The theory used for this intervention, social cognitive theory, is based on the principle that students use course materials as a framework to achieve new dietary behaviors and long-term lifestyle changes (Ha & Caine-Bish, 2009). Eighty students enrolled in a basic nutrition education course increased both vegetable and fruit consumption by 50 percent and 22 percent, respectively (Ha & Caine-Bish, 2009). By exposing students to information and hands-on experiences such as recipes, taste-testing, goal setting, practical advice for dining out, and interactive technology, students continually assessed their behaviors and goals throughout the course, using the principles of social cognitive theory. Dietary intake was assessed via three-day food records, one of several accepted standard tools for assessing data from dietary intake (Lee & Neiman, 2013). The research presented demonstrates the importance of program intervention for behavior change in nutrition with the target population. The research also displays behavior change is possible through implementation of such interventions.

College students appreciate technology as the current generation has always been “plugged in” to Web 2.0. Texting is an effective method being used for student health behavior interventions (Hingle, Nichter, Medeiros, & Grace, 2013). MyPlate, sponsored by the United States Department of Agriculture, is an illustration of the five food groups that are the foundation of a healthy diet. The MyPlate study proposed to increase awareness to MyPlate and evaluate effectiveness of texting and behavior change regarding the Dietary Guidelines for college students. Seven different messages were sent biweekly to participants. As this study did use a control group and an intervention group, the results are significant to this study in that the majority of participants (84 percent) reported favorable health benefits from the text messages, with increases consumption of fruits, grains, vegetables, protein, and dairy (Brown, O’Conner, &

Savaiano, 2014). Students suggested content of the texts should contain specific information relevant to college lifestyle and eating options (Brown et al., 2014; Hingle et al., 2013). Long-term studies of this intervention are recommended to determine its effect on long-term lifestyle changes versus short-term changes.

Nutrition interventions can be short term or long term with nutrition education. When partnered with college nutrition education courses the duration is usually four months or sixteen weeks. Using multiple resources for an intervention could prove successful. Richards, Kattleman, and Ren (2006) chose newsletters, motivational interviewing, computer programs, and a nutrition website to increase fruit and vegetable consumption in 18 – 24 year olds in Mid-Western college students. The transtheoretical model is a theory that suggests behavior change is a process that occurs in stages (Contento, 2011). Given one of the areas of focus of this literature review is to address readiness to change, the use of the transtheoretical model lends toward it being a theoretical framework. Richards et al. (2006) assessed stages of change for all participants via a food frequency questionnaire, another accepted standard tool for assessing data from dietary intake (Lee & Neiman, 2013) and algorithms. Students participated in pre- and posttest questioning. Results of the study showed greater changes in the intervention group than the control indicating success of the intervention from moving individuals from pre-action stages of change to action stages of change (Richards et al., 2006). What is not known from this research is long-term success beyond the intervention. Additional interventions could be tailored to specific stages of change or as college students transition to the next stage of adulthood. Tracking changes can be beneficial, as it will display the level of behavior change adopted, which will separate fads / quick fixes from true lifestyle changes.



The term nutrition education intervention is defined as “...any set of systematically planned educational activities or learning experiences that is provided to a group in a variety of settings, along with relevant environmental support where appropriate” (Contento, 2011, p. 148). The literature demonstrates the significance of nutrition intervention with nutrition education (Brown et al., 2014; Ha & Caine-Bish, 2009; Richards et al., 2006). Nutrition intervention is treatment based on the nutrition care process; this can include dietary changes or simply nutritional education. Due to the impact of reducing health risk in the adult years, research does favor nutrition interventions focusing on increasing fruit and vegetable consumption in college-aged students (Brown et al., 2014; Ha & Caine-Bish, 2009; Richards et al., 2006). Nutrition knowledge and educational interventions alone are not enough to stimulate behavior change. This leads to the question of how nutrition education can be used to implement behavior change in the target population.

### **Nutrition Education and Behavior Change**

Behavior change is a process; it does not occur overnight. For some individuals, the change process occurs quickly, while for others the process is longer and more involved. There are many behavior change theories used in research. While the literature states nutrition education is effective, it also demonstrates it is more effective when coupled with behavior change techniques (Contento, 2011; Contento et al., 2002). In nutrition education, behavior change occurs from a process of goal setting and achieving new behaviors over time using program plans, needs assessments, implementation, monitoring, and evaluation. Prochaska and DiClemente’s stages of change model (transtheoretical model) shows the steps that individuals must pass through in order to achieve a behavior change: pre-contemplation, contemplation, preparation, action, maintenance, and relapse (Contento, 2011). Behavior change only occurs in

the action and maintenance phases; individuals must be ready to make a change in order for a behavior change to occur. Social cognitive theory is a theory formed on the basis that personal, behavioral, and environmental factors all influence individuals' health behaviors. Both the transtheoretical model and social cognitive theory are prevalent in nutrition education research and seen throughout this literature review.

**Changes in health behaviors of college students.** College students actually benefit from mindfulness (the state of being fully aware of what is occurring both inside and outside the body) as a behavior change technique (Contento, 2011). Mindful eating is a technique that influences the way an individual eats through controlling the environment, lighting, ambiance, food choices, and even dining partners (Contento, 2011). The transition from high school to college is stressful, exposing students to an increased risk of poor health behaviors such as alcohol use, drugs, and poor nutritional intake. Araas (2008) demonstrated that college freshmen with higher levels of mindfulness correlated to higher self-efficacy, which yields less risk of poor health behaviors. These results are potentially important for both student academic services on college campuses and this research, as it does show that mindfulness programs and self-efficacy programs can improve college students' health habits, stress levels, and coping skills (Araas, 2008). Araas (2008) successfully demonstrated that mindfulness is a useful behavior change tool for college-aged students and is a tool for consideration in future works with college students and behavior change.

Wellness education via a standard 16-week college course is the most common mode of delivery of nutrition education for college-aged students. The purpose of health education is to increase knowledge and lead to a behavior change. Lockwood and Wohl (2012) claimed that health education alone does not appear to encourage behavior change. Students' knowledge

increases from health education. “Behavior change occurs when education is combined with certain behavioral skills, psychological variables (ex., enhanced self-efficacy, motivation, and positive attitude), and behavior change variables (ex., self-reflection, perseverance, and goal achievement)” (Lockwood & Wohl, 2012, p. 630). Results of the study showed significant increases in both physical activity and nutrition behaviors (Lockwood & Wohl, 2012). The design and outcomes of this study is substantive, demonstrating that a wellness education course combined with a behavior change component affects students’ health and attitudes.

Health and wellness are essential for successful academic performance in the college classroom. College campuses have numerous intervention programs for students focusing on academics, alcohol, tobacco, sex, physical activity, and to a lesser degree, nutrition. Ruthig, Marrone, Hladkyj, and Robinson-Epp (2011) completed a survey of college students assessing them three times over the course of the year: base line, six-month and twelve-month, and asked questions about diet, exercise, tobacco, drinking, and sleep. Females reported higher levels of stress, poor diet, and less exercise than men; women’s stress decreased and level of exercise increased over time (Ruthig et al., 2011). Overall, men and women reported differences in all health perceptions assessed: nutrition, stress, exercise, and health behaviors. The health perceptions reported directly related to changes in academic performance (Ruthig et al., 2011). In the nutrition education profession, it is challenging to keep students engaged in the classroom for a full 16-week experience as a basic general education course. Many students are first time, full-time freshmen, having never been away from home and are overwhelmed with the many factors of their new environments. Academic performance is related to health and wellness as many students struggle as the semester continues, with illnesses, and the stress and rigor of academics prevails (Ruthig et al., 2011).

Changing health behaviors not only addresses dietary issues, but also physical activity patterns. College students transitioning from adolescence to adulthood need to establish life-long pattern changes to prevent health diseases associated with being overweight or obese. Small, Bailey-Davis, Morgan, and Maggs (2012) completed a study with college students assessing dietary intake and physical activity patterns based off their living situation (on campus or off campus). Students living on campus had access to dining facilities with “all you can eat” cafeteria style dining options and multiple physical fitness opportunities. Results show that fruit and vegetable consumption and physical activity declines in students living off campus (Small et al., 2012). Availability, access, and cost could lead to the decline of fruit and vegetable consumption in students living off campus. Encouraging meal plans for all students with healthy food options and limiting calorie dense foods from the meal plan is one way to encourage behavior change. Offering students access to university fitness facilities (free of charge or via student fees) for students can help promote physical activity behavior change. Establishing behavior changes during the college years are beneficial as they can carry through to the adult years.

Behavior change can have long lasting impacts on not only one’s physical health, but also one’s emotional health. By improving one’s health habits one often improves self-esteem (Woekel et al., 2013). Woekel et al. (2013) completed a study to determine if a “Lifetime Fitness for Health” course could help students adopt healthy behaviors and positive self-perceptions. Students participated in lecture and labs focused on physical activity, nutrition, and self-view. The results of the study determined students gained both knowledge and confidence in physical activity and nutrition behavior from participation in the Lifetime Fitness for Health curriculum (Woekel et al., 2013). Relationships between physical activity and nutrition were also noted;

additionally, self-awareness of these activities increased through these behaviors (Woekel et al., 2013). In this study, the target population participated in a college nutrition education course with behavior change techniques, resulted in a noted behavior change. As previously reported, barriers to long-term success for proper nutrition and exercise can be related to living off campus, time demands, and food availability (Small et al., 2012; Woekel et al., 2013). How to address this issue successfully for students living off campus remains an area for both future education and research.

**Changes in nutrition-related behaviors of college students.** Research illustrates the importance of influencing dietary practices in college students as many students are overweight or obese (American College Health Association, 2011). Dietary practices include low intake of fruits, vegetables, low fiber foods, and high intake of sugar-sweetened beverages, calorie dense foods, binge eating, and skipping meals. The most effective nutrition education strategies include behavior change theories and research strategies (Contento, 2011). Social cognitive theory used with a nutrition module for college students incorporating the use of graphics and technology demonstrated positive results, but also suggest the value of targeting the nutrition education for race and gender (Kicklighter, Jonnalagadda, McClendon, & Hopkins, 2005; Kicklighter, Koonce, Rosenbloom, & Commander, 2010). While this particular research study did not address behavior change, the use of social cognitive theory and design presents the opportunity for future research.

Reviewing examples of nutrition education programs are beneficial as they provide foundational frameworks for behavior change models. Patterns of eating established in college are likely sustained throughout the adult years (Ha & Caine-Bish, 2011). Using social cognitive theory, students participating in a general nutrition course incorporated elements of behavior,

environment, and cognition to influence intake of whole grain in dietary consumption. College students participating in the study increased whole grain intake from 0.37 oz. to 1.16 oz. per day (Ha & Caine-Bish, 2011). The strength of this behavior change study is how it uses social cognitive theory in an existing college nutrition course, serving as a cost-effective means to address positive nutrition behavior change in the target population.

Evidence states that diet and exercise are the two most changeable factors related to obesity and chronic diseases. Additionally, diets rich in plant foods and minimally processed foods may reduce risk of obesity, chronic diseases, and certain cancers. Plant-based diets are an increasingly popular trend with college-aged students (Wyker & Davidson, 2010). Using the transtheoretical model and the theory of planned behavior (the behavior is a function of an individual's intention to perform a behavior), researchers investigated college-aged students and their readiness to adopt a plant-based diet. Wyker and Davidson (2010) demonstrated from this study that the decision to eat more fruits and vegetables is entirely different than changing to a plant-based diet; additionally, the stage of change for consideration of increasing fruit and vegetable consumption versus consideration of a plant-based diet was significant (Wyker & Davidson, 2010). Research promoting plant based diet changes is limited due to the emphasis of animal protein consumption in the U.S. diet. Additional research is warranted in exploring dietary pattern changes with college students and what effects these changes might have long-term.

The college years are a time of transition. With that transition, college students develop dietary patterns, of which are the poorest of all age groups (Pelletier & Laska, 2012). Students attribute these poor health behaviors (both dietary and physical activity) to time constraints, stress, and availability of convenience foods and fast foods (Pelletier & Laska, 2012). Time

constraints are a primary concern affecting healthy dietary practices (Pelletier & Laska, 2012), and college students related them as a barrier along with food preparation skills, facilities, and / or motivation. Nutrition education interventions focusing on healthy eating practices, food preparation tips, and recipes can reduce these barriers and encourage healthy dietary practices.

It is noted in the nutrition education literature that both the transtheoretical model and social cognitive theory are beneficial when implementing nutrition interventions. While behavior change theories address the efficacy issue of nutrition education, there is still the unanswered question of technology. What technologies combined with nutrition education and behavior change provide more effective lifestyle changes?

### **Application of Technology in Nutrition Education and Health Interventions**

Nutrition education and its resources are readily available; however, technology use remains a novelty in the realm of nutrition education. It is a challenge to present students with both knowledge and technology; often when students have instant access to information, the chance for information to be inaccurate increases greatly. In nutrition education, the incorporation of technology necessitates not only the importance of technological use, but also how to effectively disseminate the information. While technology resources are available and increase daily, Collins and Halverson (2009) emphasize the value of pedagogy over technology. Technology can expand education by leaving the walls of the classroom, through online courses, home schooling models, instructional games, SMS texting, and social media (Collins & Halverson, 2009). Early implementation of technology in education is paramount for future generations as children today begin using technology even in the toddler years. Technology leaders should make responsible decisions regarding technology, focusing on student-centered learning opportunities (Papa, 2011). When implementing any technology in nutrition education

courses, it is important to have realistic expectations and trust teachers to use the technology as it best suits their classroom environment (Williamson & Reddish, 2009). Educators implementing technology in nutrition education should strive to “commit themselves to constantly generating and increasing knowledge inside and outside the organization” (Fullan, 2007, p. 6).

**Technology in nutrition education and health interventions.** Web-based nutrition education programs were some of the first nutrition education programs developed with free access. Prior to the internet, many nutrition education programs were only available via purchase, thus making them inaccessible to the public and many educators. Cousineau, Franko, Ciccazzo, Goldstein, and Rosenthal (2006) used qualitative research methods to determine “...major nutrition content themes and specific web features that college students and health experts perceived as unique and important” (p. 27). A website was designed with interactive tools, information, games, quizzes, and tailored feedback. Students participating in the study said they would use resources targeting their needs. The research indicates college students are more interested in weight management and body image rather than concerns of long-term nutrition related to health effects such as hypertension or high cholesterol (Cousineau et al., 2006). This research contributes to the proposal topic by showing how college students are (a) interested in nutrition education, and (b) will use a technology as a resource for their specific nutrition needs.

Healthy lifestyles can be promoted using a variety of different technologies. Texting is one method used by Hingle, Nichter, Medeiros, and Grace (2013). Hingle et al. (2013) developed relevant text messages for adolescents (ages 12-18) based on feedback from adolescents to increase nutrition knowledge and lead to a behavior change. Prior to this study, minimal research had been completed looking at SMS messaging to promote healthy lifestyles from a youth’s perspective. Participants’ perceptions found useful to the researcher’s study questions, as



adolescents reported they do like the SMS messages if the content is relevant to their age. They also indicated messages should avoid "...you should" or "...you need to" (Hingle et al., 2013, p. 18). As college students are adolescents entering into the first years of college, the results of this study are an age relevant target population in the study of this literature review. Any nutrition education combined with technology used with this age group needs to have relevant content that is clear, concise, and interesting.

The internet has become a vast resource for nutrition related information. With the increase of information accessibility, internet based nutrition education programs have also increased, differing in design and function. Franko et al. (2008) completed a study with college-aged students using an internet based nutrition program. Results did show students would have an increase in fruit and vegetable intake, increase in nutrition knowledge, and motivation to change behaviors from use of the internet based nutrition education programs (Franko et al., 2008). The results of this study are relevant to the research topic as it successfully demonstrates implementation of technology into a college-level nutrition education course and measuring the effect of behavior change.

Many nutrition college courses implement technology that is readily available. The USDA's MyPyramid Challenge is an example of government funded, nutrition education technology used in many classrooms. Hensleigh, Eddy, Wang, Dennison, and Chaney (2004) present a quantitative study focusing on college-aged students using the USDA's MyPyramid Challenge. Students were placed in either the control group (receiving traditional course instruction) or the experimental group (receiving enhanced instruction with the MyPyramid Challenge). Statistics run on the data showed no difference in the control group versus the group that received the technology enhanced nutrition education (Hensleigh et al., 2004). Each group

had different instructors and textbooks, and the control group was primarily upper classmen, factors which could have contributed to the non-significance outcomes. The results of this study conflict with other technology studies in this literature review demonstrating that technology use does not result in behavior change related to nutrition education, the design of this study is relevant and could be repeated, removing limiting factors, such as different course instructors, textbooks, and classification of students which may have influenced the study outcomes.

Technology in a broad terms is relevant to nutrition education, and even though MyPyramid no longer exists; it was retired in May 2011 and redesigned for the more user-friendly interface of ChooseMyPlate, the interactive learning tools still exist and are applicable for nutrition education courses.

Historically, nutrition educators collaborated with technology via SMS texting and transitioned educational outreach to many venues such as the internet, personal response systems, and interactive games. Though nutrition education has the ability to be supplemented via a variety of technological avenues (Brown et al., 2014; Cousineau et al., 2006; Franko et al., 2008; Hensleigh et al., 2004; Richards et al., 2006), it is the next generation of technology, social media, that deserves research in today's technology driven society. College-aged students prefer social media sites Instagram, Twitter, and Snapchat for political and entertainment news, for health and recreational advice, and for experiencing a sense of community. Facebook, though, remains the preferred social interaction media site (Martínez-Alemán, 2014). Supplementing with nutrition education with technology techniques and behavior change methods has resulted in long-term lifestyle changes (Brown et al., 2014; Cousineau et al., 2006; Franko et al., 2008; Hensleigh et al., 2004; Richards et al., 2006). As Web 2.0 (social media) is a relatively new phenomenon, research combining healthy behavior changes and social media are also new. Thus,

it is important to explore if there are any associations to the use of social media in nutrition education resulting in behavior change.

**Social media in health interventions.** Social media is an Internet-based communication tool referred to as “Web 2.0” (Korda & Irani, 2013). Social media is comprised of many different networking services such as Facebook, MySpace, Twitter, Pinterest, LinkedIn, Tumblr, Instagram, Vine, blogs, and messaging platforms. While behavior change interventions have been noted via SMS texting, internet usage, and interactive classrooms (Brown et al., 2014; Cousineau et al., 2006; Franko et al., 2008; Hensleigh et al., 2004; Richards et al., 2006), the use of social media for tools of health promotion and behavior change may require different approaches (Korda & Itani, 2013). Social media provides an outlet for connectedness, social support, and communication; it may be advantageous as a tool for health promotion and behavior change (Korda & Itani, 2013). More than 70 percent of adolescents and teens use social media as a source of information (Lenhart, Purcell, Smith & Zickhur, 2010). Research indicates 34 percent of users seek health and wellness information on social media (Korda & Itani, 2013). Socio-economic status, gender, and race all play a role in social media use. Research indicates women search for information about diseases, conditions, and treatments, whereas men search for information about vitamins and supplements (Chou, Hunt, Beckjourn, Moser, & Hesse, 2009; Korda & Itani, 2013). Webb, Joseph, Yardley, and Mitchie (2010) reported effectiveness of short messages promoting interaction and motivation and found these messages had further impact when combined with behavior change techniques. Key points for using social media for health interventions are to (a) remember the target audience when selecting the social media source, (b) combine the use of social media with a behavior change theory, and (c) stay current in the trends of social media (Korda & Irani, 2013). The questions are how to address the changing trends in

social media as individuals move on to the next new technology and best practices for use of social media for health promotion interventions.

As with any health intervention, social media based approaches need to incorporate evidence-based practices, being sure that the program is effective and relevant to the target audience. Social media is a starting point for communication and collaboration (Tobey & Manore, 2014). Trends in social media popularity change, as personal blogs were popular five years ago (Korda & Irani, 2013), today the most popular sites are Facebook, Twitter, and Pinterest with 55 percent to 67 percent of adults searching for health and wellness information (Tobey & Manore, 2014). Research demonstrates that health promotion interventions are effective when social media posts are timely, encouraging, intentional, and targeted to the specific population (Korda & Irani, 2013; Tobey & Manore, 2014). Food Hero is an example of an experiment completed by Tobey and Manore (2014) implementing Facebook, Twitter, and Pinterest to target different populations in their communities. Researchers chose Facebook for its popularity with low-income users; Twitter reaches educators and sends participants short action messages; Pinterest facilitates the collaboration of ideas, recipes, and strategies (Tobey & Manore, 2014). While using practices that mimic face-to-face health education programs, best practices for social media health interventions also demand a face-to-face presence. A sound strategic plan requires development for the health promotion program, as well as monitoring and evaluation (Contento, 2011; Tobey & Manore, 2014). Understanding how social media's role in health interventions is the first step towards success.

With the popularity of the internet skyrocketing, it is not a question of if a student uses social media, but rather a question of how often and for what purpose. Giordano and Giordano (2011) completed a research study with health profession students to determine if usage of social

media was higher than other traditional four-year college students. Noted at the time of this research, there was a dearth of studies investigating social media. Results of the study demonstrated health profession students do use Facebook to keep connected with alumni; most respondents of the survey reported seeing advertisements but do not click on them for additional information (Giordano & Giordano, 2011). At the time of this research, the use of Twitter and LinkedIn with health profession students was minimal (Giordano & Giordano, 2011). The implication of the study, though dated, does show that students in health professions will use social media to maintain contact with peers (Giordano & Giordano, 2011). More importantly, how can researchers take this information and utilize it in classroom pedagogy? How can Facebook or other social media platforms be implemented into the classroom knowing students are receptive to its use?

Using social media for health interventions requires that educators focus on behavior change. As previously discussed, behavior change is difficult and requires small lifestyle changes combined with goal setting techniques. Goals should be realistic and attainable, in other words, SMART: Specific, Measurable, Attainable, Relevant, and Time bound. In order to obtain goals, three essential components play a role: motivation, ability, and triggers (Torgan & Cousineau, 2012). Social media is one strategy for achieving health interventions, as many of the technologies employed by social media can provide “reminders” or calls to action, encouraging individuals toward health related goals (Torgan & Cousineau, 2012). The potential significance of this application is its use towards behavior change and using social media to create SMART goals with motivational reminders for participants. When selecting social media to enhance behavior change, the POST approach is also encouraged, reminding educators to develop interventions around “people, objectives, strategies, and technology,” with people being the

highest priority and technology coming last (Torgan & Cousineau, 2012). Using Facebook and BlogSpot, Story and Bonica (2014) demonstrated positive health outcomes challenging users to three-dollar a day diet for thirty days. As technology moves towards a gaming-like venue, finding ways to motivate clients remains one of the biggest challenges. The need to motivate clients relates to the research question of social media's ability to affect an individual's readiness to make lifestyle changes via the transtheoretical model when participating in health interventions supplemented with social media.

Trends in social media have flourished since early 2004, when the term "Web 2.0" was first introduced (Scanfield, Scanfield, & Larson, 2010). Since that time, over 61 percent of Americans report seeking health care information online and 37 percent have accessed user-generated health information (Lenhart et al., 2010; Scanfield et al., 2010). Twitter is a large social network, considered a microblog, as updates are limited to 140 characters (Scanfield et al., 2010). Researchers completed an observational analysis using Twitter, confirming its use for sharing health information and advice (Scanfield et al., 2010). As information is shared via a culture of followers liking and "retweeting" information, it is important that any health intervention information shared be accurate (Scanfield et al., 2010). While this particular study did not produce results supporting evidence favoring social media's effect for sharing health information, research on social media is in early stages pertaining to health intervention, specifically nutrition related intervention. The literature warrants further study to determine use and effectiveness of this tool in health interventions (Scanfield et al., 2010; Torgan & Cousineau, 2012).

**Social media interventions with college-aged students.** Twitter is one social media site popular with college-aged students. Tyma (2011) outlines rationale for utilizing Twitter in large

lecture classrooms as a means of student interaction: (a) it is free, (b) records of the interactions are kept, and (c) students likely already own the technology to use Twitter without incurring additional costs. Twitter is a real time feed with a limitation of 140 characters per entry. Best practices for using technology state that before implementing any new technology, one should make sure the environment could support the technology, such as having appropriate Wi-Fi or screens for dual feed in the classroom (Collins & Halverson, 2009; Tyma, 2011). Feedback from students was largely positive as it allowed students to be engaged in the course, while others felt it was yet one more course requirement (Tyma, 2011). College-aged students are plugged into Twitter, as it is the “now” social media. Due to the popularity of social media among college-aged students, its ease of accessibility, affordability, and application in the classroom, it is a practical application for the technology aspect of this study.

Evidence indicates that social media use is linked to age and gender, with more than 85 percent of young adults ages 18-29 years of age and 89 percent of 18-29 year-old women using social media (Chou et al., 2009; Korda and Itani, 2013; Mackert, Kim, Guadagno, & Donovan-Kicken, 2012). Given the extent and reach of social media, it represents a new platform for health promotion and behavior change, though results are conflicting in the literature (Scanfield et al., 2010; Webb et al., 2010). Literature confirms using social media as a health promotion tool; however, research using social media solely as a nutrition behavior change tool is less prevalent (Mackert et al., 2012). As with any health education program, best practices in social media warrant customization for the intended target audience. Mackert et al. (2012) used Twitter to determine if tailored messages would promote multivitamin usage in college-aged females. This study created a new social media page for its research rather than using a known, trusted medium to deliver its message for the duration of the study, thus affecting the users’ engagement

(Mackert et al., 2012). While the research hypotheses were not supported in this particular study, the results demonstrate the importance of trust and credibility for success using social media networks.

Enhancing college students' engagement in class remains a challenge for educators. In the educational environment, the use of social media allows for the conversation to occur simultaneously or even after hours (Bristol, 2010; McKay et al., 2014). Of 198 students surveyed post engagement of social media in an interprofessional safety course, only 19 percent and 30 percent respectively strongly agreed or agreed that the use of social media was beneficial for course engagement (McKay et al., 2014). While the survey results were less than favorable, student and faculty engagement in social media noted during the course was high, indicating social media is an innovative means of student engagement.

Social media technology is now deeply rooted in college students' lives. It is used for interaction with peers, sharing of common interests, and even course engagement. To achieve collaboration and engagement for nutrition education, interventions are imperative. Social media interventions for course student engagement demonstrate effectiveness as a tool for connectedness, as 68 percent of pharmacy students reported positive perceptions of its use (Clauson et al., 2013). Research substantiates the use of social media in health promotion and medical education courses, further emphasizing the versatility of various social media sites and the importance of tailoring the use of social media to the target population (Clauson et al., 2013). Many social media tools exist, yet are not incorporated into educational experiences. The opportunity to further investigate these avenues is suggested in the literature.

The modern day college student's way of learning involves technology and social media. When applying sound pedagogical techniques for learning for this generation both the use of



technology and social media promotes opportunities for increase in knowledge, collaboration, engagement, and behavior change. Research indicates that 83 percent of adults ages 18-29 use the internet to research health and medical information, with 72 percent for social networking (Lenhart et al., 2010). Higher educational institutions need to prepare students for life as adults, including addressing knowledge of nutrition and physical activity. With public health concerns for college health students including physical activity, obesity, and nutrition, facilitating knowledge increase and behavior changes using social media interventions is an opportunity to establish lifelong patterns of healthy behaviors (Frimming et al., 2011). College students participating in a social media supported health and fitness course reported positive feedback, noting the expansion of learning and peer interactions (Frimming et al., 2011). Students expressed interest in seeing the application being taken beyond the classroom, thus opening research possibilities for social media's effect on health intervention beyond classroom walls.

Previous studies demonstrated social media's prevalence in society and applications in health and wellness. Koszewski, Monroe, Faiman, and Whitman (2014) presented work to learn more about college students' preference for the most effective way of receiving nutritional messages via social media. The survey contained questions about preferences of social media forms, topics of interest, and from which types of social media one would prefer to receive nutritional information. Correlating to research conducted by Korda and Irani (2013) and Tobey and Manore (2014), Koszewski et al. (2014) also found that college students preferred Facebook (92 percent) followed by Twitter (51 percent) and finally Pinterest (42 percent) as types of social media tools. Students participating in this research noted their primary source of nutrition information was online and the best information are fun facts, sports nutrition, and information about weight loss (Brown et al., 2014; Hingle et al., 2013; Koszewski et al., 2014). The results of

this study demonstrate benefits of displaying nutrition information messages to college students via social media platforms. Additional research further explores the effects of these messages used in social media via alterations on dietary changes or readiness to make lifestyle changes.

Technology integrates with nutrition education in a variety of forms. Social media is the newest of these technologies allowing for collaboration, support, and learning (Lenhart et al., 2010). By gaining an extensive comprehension of the application of social media in a general college nutrition education course, practices for behavior change with this target population that address readiness to make life style changes and alterations in dietary changes can be applied and shared.

### **Conceptual Framework**

Nutrition education is an educational technique or strategy used (in a variety of settings) to encourage individuals to make healthier food and lifestyle choices. Post research shows that college-aged students form poor eating habits during this stage of life that can negatively affect health outcomes as adults (Lockwood & Wohl, 2012). Nutrition education for college-aged students can be delivered via numerous methods including college courses, seminars, social norm marketing campaigns, and technology including social media (Killos et al., 2010; Lockwood, & Wohl, 2012; Tyma, 2011). Social media is a relatively low-cost, direct approach for nutrition educators to reach target audiences (Tobey & Manore, 2014; Torgan & Cousineau; 2012). Searches of health related topics ranks third only below general search engine use and email (Korda & Itani; 2013; Tobey & Manore, 2014). Using social media (and searches of health information) as one tool for behavior change is a practical solution as evidence presents effectiveness of social media interventions.

Changing behavior is not simple, as individuals may set goals that are too difficult to reach or lack the motivation needed to complete their goals. Research validates the effectiveness of nutrition education in all populations; however, it is more impactful when combined with behavior change techniques (Contento, 2011; Contento et. al, 2002; Woekel et al., 2013). Webb, Joseph, Yardley, and Michie (2010) document social media's impact on behavior change as being greater when based in behavior change theory. As a researcher and educator working daily with college students, influencing nutrition education for this focus group remains of utmost importance. College students are (a) interested in nutrition education, and (b) will use technology as a resource to meet specific nutritional needs (Contento, 2011; Cousineau et al., 2004; Duffrin et al., 2011; Ha & Caine-Bish, 2009). Evaluating the effects of social media on college-aged students in a basic nutrition education course can generate new practices and approaches for this target audience.

Merriam (2009) states simply that a theoretical framework is the foundation for scientific study. It allows one to present research from a particular perspective or show the reader the research from a particular lens. The principles of the transtheoretical model and social cognitive theory assist in explaining this investigation. The transtheoretical model looks at behavior change through assessing an individual's readiness to change based on Prochaska and DiClemente's stages of change model (Contento, 2011). Before an individual can commit to making goals, the individual has to be ready to make changes. According to transtheoretical model, behavior change occurs only when in individual is in the action or maintenance stage of change (Contento, 2011).

Social cognitive theory supports research combining traditional nutrition education materials with interactive activities (the use of social media). Social cognitive theory suggests

behavior change occurs because of personal, behavioral, and environmental factors (Contento, 2011). By exposing students to both information and interactive technology, social cognitive theory can assist in explaining how students achieve new dietary behaviors and long-term lifestyle changes.

Literature also supports the use of social media in health promotion and education (Tobey & Manore, 2014; Torgan & Cousineau, 2012). While research demonstrates successful strategies for using some social media for behavior change (Story & Bonica, 2014; Webb et al., 2010), evidence is lacking using social media as an effective tool for nutrition educators (Balatsoukas et al., 2015; Leak et al., 2014; Lohse, 2013). By assessing lifestyle behavior changes – demonstrated through readiness to change and alterations in dietary intake – in college-aged students participating in a general education nutrition course supported with social media, the use of social media will either prompt individuals to accomplish – or not accomplish – their nutrition goals.

## **Conclusion**

Technology is omnipresent on today's college campus. Professors use technology to deliver lectures in classroom and in online courses. Students use technology to submit assignments in learning managements systems, and participate in courses enhanced with videos, webinars, clickers, and social media. The purpose of nutrition education is to use educational techniques (including technology and social media) to encourage individuals to make healthier food and lifestyle choices. The literature clearly emphasizes that knowledge of nutrition is not enough to change behavior. In order for behavior change to occur, nutrition education must be paired with behavior change skills or goal setting strategies (Contento et al., 2002; Lockwood & Wohl, 2012). Assessment tools used must be specific to the study goal and the target population.

College students are interested in nutrition education; however, interests are not in long-term nutrition outcomes, but related to body image, weight, food-selection on campus, and dining on a budget (Cousineau et al., 2006; Lockwood & Wohl, 2012). While evidence supports the use of technology in education for behavior change (Cousineau et al., 2006; Cummiskey, 2011; Franko et al., 2008; Hingle et al., 2013; Killos et al., 2010; Tyma, 2011), other research did not support this finding (Hensleigh et al., 2004). As social media provides an outlet for connectedness, social support, and communication, it may be advantageous as a tool for health promotion and behavior change (Korda & Itani, 2013). The challenge with nutrition education is that it should be tailored for the target audience. In a counseling session, the information an individual receives is specifically prescribed for his or her needs. To effectively meet these individualized demands would require working with nutrition education and social media tools that currently exist, as well as with college students to see if behavior change is enhanced using social media and behavior change theories. Another challenge with the research is to use social media in a classroom setting, using information that is relevant and tailored to produce a behavior change in the target population. Further research of this topic could provide evidence of social media as a nutrition education behavior change tool for college students. Additional benefits to this research are a model for nutrition education supported by social media to be used by nutrition educators, registered dietitians, and public health educators. As Collins and Halverson (2009) said, "...this demands rethinking education not in isolation, but considering the interplay of society, education, and learning," (p. 129).

## CHAPTER 3

### METHODOLOGY

This comparative analysis, quantitative study proposed to assess college students in a general education nutrition course and their resultant lifestyle behavior changes, measured by alterations in readiness to change and dietary intake. This study obtained Institutional Review Board approval at both the degree granting institution and the research site before recruiting participants. The course was supported with social media both in and out of the nutrition education learning environment. An informal survey, conducted on a convenience sample of students in a general education nutrition course at the site indicated a high preference for Facebook, followed by Instagram, Snapchat, and Twitter. A Facebook page and corresponding Twitter page was created and registered for this study by the university's nutritional sciences department. The decision was made to implement multiple forms of social media (Facebook and Twitter) for this study since, as indicated using multiple social media outlets in an informal survey prior to the commencement of this research. Students were allowed to use existing Facebook and Twitter user profiles or create new user profiles for the purposes of participation in the study. The popularity of Facebook and Twitter noted throughout the literature review also contributed to the selection of the social media tools (Statista, Inc., 2015; Tobey & Manore, 2014). The purpose of the both the Facebook page and Twitter page is to provide additional resources for nutrition education information and behavior change techniques.

The theoretical framework of social cognitive theory is based on interactions with the environment or behavior change, factors affecting an individual's way of thinking, and changing how an individual acts or goal-directed behaviors (Ha & Caine-Bish, 2009). Posts were used to

further emphasize normal class assignments, activities, and lectures tied to social cognitive theory where students use their own dietary choices and lifestyle behaviors as a reference for learning course materials. The transtheoretical model additionally support the study by determining a student's stage of change based on Prochaska and DiClemente's stages of change model (Contento, 2011). A pretest-posttest design was used to compare the alterations in readiness to change and dietary intake of the students in the nutrition education course supported by social media versus post courses where archival data was available. This chapter includes a discussion of the research design, purpose of the study, research questions, participants and setting, methods of data collection and analysis, participant rights, and potential limitations of the study.

### **Research Design**

A quantitative approach has been chosen as researchers indicate the appropriateness of this methodology for educational research (Creswell, 2012; White, 2014). "Quantitative nutrition education research assists nutrition educators first, by helping them understand the factors that influence dietary behavior, and second, by providing a systematic method of investigating the most effective methods for influencing dietary behavior to promote health" (Guthrie, 1994). The study will enhance understanding of lifestyle changes and promote healthier choices that may be highly influential for those individuals in earlier stages of life. Additionally, Creswell (2014) stated that the theoretical perspective, data collection methods, and strategies of inquiry are central when forming research design. Noted strengths of quantitative research are (a) it is a strong component of many research studies, (b) the ability to replicate and reproduce the rigors of quantitative studies without compromising validity or reliability, and (c) the answers produced are statistically solid (Creswell, 2014). For this study, the quantitative methods approach allows

the researcher to develop knowledge through the measurement of data and specific variables relevant to the study's goals.

### **Purpose**

The purpose of this comparative analysis, quantitative study was to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. The course was supported with social media and offered in 2016 at a regional Division II higher education institution located in a rural, mid-western region of the United States. The theoretical frameworks of social cognitive theory and transtheoretical model describe the motivational strategies of behavior change employed using social media in the nutrition education course (Contento, 2011; Frimming, Polsgrove & Bower, 2011; Ha & Caine-Bish, 2009; Mihaly, Altit, & Coccia, 2015).

### **Research Questions**

Through the guiding lenses of the transtheoretical model and social cognitive change theories, this research endeavored to investigate the following questions: (1) What influence does the use of social media have in modifying a college student's readiness to change regarding nutritional lifestyle behaviors? and (2) How does the use of social media in a general education nutrition course relate to a college student's alterations in dietary intake?

Social cognitive theory proposes that behavior change occurs because of personal, behavioral, and environmental factors (Contento, 2011). The measurement of a college student's alterations in dietary intake is an efficacy of a social-media based intervention (Mihaly et al., 2015). Previous research completed by Richards, Kattlemann, and Ren (2006) used web-based interventions to increase fruit and vegetable consumption in 18- to- 24 year-olds and assessed stage of change using an algorithm based on an individuals consumed number servings of fruits



and vegetables per day. The research implemented the use social media to assess the influences on a college student's overall nutrient intake of the five food groups represented in MyPlate: grains, vegetables, fruits, proteins, and dairy (Byrd-Bredbenner, Moe, Berning, & Kelley, 2016). Stage of change assessment will occur using an algorithm adapted from research completed by Richards et al. (2006).

### **Participants**

A convenience sampling of students (N=108) enrolled in a traditional delivery, general education nutrition course was invited to participate in the study. Of the 108 invited participants, 65 students chose to participate in the study. As this course is a general education requirement, participants ranging from freshman to senior classification were included in the study. Participants were current students at the selected regional Division II higher education institution located in a rural, mid-western region of the United States beginning January 2016, and be between the ages of 18 to 50 years.

The initial stakeholders are college students, as the results of this research strive to uncover new nutrition education interventions that resonate with the designated population in today's digital world. Other invested parties are Registered Dietitians and Dietetic Technician Registered as the information provided from this research aids in new techniques for the health professionals to implement in creating nutrition-counseling programs for college students. Finally, The Accreditation Council for Nutrition in Education and Dietetics Program Directors, Nutritional Science faculty, or program pedagogy planners responsible for providing coursework to college-aged students in a general education nutrition course can better structure coursework from information presented in the research findings.

## **Setting**

The site selected for the study is a regional Division II higher education institution with approximately 8,000 enrolled students located in a rural, mid-western region of the United States. With three locations, the institution offers over 50 undergraduate degrees and 25 graduate degrees. The general education nutrition course offered via traditional methods is housed on the university's primary campus. Nutritional sciences faculty operate from the primary campus and instruct general education nutrition courses from one building. As a faculty member of the university and the nutritional sciences program, the decision to conduct the study at this site was both rational and convenient.

## **Data Collection**

This study obtained Institutional Review Board approval at both the degree granting institution and the research site before recruitment of participants. College students enrolled in the traditional delivery general education nutrition course between the ages of 18 and 50 were invited to participate in the study during Week 1 of the spring 2016 semester. Along with the Cover Letter (see Appendix A), students received an Informed Consent, explaining the study's intent and research design (see Appendix B). The information for the study was given during Week 1 of the course, prior to student engagement in research related activities during Weeks 2-14. As the primary researcher for the study, permission was obtained from each course instructor prior to inviting participants to the study. Additionally, as the primary researcher for the study, the author is not the instructor of record for any of the courses used for the study. Beginning Week 2, students having received the Cover Letter and signed the Informed Consent began participation in the study. In addition to data collection occurring Weeks 2 & 14, students

commenced use of social media (Facebook and/or Twitter), according to the Informed Consent, starting Week 3. Exclusion from the study resulted if data was incomplete (data was not collected during both Weeks 2 & 14), unreliable data was submitted (assignment was not completed per instructions), if a student withdrew from the course before completion of the study, or if a student did not register for one of the course supported social media accounts.

A pretest-posttest design was used to compare the alterations in readiness to change and dietary intake of the students in the nutrition education course supported by social media. Data was collected in Week 2 of the spring 2016 semester. Twenty-four hour food recall records were assessed using SuperTracker. Students documented dietary intake for a twenty-four hour period and performed a self-dietary analysis using SuperTracker, a personalized food and exercise tracker that aligns with the USDA's MyPlate and Dietary Guidelines (Byrd-Bredbenner et al., 2016) (see Appendix C). The USDA's SuperTracker is a satisfactory tool for dietary assessment (Summerfield, 2012). Individuals can use SuperTracker to input food intake information throughout the day and generate various nutrient reports pertaining to dietary intake (Summerfield, 2012). Standard dietary assessment tools included twenty-four hour dietary recall, food frequency questionnaires, food records, food check lists, diet history, and duplicate food collections (Lee & Neiman, 2013). Tools selected to measure dietary behaviors depended on the purpose of the evaluation, size of the group, and resources available (Lee & Neiman, 2013). The purpose of this study was to evaluate the selected population using social media in a general education nutrition course for impact on stage of change and alterations of dietary intake.

Class meets three times a week for 50 minutes each meeting. Topics covered in the first two weeks of lectures include basic information on the science of nutrition, dietary reference intakes, and nutrient composition of foods, thus minimizing the effect of class assignments,

activities, and lectures on behavior change for the initial sampling. During Weeks 3-14, class lecture and assignments covered topics including: (a) how lifestyle choices affect physical, psychosocial, and emotional health, (b) the effects of decision-making on lifestyle outcomes, (c) understanding of the basic principles of human nutrition by explaining the relationship of nutrition to overall health, and (d) identifying key components and their role for obtaining and maintaining desirable body weight, personal food habits, and eating behaviors. In addition to traditional class lectures, videos, assignments, and discussions tied to social cognitive theory, where students use their own dietary choices and lifestyle behaviors as a reference for learning course materials, students participated in discussions on social media. The primary researcher supplemented course materials with information on Facebook and Twitter beginning in Week 3 and continuing through Week 14. Posts were of relevant content, clear, concise, and contained information targeted to college-aged students (Hingle, Nichter, Medeiros, & Grace, 2013). Students were encouraged to respond to posts received from the master Facebook and Twitter accounts and could even ask questions relevant to general nutrition during the study. If a student did not wish to use their personal Facebook or Twitter account, they were encouraged to create a new account for the duration of the study.

Data was collected again in Week 14 of the spring 2016 semester. A comprehensive dietary analysis assignment was assessed using SuperTracker, comprised of three, twenty-four hour food recall assignments. Students documented dietary intake for a twenty-four hour period on three separate days and performed self-dietary analyses using SuperTracker, a personalized food and exercise tracker that aligns with the USDA's MyPlate and Dietary Guidelines (Byrd-Bredbenner et al., 2016) (see Appendix D). Using the work of Frimming et al. (2011) as a template, students were asked to document which social media tool they used throughout the

study. Additional information included for statistical analysis on the Week 14 comprehensive dietary analysis assignment is the following question: (1) Which form(s) of social media did you use throughout this course? (a) Facebook, (b) Twitter, or (c) a combination of both Facebook and Twitter.

**Archival data.** Archival data are any data collected prior to the commencement of the research study. This study obtained Institutional Review Board approval at both the degree granting institution and the research site before analysis of any archival data. According to *The University of New England Policies, Procedures and Guidance on Research with Human Subjects Research*, research that is exempt from IRB oversight includes research

Involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. (University of New England, 2010)

As mentioned in the introduction to the methodology section, this study is a comparative analysis, quantitative study proposing to compare the alterations in readiness to change and alterations in dietary intake of the students in the nutrition education course supported by social media versus previous courses where archival data is available. Use of archival data (N=90) from a previous section of the general nutrition education course, when students participated in the same educational experiences as described in the Data Collection section, allowed for comparison between the two groups. The modification of social media was not utilized to further emphasize normal class assignments, activities, and lectures tied to social cognitive theory where

students use their own dietary choices and lifestyle behaviors as a reference for learning course materials. Archival data was analyzed using the same procedures as newly collected data.

### **Data Management**

Quantitative data was collected (N=65) twice over a 12-week period. The data came from two scheduled class assignments given in Weeks 2 and 14. Data from the assignments were transferred to an Excel spreadsheet on the researcher's computer; students were assigned non-identifying numbers, and names were removed. All research data was backed up on an external 64GB thumb drive and will be stored in a locked file cabinet in the researcher's office for a period of five years. After a period of five years, the 64GB thumb drive containing all quantitative research data will be erased. Informed Consents are also locked in the same file cabinet in the researcher's office and will be shredded at the end of the waiting period.

### **Data Analysis**

Statistical analysis was completed using several procedures in SPSS version 21.0. All statistics were set at the .05 level of significance. Both descriptive and inferential statistical analyses methods were utilized to interpret the data. The use of social media in a general education nutrition course relating to a college student's alterations in dietary intake was assessed by measuring pretest-posttest-test differences from Weeks 2 & 14 class assignments; paired t-tests were used to compare changes in dietary intake in the five food groups that are the building blocks of a healthy diet. Paired t-tests were also used to compare the tallies or counts of categorical responses within the convenience sample group and the archival data. Independent sample t-tests were used to compare the tallies or counts of categorical responses between the convenience sample group and the archival data. Stage of change was assessed using an algorithm adapted from research completed by Richards et al. (2006). Previous research

completed by Richards et al. (2006) used web-based interventions to increase fruit and vegetable consumption in 18-to-24 year olds and assessed stage of change using an algorithm based on the individual's consumed number of servings of fruits and vegetables per day. In the study by Richards et al. (2006), participants were categorized as precontemplation, contemplation, preparation, action, or maintenance based on responses to various questions.

In other studies, stage of change was assessed for fruits and vegetables depending on participant response to the variable-item algorithm, constructed based on previous research (Finckenor & Byrd-Bredbenner, 2000; Ma, Betts, & Horacek, 2001). Using data from assignments collected in weeks 2 and 14, the research implemented the use of social media to assess influences on a college student's overall nutrient intake of the five food groups represented in MyPlate: grains, vegetables, fruits, proteins, and dairy (Byrd-Bredbenner et al., 2016). Results for each food group are dependent on set nutrition standards pertaining to the student's age, height, and weight, entered when each student created a private user profile on SuperTracker (instructions provided for this requirement on Week 2 assignments). Stage of change was assessed with an algorithm based on the student's overall dietary patterns (see Table 1).

Table 1

*Algorithm for Stage of Change Based on Student's Overall Dietary Pattern*

Stage of Change	Classification
Precontemplation	24 hour food analysis results show 5 food groups under target range
Contemplation	24 hour food analysis results show 4 food groups under target range
Preparation	24 hour food analysis results show 3 food groups under target range
Action	24 hour food analysis results show 2 food groups under target range
Maintenance	24 hour food analysis results show 1 food group under target range

Additionally, independent sample t-tests were used to compare the tallies or counts of categorical responses between the convenience sample group and the archival data for stage of change.

### **Participant Rights**

The primary ethical consideration of the research project is to protect the identity of the participants. This study obtained Institutional Review Board approval at both the degree granting institution and the research site before recruitment of participants. All individuals participating in the study received the Cover Letter (see Appendix A) and the Informed Consent (see Appendix B) as a part of the recruitment of participants in Week 1, which discussed procedures for data collection, benefits of the study, and processes to protect anonymity and confidentiality (Creswell, 2012). Participants were informed that involvement in the research was voluntary, and there were no associated risks from participation in the study. Participants were free to decline to participate for any reason. Participants were also allowed to withdraw from the study at any time or refuse to answer any individual questions, even after signing the informed consent. Given this study was conducted in correlation with a general nutrition education course, the teacher or



professor could not hold completion against the participant when determining grades. The primary researcher did not instruct the course(s), and is thus not responsible for grades; however, the primary researcher was responsible for all data collection, analysis, data maintenance, privacy of information, and implementation and maintenance of Facebook and Twitter throughout the study. The course instructor(s), while having access to the student assignments, was not a collaborative researcher; thus, did not have access to data once it had been prepared for data analysis (coding of students and removal of all personal identifiers). Research participants were given contact information for the principal researcher, the lead research advisor, and the Institutional Review Board should questions and/or concerns arise.

### **Limitations of the Study**

The limitations of the study include a small sampling size of college students at a regional Division II higher education institution located in a rural, mid-western region of the United States. While the use of college students for a sample population is appropriate for the nutrition-related study, college students do not represent the general population, thus additional studies using Twitter as a health promotion tool are warranted (Maher et al., 2014). As participation is voluntary, this may have an effect on the overall sample size for the study. Students participating in this study may not be representative of all college student populations participating in a general education nutrition course. Students participating in the study did not have the same course instructor; however, course curriculum design was the same for all participants. Reliability of data is limited as all participant data is self-reported. Sample size was affected, as a few students did not complete both scheduled course assignments. The length of the study, approximately 12-weeks, limits examination of a true representation of social media experiences. Finally, reliability of nutrient intake data is limited as the dietary records are self-

reported and 24-hour records are used versus a longer dietary assessment method (e.g., three-day food record).

Previous experiences as a Registered Dietitian and as a university instructor influence the views and approaches to this research (Denzin & Lincoln, 2011). As a practicing Registered Dietitian, the researcher employs behavior change techniques for modification of health behaviors with clients. The researcher must be watchful for bias throughout the process, not allowing professional experiences to influence any outcomes from this study. By employing quantitative research methods, data collection, and analysis, this does assist in limiting conflicts of interests. The researcher endeavored to maintain the highest quality of scholarship and credibility of results throughout the study.

## **Conclusion**

One of the most popular trends in social media is Facebook, ranking first most popular of all social media sites ahead of Twitter and YouTube (Statista, Inc., 2015). Facebook and Twitter are social media sites popular with college students, thus are practical solutions as evidence presents effectiveness of social media interventions (Leak et al., 2014; Lohse, 2014; Martínez-Alemán, 2014). This comparative analysis, quantitative study proposes to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as measured by alterations in readiness to change and dietary intake. A pretest-posttest design was used to compare the alterations in readiness to change and alterations in dietary intake of the students in the nutrition education course supported by social media and compared with archival data. Analysis of quantitative data was completed to answer the research questions of this study.

## CHAPTER 4

### RESULTS

The purpose of this chapter is to report the findings of statistical analyses pertaining to the use of social media in a general education nutrition course, and relating to a college student's readiness to make lifestyle changes (stage of change) and alterations in dietary intake. This chapter also presents answers to the research questions through results from analysis of the Week 2 dietary intake versus the Week 14 dietary intake, as well as the thematic analysis of alterations in dietary intake and stage of change in the convenience sample group versus the archival data. Analysis of N=90 Week 2 and Week 14 dietary intake assignments were completed for the archival data of an initial 114 students enrolled in the section, with 105 students completing the course.

The overall participation rate collected from the semester in which archival data was used, as defined in Chapter 3, was 85.7%. A higher participation is important as it limits sample bias (Fowler, 2009). Analysis of N=65 Week 2 and Week 14 dietary intake assignments were completed for the convenience sample group, with 108 students initially enrolled in the section and invited to participate in the research study. Of the 108 invited participants, 65 students (60.2%) chose to participate in the study. Criteria for exclusion from the study was established in Chapter 3. Exclusion from the study due to incomplete data (data was not collected during both Weeks 2 & 14) applied to 12 students from the archival data and one student from the convenience sample group. Unreliable data submitted (assignment was not completed per instructions) was not applicable to either research group, and having a student withdraw from the

course before completion of the study applied to nine students in the archival data and zero participants in the convenience sample group.

The two research questions addressed in this study were:

1. What influence does the use of social media have in modifying a college student's readiness to change regarding nutritional lifestyle behaviors?
2. How does the use of social media in a general education nutrition course relate to a college student's alterations in dietary intake?

### **Archival Data Analysis**

Of the sample respondents, data collected from the archival group (N = 90), 65.6% were female and 34.4% were male. Just over half (53.3%) of the respondents were classified as freshman, one-quarter (24.4%) sophomore, and the remaining quarter was divided between juniors (12.2%) and seniors (10.0%). Ages at the time of data collection had the following breakdown among respondents; 55.5% reported being 18–20 years of age, 33.3% for 21-24 years of age, 4.4% for 25-29 years of age, 3.3% for 30-34 years of age, 1.1% for 35-39 years of age, 1.1% for 40-44 years of age, and 1.1% for 45-49 years of age.

In order to answer the research questions posed in this study, archival data from a previous general education nutrition course without the use of social media was needed to compare the outcomes of the study. Data and results from sample respondents in the archival group (N = 90) were examined. Findings were reported for Week 2 and Week 14, alterations in dietary intake for each food group (grains, vegetables, fruits, dairy, and protein). The Week 2 and Week 14 alterations in dietary intake data for the archival group are summarized in Table 2.

Table 2

*Week 2 and Week 14 Alterations in Dietary Intake for Archival Data Group*

Pairs	Paired Differences						<i>t</i>	<i>p</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>SEM</i>	95% CI of the difference				
				Lower	Upper			
Pair 1: Week 2 Grains - Week 14 Grains	0	1.1318	0.1193	-0.237	0.237	0	1	
Pair 2: Week 2 Vegetables - Week 14 Vegetables	-0.1556	0.733	0.0773	-0.3091	-0.002	-2.013	0.047	
Pair 3: Week 2 Fruits - Week 14 Fruits	-0.2778	0.8745	0.0922	-0.4609	-0.0946	-3.014	0.003	
Pair 4: Week 2 Dairy - Week 14 Dairy	-0.1778	0.7123	0.0751	-0.327	-0.0286	-2.368	0.02	
Pair 5: Week 2 Protein - Week 14 Protein	-0.3	0.9994	0.1054	-0.5093	-0.0907	-2.848	0.005	

Table 2 displays pairings of Week 2 versus Week 14 archival respondents per dietary analysis item, mean, standard deviations, standard error mean, CI of the difference, *t* value, and significance (p-value). Participants used twenty-four hour food recall records that were assessed using SuperTracker, a personalized food and exercise tracker that aligns with the USDA's MyPlate and Dietary Guidelines. Students documented dietary intake for a twenty-four hour period and performed a self-dietary analysis using SuperTracker at Week 2 and Week 14 (Byrd-Bredbenner, Moe, Berning, & Kelley, 2016).

The data from the dietary analysis was entered and numerically coded into SPSS, categorizing each participant's dietary intake for each of the five dietary food groups (grains, vegetables, fruits, dairy, and protein). Each participant's dietary intake for each of the five food groups was reported as "Under," "On Target," or "Over." For the purposes of tallying and comparing values, these reported values were converted numerically to Under = -1, On Target = 0, and Over = +1.

For Pair 1: Week 2 Grains - Week 14 Grains, the significance was  $p=1.000$ . Sufficient evidence has not been demonstrated to state a difference in the dietary intake of grains between Week 2 and Week 14 as a result of participation in the general education nutrition course. For Pair 2: Week 2 Vegetables - Week 14 Vegetables, the significance was  $p=0.047$ . This result demonstrated a significant difference in the dietary intake of vegetables as a result of participation in the general education nutrition course. For Pair 3: Week 2 Fruits - Week 14 Fruits, the significance was  $p=0.003$ . This result also demonstrated a significant difference in the dietary intake of fruits as a result of participation in the general education nutrition course. For Pair 4: Week 2 Dairy - Week 14 Dairy, the significance was  $p=0.020$ . This result similarly demonstrated a significant difference in the dietary intake of dairy as a result of participation in the general education nutrition course. Finally, for Pair 5: Week 2 Protein - Week 14 Protein, the significance was  $p=0.005$ . This result demonstrated a significant difference in the dietary intake of protein as a result of participation in the general education nutrition course.

Stage of change was assessed with an algorithm based on the student's overall dietary patterns (see Table 1). Using the algorithm from Table 1, the stage of change was assessed using a pre-test / posttest method of data collection from Weeks 2 and Weeks 14. Table 3 displays Week 2 and Week 14 stage of change assessment for archival group.

Table 3

*Week 2 and Week 14 Stage of Change Assessment for Archival Data Group*

Pairs	Paired Differences					<i>t</i>	<i>p</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>SEM</i>	95% CI of the difference			
				Lower	Upper		
Pair 1: Stage of Change Pre Assessment - Stage of Change Post Assessment	0.7444	1.1666	0.123	0.5001	0.9888	6.054	0

For Pair 1: Stage of Change Pre Assessment – Stage of Change Post Assessment, the significance was  $p=0.000$ . This result demonstrated a significant difference in the stage of change from Week 2 to Week 14 as a result of participation in the general education nutrition course.

### Convenience Sample Data Analysis

Of the sample respondents, data collected from the convenience sample group ( $N = 65$ ), 60.0% were female and 40.0% were male. Just under half (43.1%) of the respondents were classified as freshmen, one-third (35.4%) sophomore, and the remaining quarter was divided between juniors (6.2%) and seniors (13.8%). Ages at time of data collection had the following breakdown among respondents; 55.3% reported being 18–20 years of age, 30.9% for 21-24 years of age, 7.7% for 25-29 years of age, 3.0% for 30-34 years of age, 1.5% for 35-39 years of age, 0% for 40-44 years of age, and 3.0% for 45-49 years of age.

In order to answer the research questions posed for this study, data was collected from a convenience sampling of students in a general education nutrition course having agreed to

participate in the research and use social media throughout the duration of the study. Data and results from sample respondents in the convenience sample group (N = 65) were examined. Findings were reported for Week 2 and Week 14 alterations in dietary intake for each food group (grains, vegetables, fruits, dairy, and protein). The Week 2 and Week 14 alterations in dietary intake data for the convenience sample group are summarized in Table 4.

Table 4

*Week 2 and Week 14 Alterations in Dietary Intake for Convenience Sample Group*

Paired Samples Test								
Pairs	Paired Differences			95% CI of the difference		<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>SEM</i>	Lower	Upper			
Pair 1: Week 2 Grains - Week 14 Grains	-0.5385	1.0319	0.128	-0.7942	-0.2828	-4.207	64	0
Pair 2: Week 2 Vegetables - Week 14 Vegetables	-0.3077	0.8464	0.105	-0.5174	-0.098	-2.931	64	0.005
Pair 3: Week 2 Fruits - Week 14 Fruits	-0.3077	0.7054	0.0875	-0.4825	-0.1329	-3.517	64	0.001
Pair 4: Week 2 Dairy - Week 14 Dairy	-0.1846	0.9665	0.1199	-0.4241	0.0549	-1.54	64	0.128
Pair 5: Week 2 Protein - Week 14 Protein	-0.7692	1.0424	0.1293	-1.0275	-0.5109	-5.95	64	0

Table 4 displays pairings of Week 2 versus Week 14 convenience sample respondents per dietary analysis item, mean, standard deviations, standard error mean, CI of the difference, *t* value, and significance (p-value). Participants used twenty-four hour food recall records that were assessed using SuperTracker, a personalized food and exercise tracker that aligns with the USDA's



MyPlate and Dietary Guidelines. Students documented dietary intake for a twenty-four hour period and performed a self-dietary analysis using SuperTracker at Week 2 and Week 14 (Byrd-Bredbenner et al., 2016).

The data from the dietary analysis was entered and numerically coded into SPSS, categorizing each participant's dietary intake for each of the five dietary food groups (grains, vegetables, fruits, dairy, and protein). Each participant's dietary intake for each of the five food groups was reported as "Under," "On Target," or "Over." For the purposes of tallying and comparing values, these reported values were converted numerically to Under = -1, On Target = 0, and Over = +1.

For Pair 1: Week 2 Grains - Week 14 Grains, the significance was  $p=0.000$ . This result demonstrated a significant difference in the dietary intake of grains as a result of participation in the general education nutrition course supported with social media. For Pair 2: Week 2 Vegetables - Week 14 Vegetables, the significance was  $p=0.005$ . This result demonstrated a significant difference in the dietary intake of vegetables as a result of participation in the general education nutrition course supported with social media. For Pair 3: Week 2 Fruits - Week 14 Fruits, the significance was  $p=0.001$ . This result also demonstrated a significant difference in the dietary intake of fruits as a result of participation in the general education nutrition course supported with social media. For Pair 4: Week 2 Dairy - Week 14 Dairy, the significance was  $p=0.128$ . Sufficient evidence has not been demonstrated to state a difference in the dietary intake of dairy between Week 2 and Week 14 as a result of participation in the general education nutrition course supported with social media. Finally, for Pair 5: Week 2 Protein - Week 14 Protein, the significance was  $p=0.000$ . This result demonstrated a significant difference in the

dietary intake of protein as a result of participation in the general education nutrition course supported with social media.

Stage of change was assessed with an algorithm based on the student's overall dietary patterns (refer to Table 1). Using the algorithm from Table 1, the stage of change was assessed using a pre-test / posttest method of data collection from Weeks 2 and Weeks 14. Table 5 displays Week 2 and Week 14 stage of change assessment for the convenience sample group.

Table 5

*Week 2 and Week 14 Stage of Change Assessment for Convenience Sample Group*

Paired Samples Test									
Pairs	Paired Differences						<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>SEM</i>	95% CI of the difference					
				Lower	Upper				
Pair 1: Stage of Change Pre Assessment - Stage of Change Post Assessment	1.3385	1.1763	0.1459	1.047	1.6299	9.174	64	0	

For Pair 1: Stage of Change Pre Assessment – Stage of Change Post Assessment, the significance was  $p=0.000$ . This result demonstrated a significant difference in the stage of change from Week 2 to Week 14 as a result of participation in the general education nutrition course supported with social media.

Social media used by those participants in the convenience sample group ( $N=65$ ) occurred from Weeks 3-Weeks 14. Results showed that 39 participants were female and 26 were male. Table 6 displays the data of the social media usage of the convenience sample group.

Table 6

*Social Media Used by Participants in Convenience Sample Group from Weeks 3-Weeks 14*

Gender	Social Media	Frequency	Percent	Valid Percent	Cumulative Percent
Male	Facebook	12	46.2	46.2	46.2
	Twitter	5	19.2	19.2	65.4
	Both Facebook & Twitter	2	7.7	7.7	73.1
	(did not respond to question)	7	26.9	26.9	100.0
	Total	26	100.0	100.0	
Female	Facebook	27	69.2	69.2	69.2
	Twitter	6	15.4	15.4	84.6
	Both Facebook & Twitter	3	7.7	7.7	92.3
	(did not respond to question)	3	7.7	7.7	100.0
	Total	39	100.0	100.0	

In looking at frequency of use of social media, the results from Table 6 display data separately for each gender. Both males and females predominately used Facebook (46.2% and 69.2%, respectively), while using Twitter, 19.2% for males and 15.4% for females. The results for individuals using both forms of social media were similar for both genders, 7.7% for males and females. Finally, 26.9% of males and 7.7% of females did not respond to this question on the survey, thus not providing any relevant data for the study.

According to Hingle et al. (2013) any nutrition education combined with technology targeted toward college-aged individuals needs content that is relevant, interesting, clear, and concise. Messages posted on Facebook and Twitter focused on information related to improving dietary intake, nutrition and fitness tips for college students, and changing nutrition related

lifestyle behaviors. Examples of the messages posted on Facebook and Twitter for this study included the following:

- “Let's do something new. Ask Mrs. C, RD. Ask me your nutrition or wellness questions today!” (NSU MyPlate, 2016).
- “Did you know? In 1893, the US Supreme Court declared the tomato a vegetable, using the popular definition which classifies vegetable by use. The case is known as Nix vs. Hedden (149 U.S. 304). While the tomato can be classified botanically as a fruit, it is officially categorized as a vegetable in the United States. #eatyourveggies or #eatyourfruit,” (NSU MyPlate, 2016).
- “Find your healthy eating style and maintain it for a lifetime. Start by eating a variety of healthy foods from the five MyPlate food groups. Check out the new MyPlate, MyWins here: <http://1.usa.gov/1UyZGma>,” (NSU MyPlate, 2016).

### **Findings for Research Question 1**

What influence does the use of social media have modifying a college student's readiness to change regarding nutritional lifestyle behaviors?

In order to answer the research questions posed of this study, analysis of the two groups was completed. Independent sample t-tests were used to compare the tallies or counts of categorical responses between the convenience sample group and the archival data for stage of change. First, comparisons were completed for *Week 2 stage of change comparison for archival data group versus convenience sample group*. Table 7 displays pairings of Week 2 archival data group versus convenience sample group respondents per stage of change assessment, group, N = number, mean, standard deviations, and standard error mean.

Table 7

*Week 2 Stage of Change Comparison for Archival Data Group versus Convenience Sample Group: Group Statistics*

Stage of Change	Group	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
Stage of Change Pre Assessment	1.0	90	3.422	1.0275	.1083
	2.0	65	3.615	.9469	.1174

Table 8 displays pairings of Week 2 archival data group versus convenience sample group respondents per stage of change assessment showing Levene's Test for equality of variances providing both the *F* value and significance.

Table 8

*Week 2 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group: Independent Samples Test*

Stage of Change	Equal Variance	Levene's Test for Equality of Variances		t-test for Equality of Means						
		<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)	<i>M</i> Difference	<i>SE</i> Difference	95% CI of the Difference	
									Lower	Upper
Stage of Change Pre Assessment	Assumed	0.916	0.340	-1.193	153	0.235	-0.1932	0.1619	-0.513	0.1267
	Not assumed			-1.209	144.161	0.229	-0.1932	0.1598	-0.5089	0.1226

The results displayed in Table 8 for Stage of Change Pre Assessment (Week 2 Archival Data Group versus Convenience Sample) with equal variance assumed demonstrated a significance value of  $p=0.340$ . A value greater than .05 means that the variability in these two groups is about

the same; that the results in one group do not vary too much more than the results in the second group. The importance these results demonstrate that there is no significant difference between Group 1 and Group 2 prior to beginning the research.

Table 9

*Week 14 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group*

Stage of Change	Equal variances	Levene's Test for Equality of Variances		t-test for Equality of Means						
		<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)	<i>M</i> Difference	<i>SE</i> Difference	95% CI of the Difference	
									Lower	Upper
Stage of Change Post Assessment	Assumed	2.603	0.109	2.292	153	0.023	0.4009	0.1749	0.0553	0.7464
	Not assumed			2.368	150.756	0.019	0.4009	0.1692	0.0665	0.7353

The results displayed in Table 9 for Stage of Change Post Assessment (Week 14 Archival Data Group versus Convenience Sample) with equal variance assumed demonstrated a significance value of  $p=0.109$ . A value greater than .05 means that the variability in these two groups is about the same; that the results in one group do not vary much more than the results in the second group. The results fail to reject the null hypothesis indicating that the two means for Group 1 ( $M=2.6$ ) and Group 2 ( $M=2.3$ ) were of similar or equal values. For this study the results failed to demonstrate any difference from the use of social media in a college nutrition education course in the modification of a college student's readiness to change regarding nutritional lifestyle behaviors.

## **Findings for Research Question 2**

How does the use of social media in a general education nutrition course relate to a college student's alterations in dietary intake?

In order to answer this research question, analysis of the two groups was completed. Independent sample t-tests were used to compare the tallies or counts of categorical responses between the convenience sample group and the archival data for each participant's dietary intake for each of the five dietary food groups (grains, vegetables, fruits, dairy, and protein). Each participant's dietary intake for each of the five food groups was reported as "Under," "On Target," or "Over." For the purposes of tallying and comparing values, these reported values were converted numerically to Under = -1, On Target = 0, and Over = +1.

Table 10 displays pairings of Week 14 archival data group versus convenience sample group respondents per stage of change assessment, group, N = number, mean, standard deviations, and standard error mean.

Table 10

*Week 14 Stage of Change Comparison for Archival Data Group Versus Convenience Sample Group: Group Statistics*

Food Group	Group	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
Week 14 Grains	1	90	-0.222	0.8316	0.0877
	2	65	0.031	0.9009	0.1117
Week 14 Vegetables	1	90	-0.489	0.6576	0.0693
	2	65	-0.215	0.7602	0.0943
Week 14 Fruits	1	90	-0.389	0.7745	0.0816
	2	65	-0.585	0.7047	0.0874
Week 14 Dairy	1	90	-0.622	0.6633	0.0699
	2	65	-0.477	0.7927	0.0983
Week 14 Protein	1	90	0.067	0.8585	0.0905
	2	65	0.523	0.6871	0.0852

The comparison of the dietary intake for the archival group (Week 14) and the convenience sample group (Week 14) is summarized in Table 11.



Table 11

*Week 14 Alterations in Dietary Intake Comparison for Archival Data Group Versus Convenience Sample Group*

Food Group	Equal variances	t-test for Equality of Means									
		Levene's Test for Equality of Variances								95% CI of the Difference	
		<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i> (2-tailed)	<i>M</i> Difference	<i>SE</i> Difference	Lower	Upper	
Week 14 Grains	Assumed	1.026	0.313	-1.805	153	0.073	-0.253	0.1402	-0.53	0.024	
	Not assumed			-1.781	131.27	0.077	-0.253	0.142	-0.5339	0.028	
Week 14 Vegetables	Assumed	1.315	0.253	-2.392	153	0.018	-0.2735	0.1143	-0.4994	-0.0476	
	Not assumed			-2.337	125.511	0.021	-0.2735	0.117	-0.5051	-0.0419	
Week 14 Fruits	Assumed	3.238	0.074	1.612	153	0.109	0.1957	0.1214	-0.0442	0.4357	
	Not assumed			1.636	145.011	0.104	0.1957	0.1196	-0.0407	0.4321	
Week 14 Dairy	Assumed	5.772	0.017	-1.239	153	0.217	-0.1453	0.1172	-0.3769	0.0863	
	Not assumed			-1.204	122.555	0.231	-0.1453	0.1206	-0.3841	0.0935	
Week 14 Protein	Assumed	5.492	0.02	-3.543	153	0.001	-0.4564	0.1288	-0.7109	-0.2019	
	Not assumed			-3.672	151.336	0	-0.4564	0.1243	-0.702	-0.2108	

The results visible in Table 11 for Week 14 Grains with equal variance assumed demonstrated a significance value of  $p=0.313$ . A value greater than .05 means that the variability in these two groups is about the same; that the results in one group do not vary much more than the results in the second group (Morgan, Leech, Gloeckner, & Barrett, 2013). The results fail to reject the null

hypothesis indicating that the two means for Group 1 ( $M = -.22$ ) and Group 2 ( $M = .03$ ) were of similar or equal value. Thus, for this study the results failed to demonstrate any difference from the use of social media in a college nutrition education course in the modification of a college student's dietary intake of the grains food group. The results for Week 14 Vegetables alterations in dietary intake with equal variance assumed demonstrated a significance value of  $p = 0.253$ . These results also fail to reject the null hypothesis as the means for Group 1 ( $M = -.49$ ) and Group 2 ( $M = -.42$ ) were of similar values. Thus, for this study the results failed to demonstrate any difference from the use of social media in a college nutrition education course in the modification of a college student's dietary intake of the vegetable food group. The results for Week 14 Fruits alterations in dietary intake with equal variance assumed demonstrated a significance value of  $p = 0.074$ . Additionally, these results failed to reject the null hypothesis with means of similar values for Group 1 ( $M = -.39$ ) and Group 2 ( $M = -.59$ ). Thus, for this study the results failed to indicate any difference from the use of social media in a college nutrition education course in the modification of a college student's dietary intake of the fruit food group.

Results from an independent sample t-test indicated that participants in the convenience sample group completing the general nutrition education course supplemented with social media ( $M = -.48$ ,  $SD = .79$ ,  $N = 65$ ) scored higher in modification of dietary intake for dairy than college students from the archival data group ( $M = -.62$ ,  $SD = .66$ ,  $N = 90$ ),  $p < .05$ , two-tailed. The difference of .29 scale points was small (scale range: -1 to 1), and the 95% confidence interval around difference between the group means was relatively precise (-.38 to .09). These results for Week 14 Dairy alterations in dietary intake with equal variance assumed demonstrated a significance value of  $p = 0.017$ . A value less than or equal to .05 means that the variability in these two groups is not the same; that the scores in one group vary much more than the scores in

the second group (Morgan et al., 2013). Normally, this would be a negative interpretation. However, in this instance, it demonstrates that the use of social media in a general nutrition education course did significantly affect a college student's dietary intake of the dairy food group.

Results from an independent sample t-test indicated that participants in the convenience sample group completing the general nutrition education course supplemented with social media ( $M = .52$ ,  $SD = .69$ ,  $N = 65$ ) scored higher in modification of dietary intake for protein than college students from the archival data group ( $M = .07$ ,  $SD = .85$ ,  $N = 90$ ),  $p < .05$ , two-tailed. The difference of .51 scale points was moderate (scale range: -1 to 1), and the 95% confidence interval around difference between the group means was relatively precise (-.71 to -.20). These results for Week 14 Protein alterations in dietary intake with equal variance assumed demonstrated a significance value of  $p=0.020$ . These results demonstrate that there is significant difference between Group 1 and Group 2. Thus, for this study there is a significant outcome from the use of social media in a college nutrition education course in the modification of a college student's alterations in protein dietary intake.

## **Conclusion**

Overall, results from this study did not indicate that the use of social media in a general nutrition education course to be of value when modifying a college student's readiness to change regarding nutritional lifestyle behaviors. The results were varied regarding the use of social media in a general nutrition education course affecting a college student's dietary intake, with no significant changes occurring in grain, vegetables, or fruit intake, but with significant alterations in dietary consumption of dairy and protein foods. Chapter 5 offers a comprehensive discussion of the findings, provides implications for the conclusions, as well as recommendations for future research.



## CHAPTER 5

### SUMMARY AND DISCUSSION

The primary purpose of this comparative analysis, quantitative study was to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake in a course supported with social media. Through the guiding lenses of the transtheoretical model and social cognitive change theories, this research endeavored to investigate the following questions: (1) What influence does the use of social media have in modifying a college student's readiness to change regarding nutritional lifestyle behaviors? and (2) How does the use of social media in a general education nutrition course relate to a college student's alterations in dietary intake?

The literature clearly emphasizes that knowledge of nutrition is not enough to change behavior. In order for behavior change to occur, nutrition education must be paired with behavior change skills or goal setting strategies (e.g., motivational interviewing, the Nutrition Care Process, action plans) (Contento, 2011; Contento, Randell, & Basch, 2002; Lockwood & Wohl, 2012). Additional research in the literature supports evidence that interventions combining social media and behavior change techniques which incorporate online social networks may be effective (Maher et al., 2014; Webb, Joseph, Yardley, & Michie, 2010). The theoretical frameworks of social cognitive theory and transtheoretical model describe the motivational strategies of behavior change employed using social media in the nutrition education course. Research was limiting demonstrating social media as an effective tool for nutrition education resulting in behavior change (Leak, Benavente, Goodell, Lassiter, Jones, & Bowen; 2014; Lohse, 2013).

With the college years being the last years of adolescence – presenting an opportunity to influence eating behaviors, implement healthy behaviors, and support positive self-esteem – research demonstrates that eating habits formed in college years can negatively affect health outcomes as adults (Lockwood & Wohl, 2012). Literature supports evidence that interventions combining social media and behavior change techniques which incorporate online social networks may be effective (Maher et al., 2014; Webb et al., 2010). With the limited results on the use of social media in nutrition education and the evidence supporting its efficacy as a tool for behavior change, there is a clear need for further investigation, thus supporting the purpose of this research.

### **Interpretations of Findings**

This study confirmed existing literature of the benefits of nutrition education and behavior change techniques for this group of college students (Contento, 2011; Contento et al., 2002; Woekel et al., 2013). While college students are typically defined as ages 18-24 (freshmen to seniors), the participants in this study ranged from 18 to 50 years of age (freshmen to seniors). Though significant results were only seen in two of six areas, college students did alter dietary intake in two of five food groups (dairy and protein) as a result of participation in this study (a nutrition education course supported with social media). The nutrition education supported with social media was impactful in this group of college students, suggesting its use could have a broader target audience as the participants in the study were from across the lifespan. Using social media as a tool for nutrition specific behavior change is a practical solution. This study presents evidence of effective social media interventions for behavior change (Maher et al., 2014). Further research is warranted to continue to develop best practice approaches for nutrition

education using social media and its' intended audiences for the promotion of healthy lifestyle behaviors.

Analysis of N=90 Week 2 and Week 14 dietary intake assignments were completed for the Archival Data Group of an initial 114 students enrolled in the section with 105 students completing the course. The overall participation rate collected from the semester in which archival data was 85.7%. Analysis of N=65 Week 2 and Week 14 dietary intake assignments were completed for the Convenience Sample Group, with 108 students initially enrolled in the section and invited to participate in the research study. Of the 108 invited participants, 65 students (60.2%) chose to participate in the study. Participation rate was higher in the archival data group. Lower participation in the convenience sample group could correlate to the lack of participation of the researcher as the instructor of record for the nutrition education course.

When analyzed separately, the results from Week 14 Archival Data Group did indicate that with this group of college students, nutrition education implemented with behavior change techniques will result in both readiness to change nutritional lifestyle behaviors and alterations in dietary intake measured by the five food groups. Behavior change occurs when education is combined with certain behavioral skills, positive attitude, and goal achievement (Lockwood & Wohl, 2012). Results from the Week 14 Convenience Sample Group similarly indicated that with this group of college students, nutrition education implemented with behavior change techniques supplemented with social media will result in both readiness to change nutritional lifestyle behaviors and alterations in dietary intake measured by the five food groups. While these results align with existing literature on social media's impact on behavior change and scientists agree it has greater impact when paired with behavior change theory (Maher et al., 2014; Webb et al., 2010), additional research is warranted as little prevails to the use of social

media with long-term healthcare and behavioral improvements (Centola, 2013; Maher et al., 2014).

Facebook and Twitter, identified as preferred social media sites for college students, have both been successful in enhancing student engagement (Clauson, Singh-Franco, Sicar-Ramsewak, Joseph, & Sandars, 2013; McKay, Sanko, Shekhter, & Birnbach, 2014; Tyma, 2011). In survey results, both males and females reported Facebook as the predominate preferred social media platform for the study (46.2% and 69.2%, respectively), while 19.2% of males and 15.4% of females reported using Twitter. Results from this study confirm existing literature for this group of college students' social media preferences. Messages posted on Facebook and Twitter focused on information related to improving dietary intake, nutrition and fitness tips for college students, and changing nutrition related lifestyle behaviors. According to Hingle et al. (2013) any nutrition education combined with technology targeted toward college-aged individuals needs content that is relevant, interesting, clear, and concise.

### **Implications of Limitations on Research**

The following are noted observations of the research results, initial limitations reported for the study, and recorded observations of the researcher throughout the duration of the 12-week study. Of the 108 invited participants, 65 students (60.2%) chose to participate in the study. While considered an acceptable participation rate, it was considerably lower than that of the of the archival data group (85.7%). The researcher was not an instructor of record for the study, however, but had been an instructor in courses where archival data was collected. Student participation might increase with research involvement in the study as there is a level of trust created with the researcher / instructor.



The study population was a small, convenience sample of college students enrolled in a general education nutrition course located in a rural, mid-western region of the United States. The findings may not be generalized to other college students on campus or representative of other universities across the region or even the United States. The study could be repeated at the same institution for a full academic year to increase sample size.

The researcher had larger online courses available that would have extended the study population. These courses were not used as the scope of the study was limited to traditional instruction courses. As social media is an online environment, the use of social media in an online general nutrition education course could facilitate student / teacher dialog and elicit nutrition related behavior change.

Data was self-reported, thus affecting its accuracy and reliability. Future studies could utilize food frequency questionnaires or interviews for data collection methods to improve standardization of data collection methods.

Finally, the study was conducted for one 12-week session, which is not a true representation of a college student's social media experience. Further action warrants additional research studies that examine long-term social media use both in and out of the classroom and its effects on nutrition education and lifestyle behavior changes.

### **Implications for Future Practice**

The modern day college student's way of learning involves technology and social media. When applying sound pedagogical techniques for learning for this generation both the use of technology and social media promotes opportunities for increase in knowledge, collaboration, engagement, and nutrition related-behavior change. The results of this study demonstrated alterations in dietary intake in two food groups as a result of participation in a course supported

with social media. Future practice warrants the continued use of social media in general nutrition education courses. The use of social media is an additional tool to be employed with college students to affect behavior change as social media can facilitate both academic and social integration. This study did not track student engagement in social media usage during the research and found student participation in social media experiences to be limited. A recommendation for future practice is to develop strategies to evaluate student participation and encourage engagement in social media experiences.

### **Recommendations for Future Study**

The college classroom plays a significant role in educating students for their professional roles as well as influencing eating behaviors, building positive self-esteem, and implementing healthy behaviors that will carry into the adult years. As social media provides an outlet for connectedness, social support, and communication, it has also shown to be an advantageous tool for health promotion and behavior change (Korda & Itani, 2013). Recommendations for future research include:

1. Tailor social media messages towards college-aged students with regards to appropriate dietary intake patterns relating to the food groups, such as grains, vegetables, and fruits to see impact targeted messages on food group intake.
2. Replicate this research at similar institutions. This will allow for examination of eating patterns and behavior changes at similar institutions within the region.
3. Repeat the study with more participants to reduce the limitation of small sampling size.
4. Call for longitudinal studies, across the four-year college experience, allowing for long-term impacts of nutrition-related social media experiences on nutrition related-behavior changes in college-aged students.

5. Emphasize best practice approaches in the classroom with the use of social media: collaborating instructor lectures, coursework, and assignments to correlate with prompts and messages used in social media.
6. Examine the effects of social media use in the classroom (best-practice approaches) for behavior change. Studies demonstrating best practice approaches using social media are relevant to establish not only the best methods of use of social media with college-aged students, but also the most effective uses of social media for nutrition related-behavior change.
7. Evaluate the impact of a similar study with the researcher as the primary course instructor, using social media both in and outside the classroom to further engage students in social media experiences, thus increasing the reliability of the social media experience. For the purposes of this study, the researcher was not the instructor of record to limit bias in outcomes. Additional studies with the researcher as the primary course instructor or even as a consultant on best practice methods for use of social media in a nutrition education course are warranted to evaluate the impact of the role of the researcher in social media experiences.

## **Conclusion**

The purpose of this study was to assess college students in a general education nutrition course supported with social media and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. This study confirmed findings in existing literature of the benefits of nutrition education and behavior change techniques for this group of college students (Contento, 2011; Contento et al., 2002; Woekel et al., 2013). Though significant results were only seen in two of six areas, this group of college students did alter dietary intake

in two food groups (dairy and protein) as a result of the use of social media's impact throughout the duration of the course. Using social media as a tool for nutrition specific behavior change is a practical solution. This study presents evidence of effective social media interventions for behavior change (Maher et al., 2014).

According to Shields (2010), transformative leaders seek to make changes that benefit their students, organizations, and society. With four of the top ten causes of death in adults directly related to nutrition, influencing the lifestyle choices of college students is crucial as nutrition has a cumulative effect over one's lifespan (Byrd-Bredbenner, Moe, Berning, & Kelley, 2016). As an educator and researcher, transformative leaders have a vital role in the education of college students, preparing them for their future role in life. Further research is warranted to continue to develop best practice approaches for nutrition education using social media and its intended audiences for the promotion of healthy lifestyle behavior changes. Additionally, research needs to focus on collecting and disseminating valid and reliable information while using social media to promote nutrition education.

## REFERENCES

- American College Health Association. (2012). National college health assessment II: Undergraduate Reference Group Data Report 2011. Retrieved from [http://www.acha-ncha.org/docs/ACHA-NCHA-II\\_UNDERGRAD\\_ReferenceGroup\\_DataReport\\_Fall2011.pdf](http://www.acha-ncha.org/docs/ACHA-NCHA-II_UNDERGRAD_ReferenceGroup_DataReport_Fall2011.pdf)
- Araas, T. E. (2008). *Associations of mindfulness, perceived stress, and health behaviors in college freshmen* (Doctoral dissertation). Retrieved from ProQuest LLC. (Order No. AAI3303258)
- Balatsoukas, P., Kennedy, C. M., Buchan, I., Powell, J., & Anisworth, J. (2015). The role of social network technologies in online health promotion: A narrative review of theoretical and empirical factors influencing intervention effectiveness. *Journal of Medical Internet Research, 17*(6), e141.
- Bolliger, D. U., & Inan, F. A. (2012). Development and validation of the online student connectedness survey. *The International Review of Research in Open and Distance Learning, 13*(3), 42-65. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/1171/2240>
- Boyle, M. A., & Holben, D. H. (2013). *Community nutrition in action: An entrepreneurial approach* (6<sup>th</sup> ed.). Belmont, CA: Cengage.
- Bristol, T. J. (2010). Twitter: Consider the possibilities for continuing nurse education. *Journal of Continuing Education in Nursing, 41*(5), 199-200. doi:10.3928/00220124-20100423-09
- Brown, O. N., O'Conner, L. E., & Savaiano, D. (2014). Mobile MyPlate: A pilot study using text messaging to provide nutrition education and promote better dietary choices in college students. *Journal of American College Health, 62*(5), 320-327. doi:10.1080/07448481.2014.899233

- Byrd-Bredbenner, C., Moe, G., Berning, J., & Kelley, D. (2016). *Wardlaw's perspectives in nutrition*. New York, NY: McGraw Hill.
- Centola, D. (2013). Social media and the science of health behavior. *Circulation*, *127*(1), 2135-2144. doi:10.1161/CIRCULATIONAHA.112.101816
- Chou, W. S., Hunt, Y. M., Beckjourn, E. B., Moser, R., & Hesse, B. W. (2009) Social media use in the United States: Implications for health education. *Journal of Medical Internet Research*, *11*(4), e48. doi:10.2196/jmir.1249
- Clauson, K. A., Singh-Franco, D., Sicar-Ramsewak, F., Joseph, S., & Sandars, J. (2013). Social media use and educational preferences among first-year pharmacy students. *Teaching and Learning in Medicine: An International Journal*, *25*(2), 122-127. doi:10.1080/10401334.2013.770742
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative research* (4th ed.). Boston, MA: Pearson.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: Sage.
- Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York, NY: Teachers College Press.
- Contento, I. R. (2011). *Nutrition education: Linking research, theory, and practice*. Burlington, MA: Jones & Bartlett.
- Contento, I. R., Randell, J. S., & Basch, C. E. (2002). Review and analysis of evaluation measures used in nutrition education intervention research. *Journal of Nutrition Education and Behavior*, *34*(1), 2–25. doi:10.1016/S1499-4046(06)60220-0
- Cousineau, T. M., Franko, D. L., Ciccazzo, M., Goldstein, M., & Rosenthal, E. (2006). Web-based nutrition education for college students: Is it feasible? *Evaluation and Program Planning*, *29*(1), 23-33. doi:10.1016/j.evalprogplan.2005.04.018

- Cousineau, T. M., Goldstein, M., & Franko, D. L. (2004). A collaborative approach to nutrition education for college students. *Journal of American College Health, 53*(2), 79-84. doi:10.3200/JACH.53.2.79-84
- Denzin, N. K., & Lincoln, Y. S. (2011). *The discipline and practice of qualitative research*. Thousand Oaks, CA: Sage.
- Duffrin, C., Eakin, A., Bertrand, B., Barber-Heidel, K., & Carraway-Stage, V. (2011). Investigating perceived vs. medical weight status classification among college students: Room for improvement exists among overweight and obese. *International Electronic Journal of Health Education, 14*(1), 122-134. Retrieved from <http://files.eric.ed.gov/fulltext/EJ961155.pdf>
- Finckenor, M., & Byrd-Bredbenner, C. (2000). Nutrition intervention group program based on preaction-stage-oriented change processes of the Transtheoretical Model promotes long-term reduction in dietary fat intake. *Journal of the American Dietetics Association, 100*(3), 335-342. doi:10.1016/S0002-8223(00)00104-8
- Fowler, F. J. (2009). *Survey research methods* (4<sup>th</sup> ed.). Thousand Oaks, CA: Sage.
- Franko, D. L., Cousineau, T. M., Trant, M., Green, T. C., Rancourt, D., Thompson, D.,...Ciccazzo, M. (2008). Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an internet based education program. *Preventive Medicine, 47*(4), 369-377. doi:10.1016/j.ypmed.2008.06.013
- Frimming, R. E., Polsgrove, M. J., & Bower, G. G. (2011). Evaluation of a health and fitness social media experience. *American Journal of Health Education, 42*(4), 222-227. doi:10.1080/19325037.2011.10599191
- Fullan, M. (2007). *Leading in a culture of change*. Hoboken, NJ: Jossey-Bass.
- Gillespie, N. D., & Lenz, T. L. (2011). Implementation of a tool to modify behavior in a chronic disease management program. *Advances in Preventative Medicine, 2011*(1), 1-5. doi: <http://dx.doi.org/10.4061/2011/215842>

- Giordano, C., & Giordano, C. (2011). Health professions students' use of social media. *Journal of Allied Health, 40*(2), 78-81. Retrieved from [http://www.researchgate.net/publication/51240521\\_Health\\_professions\\_students%27\\_use\\_of\\_social\\_media](http://www.researchgate.net/publication/51240521_Health_professions_students%27_use_of_social_media)
- Gordon, C., & Hayes, R. (2012). Counting calories: Resident perspectives on calorie labeling in New York City. *Journal of Nutrition Education and Behavior, 44*(5), 454–458. doi:10.1016/j.jneb.2012.01.004
- Guthrie, J. (1994). Quantitative nutrition education research: Approaches, findings, outlook. *The Journal of Nutrition, 124*, 1813S-1819S. Retrieved from [http://jn.nutrition.org/content/124/9\\_Suppl/1813S.full.pdf](http://jn.nutrition.org/content/124/9_Suppl/1813S.full.pdf)
- Ha, E., & Caine-Bish, N. (2009). Effect of nutrition intervention using a general nutrition course for promoting fruit and vegetable consumption among college students. *Journal of Nutrition Education and Behavior, 41*(2), 103-109. doi:10.1016/j.jneb.2008.07.001
- Ha, E., & Caine-Bish, N. (2011). Interactive introductory nutrition course focusing on disease prevention increased whole-grain consumption by college students. *Journal of Nutrition Education and Behavior, 43*(4), 263-267. doi:10.1016/j.jneb.2010.02.008
- Hensleigh, K. E., Eddy, J. M., Wang, M. Q., Dennison, D., & Chaney, J. D. (2004). The impact of a computerized dietary assessment on nutrition knowledge. *The International Electronic Journal of Health Education, 7*, 43-49. Retrieved from <http://files.eric.ed.gov/fulltext/EJ794039.pdf>
- Hingle, M., Nichter, M., Medeiros, M., & Grace, S. (2013). Texting for health: The use of participatory methods to develop healthy lifestyle messages for teens. *Journal of Nutrition Education and Behavior, 45*(1), 12-19. doi:10.1016/j.jneb.2012.05.001
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons, 53*(1), 59-68. doi:10.1016/j.bushor.2009.09.003



- Kicklighter, J. R., Koonce, V. J., Rosenbloom, C. A., & Commander, N. A. (2010). College freshmen perceptions of effective and ineffective aspects of nutrition education. *Journal of American College Health, 59*(2), 98-104. doi:10.1080/07448481.2010.483709
- Kicklighter, J., Jonnalagadda, S. S., McClendon, J., & Hopkins, B. (2005). Nutrition education module appeals to students at Georgia State. *Journal of Family Consumer Sciences, 97*(4), 68-72. Retrieved from <http://crawl.prod.proquest.com.s3.amazonaws.com/fpcache/ab26a4e9fdbf8323245e17bea32df731.pdf?AWSAccessKeyId=AKIAJF7V7KNV2KKY2NUQ&Expires=1437951443&Signature=EHXbZb1YRri5rtFhL5ajMka171c%3D>
- Killos, L. F., Hancock, L. C., McGann, A. W., & Keller, A. E. (2010). Do “Clicker” educational sessions enhance the effectiveness of a social norms marketing campaign? *Journal of American College Health, 59*(3), 228-230. doi:10.1080/07448481.2010.497830
- Korda, H., & Itani, Z. (2013). Harnessing social media for health promotion and behavior change. *Health Promotion Practice, 14*(1), 15-23. doi:10.1177/1524839911405850
- Koszewski, W. M., Monroe, C., Faiman, C., & Whitman, E. Determining social media methods that college students would prefer to receive nutritional messages. *Journal of the Academy of Nutrition and Dietetics, 114*(9), A-98. doi:10.1016/j.jand.2014.06.336
- Leak, T. M., Benavente, L., Goodell, L. S., Lassiter, A., Jones, L., & Bowen, S. (2014). EFNEP graduates’ perspectives on social media to supplement nutrition education: Focus group findings from active users. *Journal of Nutrition Education and Behavior, 46*(3), 203-208. doi:10.1016/j.jneb.2014.01.006
- Lee, R., & Neiman, D. (2013). *Nutritional assessment* (6th ed.). New York, NY: McGraw Hill.
- Lenhart, A., Purcell, K, Smith, A., & Zickhur, K. (2010). *Social media & mobile internet use among teens and young adults* (Report). Retrieved from Pew Internet & American Life Project website: <http://www.pewinternet.org/files/old->

media//Files/Reports/2010/PIP\_Social\_Media\_and\_Young\_Adults\_Report\_Final\_with\_t  
oplines.pdf

- Lockwood, P., & Wohl, R. (2012). The impact of a 15-week lifetime wellness course on behavior change and self-efficacy in college students. *College Student Journal, 46*(3), 628-641. Retrieved from <http://web.b.ebscohost.com.une.idm.oclc.org/ehost/pdfviewer/pdfviewer?sid=227b7ba4-fa8-4a17-92fd-8c371a482c24%40sessionmgr113&vid=6&hid=112>
- Lohse, B. (2013). Facebook is an effective strategy to recruit low-income women to online nutrition education. *Journal of Nutrition Education and Behavior, 45*(1), 69-76. doi: 10.1016/j.jneb.2012.06.006
- Ma, J., Betts, N. M., & Horacek, T. M. (2001). Measuring stage of change for assessing readiness to increase fruit and vegetable intake among 18- to 24- year-olds. *American Journal of Health Promotion, 16*(2), 88-97. doi:10.4278/0890-1171-16.2.88
- Mackert, M., Kim, E., Guadagno, M., & Donovan-Kicken, E. (2012). Using Twitter for prenatal health promotion: Encouraging a multivitamin habit among college-aged females. *Studies in Health Technology and Informatics, 182*(1), 93-103. doi:10.3233/978-1-61499-152-6-93
- Maher, C. A., Lewis, L. K., Ferrar, K., Marshall, S., De Bourdeaudhuij, I., & Vandelanotte, C. (2014). Are health behavior change interventions that use online social networks effective? A systematic review. *Journal of Medical Internet Research, 16*(2), e40. doi:10.2196/jmir.2952
- Mckay, M., Sanko, J., Shekhter, I., & Birnbach, D. (2014). Twitter as a tool to enhance student engagement during an interprofessional patient safety course. *Journal of Interprofessional Care, 28*(6), 565-567. doi:10.3109/13561820.2014.912618
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

- Mihaly, S., Altiti, J., & Coccia, C. (2015). Feasibility and efficacy outcomes of a 6-week social media-based nutrition education intervention for student athletes. *Journal of the Academy of Nutrition and Dietetics*, 115(9), A-71. doi:  
<http://dx.doi.org/10.1016/j.jand.2015.06.250>
- Morgan, G. A., Leech, N. L., Gloeckner, G. W., & Barrett, K. C. (2013). *SPSS for introductory statistics: Use and interpretation* (5<sup>th</sup> ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- NSU MyPlate. (2016, January 29). Let's do something new. Ask Mrs. C, RD. Ask me your nutrition or wellness questions today! [Facebook update]. Retrieved from  
<https://www.facebook.com/NSUMyPlate01/>
- NSU MyPlate. (2016, January 28). Did you know? In 1893 the US Supreme Court declared the tomato a vegetable, using the popular definition which classifies vegetable by use. The case is known as Nix vs. Hedden (149 U.S. 304). While the tomato can be classified botanically as a fruit, it is officially categorized as a vegetable in the United States. #eatyourveggies or #eatyourfruit [Facebook update]. Retrieved from  
<https://www.facebook.com/NSUMyPlate01/>
- NSU MyPlate. (2016, January 25). Find your healthy eating style and maintain it for a lifetime. Start by eating a variety of healthy foods from the five MyPlate food groups. Check out the new MyPlate, MyWins here: <http://1.usa.gov/1UyZGma> [Facebook update]. Retrieved from <https://www.facebook.com/NSUMyPlate01/>
- O'Reilly, T., & Battelle, J. (2009, October). Web squared: Web 2.0 Five years on. *O'Reilly Media*. Retrieved from  
<http://www.web2summit.com/web2009/public/schedule/detail/10194>
- Papa, R. (2011). *Technology leadership for school improvement*. Thousand Oaks, CA: Sage.
- Pelletier, J. E., & Laska, M. N. (2012). Balancing healthy meals and busy lives: Associations between work, school, and family responsibilities and perceived time constraints among

- young adults. *Journal of Nutrition Education and Behavior*, 44(6), 481-489.  
doi:10.1016/j.jneb.2012.04.001
- Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2005). Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. *Journal of American College Health*, 53(6), 245-251.  
doi:10.3200/JACH.53.6.245-251
- Richards, A., Kattleman, K. K., & Ren, C. (2006). Motivating 18- to 24 year olds to increase their fruit and vegetable consumption. *Journal of the American Dietetic Association*, 106(9), 1405-1411. doi:10.1016/j.jada.2006.06.005
- Ruthig, J. C., Marrone, S., Hladkyj, S., & Robinson-Epp, N. (2011). Changes in college student health: Implications for academic performance. *Journal of College Student Development*, 52(3), 307-320. doi:10.1353/csd.2011.0038
- Sauceda, A. (2013). *An evaluation of users' views of food diary applications* (Master's thesis). Retrieved from ProQuest LLC. (Order No. 1523050)
- Sealy-Potts, C., Alfaro, V., Horine, S., & Kallus, K. (2009). Supersizing: Portion confusion among college students. *Journal of Family and Consumer Sciences*, 101(2), 18-22.  
Retrieved from  
[http://www.researchgate.net/publication/234658814\\_Supersizing\\_Portion\\_Confusion\\_among\\_College\\_Students](http://www.researchgate.net/publication/234658814_Supersizing_Portion_Confusion_among_College_Students)
- Shields, C. (2010). Transformative leadership: Working for equity in diverse contexts. *Educational Administration Quarterly*, 46(4), 558-589. doi: 10.1177/0013161X10375609
- Small, M., Bailey-Davis, L., Morgan, N., & Maggs, J. (2012). Changes in eating and physical activity behaviors across seven semesters of college: Living on or off campus matters. *Health Education & Behavior*, 40(4), 435-441. doi:10.1177/1090198112467801

- Statista, Inc. (2015). Most popular social media websites in the United States in June 2015, based on share of visits. Retrieved from <http://www.statista.com/statistics/265773/market-share-of-the-most-popular-social-media-websites-in-the-us/>
- Story, K. L., & Bonica, M. J. (2014). Social media as a strategy for behavior change: The three dollar a day diet challenge. *Journal of the Academy of Nutrition and Dietetics*, 114(9) A-18. doi:10.1016/j.jand.2014.06.042
- Summerfield, L. M. (2012). *Nutrition, exercise, and behavior: An integrative approach to weight management* (2nd ed.). Belmont, CA: Wadsworth.
- Tobey, L. N., & Manore, M. M. (2014). Social media and nutrition education: The food hero experience. *Journal of Nutrition Education and Behavior*, 46(2), 128-133. doi: <http://dx.doi.org/10.1016/j.jneb.2013.09.013>
- Torgan, C. E., & Cousineau, T. M. (2012). Leveraging social media technologies to help clients achieve behavior change goals. *ASCM's Health & Fitness Journal*, 16(6), 18-24. doi:10.1249/FIT.0b013e31826f8c9d
- Turley, J. (2009). Using fast food nutrition facts to make healthier menu selections. *American Journal of Health Education*, 40(6), 355-363. doi:10.1080/19325037.2009.10599114
- Tyma, A. (2011). Connecting with what is out there!: Using Twitter in the large lecture. *Communication Teacher*, 25(3), 175-181. doi:10.1080/17404622.2011.579911
- University of New England. (2010). *The University of New England policies, procedures and guidance on research with human subjects*. Retrieved from <http://www.une.edu/sites/default/files/UNE-IRB-P-P-2010-8-04.pdf>
- Webb, T. L., Joseph, J., Yardley, L., & Michie, S. (2010). Using the internet to promote health behavior change: A systematic review and meta-analysis of the impact of theoretical basis use of behavioral changes techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research*, 12(1), e4. doi:10.2196/jmir.1376

- Wheatley, M. (2006). *Leadership and the new science* (3<sup>rd</sup> ed.). San Francisco, CA: Berrett-Koehler.
- White, G. E. (2014). *How do I choose a dissertation methodology - Dr. Guy E. White* [Video file]. Retrieved from <https://www.youtube.com/watch?v=IZKVxtDShvE>
- Williamson, J., & Reddish, T. (2009). ISTE's technology facilitation and leadership standards. Retrieved from <http://www.iste.org/images/excerpts/TLPREP-excerpt.pdf>
- Woekel, E., Ebbeck, V., Concepcion, R. Y., Readdy, T., Li, K., Lee, H., & Cardinal, B. (2013). Physical activity, nutrition, and self-perception changes related to a university "Lifetime Fitness for Health" curriculum. *The Physical Educator*, 70(4), 374-394. Retrieved from <http://js.sagamorepub.com/pe/article/view/2680>
- Wyker, B. A., & Davison, K. K. (2010). Behavioral change theories can inform the prediction of young adults' adoption of a plant-based diet. *Journal of Nutrition Education and Behavior*, 42(3), 168-177. doi:10.1016/j.jneb.2009.03.124

APPENDIX A  
COVER LETTER

January 11, 2016

Dear Student:

I am conducting a study on college students in a general education nutrition course supported by Facebook and Twitter. The purpose of the study is to assess lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. You have been chosen randomly because you are currently a student at Northeastern State University (NSU) participating in the general education nutrition course and can offer insight into this important issue.

In order for my study to be accurate, I am asking students enrolled in a general education nutrition course, traditional delivery, to complete assignments in week 2 (Choose My Plate Assignment) and week 14 (Comprehensive Dietary and Physical Activity Analysis), as assigned per your course instructor. Additionally, you will need access to Facebook or Twitter to join the private page, NSU MyPlate. You will also need to set your Notification Settings to “on” for any electronic devices. These are requirements for participation of the study. If you have a Facebook or Twitter account, you can simply begin by requesting to be added to the NSU MyPlate page. If you do not wish to use your personal account for the study (have your name visible), then you may create a new account to use for the duration of the study. Starting week 3, NSU MyPlate will begin supporting course learning materials and objectives via Facebook and Twitter.

Your completion and submission of the Informed Consent implies your consent to participate in this research study. There are no repercussions for not participating in this study and your participation is completely voluntary. If you decide not to participate after beginning the study, simply do not finish the study. The information you supply for the study is anonymous. Your identity is in no way associated with your answers, as all personal identifiers will be removed by the primary researcher. The commitment to participate is no more time than you will invest for normal coursework activities. Data will be beneficial to educators teaching college students nutrition education courses, Registered Dietitians designing nutrition interventions for college students, and for program pedagogy planners responsible for providing coursework to college students looking for innovative methods in teaching and behavior change.

My major advisor and committee discussed and approved this project on Monday, November 16, 2015. My study received approval from the University of New England Institutional Review Board on November 2, 2015 and from Northeastern State University on November 16, 2015.

If the results of this study are of interest to you, please send me an email at [crawfo27@nsuok.edu](mailto:crawfo27@nsuok.edu) so that I can send the results to you. If you have any questions about my research, please contact my faculty advisor or me. My faculty advisor is Dr. Carey Clark at [cclark14@une.edu](mailto:cclark14@une.edu).

Thank you for your time.

Cassandra Crawford Ciglar, MA, RDN/LD, CPT (NFPA), MT (ASCP)  
Principle Investigator, Northeastern State University  
Doctoral Candidate University of New England



## APPENDIX B

## INFORMED CONSENT

---

**CONSENT TO PARTICIPATE IN A RESEARCH STUDY**

**Title of Project:** An Evaluation of College Students' use of Social Media in Nutrition Education for Lifestyle Behavior Changes

**Principal Investigator(s):**

Cassandra Crawford-Ciglar, MA, RDN/LD, CPT (NFPA), MT (ASCP)  
Principle Investigator, University of New England  
Doctoral Candidate University of New England  
Northeastern State University  
[crawfo27@nsuok.edu](mailto:crawfo27@nsuok.edu)

**Faculty Sponsor:**

Dr. Carey Clark  
Adjunct Faculty  
College of Graduate and Professional Studies  
Doctor of Education in Educational Leadership  
University of New England  
[cclark14@une.edu](mailto:cclark14@une.edu)

**Purpose of the Study:**

The purpose of this comparative analysis, quantitative study is to assess college students in a general education nutrition course and their resultant lifestyle behavior changes as demonstrated by alterations in readiness to change and dietary intake. The course is supported with social media and offered in 2016 at a regional Division II higher education institution located in a rural, mid-western region of the United States.

**Procedures to be Followed:**

You are being asked to participate because you are currently taking a general nutrition education course at Northeastern State University. You will be asked to complete two assignments (regularly assigned by your course instructor in Week 2 and Week 14). You will be asked to complete these assignments, Choose My Plate in Week 2 and Complete Dietary and Physical Activity Analysis in Week 14 per the class curriculum. You will need access to Facebook to join the private group, NSU MyPlate. You will also need to set your Notification Settings to "on" for any electronic devices. These are requirements for participation of the study. If you have a Facebook or Twitter account, you can simply begin by requesting to be added to the NSU

MyPlate page. If you do not wish to use your personal Facebook or Twitter account for the study (have your name visible), then you may create a new account to use for the duration of the study. Beginning Week 3, NSU MyPlate will begin supporting course learning materials and objectives via Facebook and Twitter. Your participation or non-participation in this study has no impact on your grade in Basic Nutrition. You are welcome to place the blank documents in the envelopes in the front of the room if you do not wish to participate.

You must be at least 18 years of age to participate.

General education nutrition courses will be instructed by Ms. Pamela Reid, MS, RD/LD and Mr. Jason Steven, MA, RD, CSO, LD. Cassandra Crawford Ciglar, Principle Investigator, will not instruct classes or have any influence on students' grades. Ms. Ciglar will supplement course materials with information on Facebook and Twitter beginning in Week 3 and continuing through Week 14. Students will be encouraged to respond to posts received from the master Facebook and Twitter accounts and may even ask questions relevant to general nutrition during the study.

**Discomforts and Risks:**

There are no risks in participating in this research beyond those experienced in everyday life. Some of the questions are personal and might cause discomfort.

**Benefits:**

The information obtained from this study may help uncover new nutrition education interventions that resonate with college student in today's digital world. Additionally, you might gain a better understanding of your behavior relating to nutrition and behavior change techniques.

**Costs or Compensation:**

There is no charge for participation in this study. There is no compensation for participation in this study.

**Duration:**

The commitment to participate is no more time than you will invest for normal coursework activities.

**Statement of Confidentiality:**

Only the principle investigator will know you participated in the study. The fact you participated in the study will not be shared with anyone. Personal identifying information will be removed from your information before data analysis is performed. Only the principle investigator will know how you have been randomly identified for the purposes of the study. This information will be kept in the investigator's files for 5 years and then destroyed.

**Right to Ask Questions:**

Please contact the principal investigator, UNE, or NSU's IRB if you have questions about this study.

Cassandra Crawford-Ciglar, MA, RDN/LD, CPT (NFPA), MT (ASCP)  
Principle Investigator, University of New England  
Doctoral Candidate University of New England  
Northeastern State University  
[crawfo27@nsuok.edu](mailto:crawfo27@nsuok.edu)

Carey Clark, PhD, RN, AHN-BC, RYT  
Faculty Mentor, Lead Dissertation Advisor  
University of New England  
(207) 239-6738  
[cclark14@une.edu](mailto:cclark14@une.edu)

The University of New England's Institutional Review Board (IRB) has approved this project. If you have questions about your rights as a research participant, please contact Olgun Guvench, M.D. Ph.D., Chair of the UNE Institutional Review Board for the Protection of Human Subjects at (207) 221-4171 or by email at [irb@une.edu](mailto:irb@une.edu).

Northeastern State University's Institutional Review Board (IRB) has approved this project. Contact the IRB Chair, Dr. Sophia Sweeney, if you have questions about your rights as a participant study or want to talk to someone not directly involved in this study. Dr. Sweeney can be reached at 918-444-3719 or [sweeney@nsuok.edu](mailto:sweeney@nsuok.edu), or you can visit the IRB web site for more information at <http://offices.nsuok.edu/irb/>

**Voluntary Participation and Right to Withdraw:**

Participation in this study is voluntary. You may choose to either take part or not part in the study. You may end your participation at any time by telling your course instructor or the principle investigator. Participation, non-participation, or ending your participation will not affect your grade in any way.

**Informed Consent**

Your completion and signature on the Informed Consent implies your consent to participate in this research study according to the outlined procedures. I certify that I am at least 18 years of age. I can ask for a copy of this consent form.

Student Signature:

Date:

## APPENDIX C

### CHOOSE MY PLATE ASSIGNMENT

#### Basic Nutrition

#### Choose My Plate Dietary Assignment

**OBJECTIVE:** Assess your diet based upon the USDA MyPlate eating plan.

1. Record your food and beverage intake for a 24-hour period. Be sure to record what you have eaten in a specific amount such as cups, ounces or teaspoons.
2. Go to <http://www.choosemyplate.gov>. At the bottom center of the page, click on “Super Tracker”. When the new screen opens, select “Create Profile” in the upper right corner (or log in if you have already created a profile). You will also want to register to save your profile so that you can access the information again later. Be accurate, as this information will customize your dietary goals. Submit.
3. After you have created a profile and logged in, your personal profile will populate the fields at the top of the Food Tracker screen showing your calorie limit, physical activity target, etc.
4. After creating your profile, go to the “Track Food and Activity” tab and select “Food Tracker”.
5. Enter your food intake for the given 24-hour period.
6. When you have finished entering all of your food and beverage items, go to the top of the page and choose the tab “My Reports”. You need to run two different reports: “Food Groups and Calories” and “Food Details”. \*IMPORTANT: When you prepare to run the Food Details Report, you will first see a screen that allows you to select food categories. To keep the size of the report manageable, select the following: Grains, Vegetables, Fruits, Dairy, Protein Foods and Oils in the Food Groups & Oils. Select only Total Calories in the Limits column and do not select anything from the Nutrients column. Enter the start and end dates for your food record, run the reports, export them (in Word, Excel, or PDF format) to your computer, your “L” drive or a flash drive and submit them through the assignment link in Bb. You can put both reports in the same file so that you can upload only the one file when you submit the assignment or you can make two attachments to the assignment submission.

**BASIC NUTRITION**  
**24 HOUR FOOD & BEVERAGE INTAKE**

Record the food item and the amount you consumed for all food and beverages consumed over a 24-hour period. Use appropriate measurements such as fluid ounces for beverages, cups for vegetables, etc. Portion size is important as well as how an item is prepared such as baked or fried. Use this information to input data in SuperTracker.

	<b>FOOD ITEM</b>	<b>AMOUNT</b>	<b>FOOD ITEM</b>	<b>AMOUNT</b>
<b>Breakfast:</b>				
<b>Snack:</b>				
<b>Lunch:</b>				
<b>Snack:</b>				
<b>Dinner:</b>				
<b>Snack:</b>				

## APPENDIX D

### COMPREHENSIVE DIETARY AND PHYSICAL ACTIVITY ANALYSIS

#### Basic Nutrition

#### Comprehensive Dietary & Physical Activity Analysis

##### **Dietary Analysis:**

Keep a record of your food and beverage intake for three (3) days. There is a blank form at the end of this assignment to keep track of everything. It is important to write things down frequently throughout the day so that you will not forget anything.

For your food and beverage intake, include all meals, snacks and beverages. Record the amount in measurements like cup, Tbsp., tsp, oz. or grams. List the main ingredients of mixed items and the approximate amount of each if you cannot find the food in MyPlate. Also, describe the method of preparation such as fried, baked, and broiled. Time is the approximate time of day you consumed the food or beverage. (This will help you identify patterns in your eating.)

You will need to enter all of the above in Super Tracker on the ChooseMyPlate web site. You can do this at the end of each day or you can save it all up and enter it at one sitting. As long as you follow the instructions given below, your information will be saved on the web site so you can work on this assignment in small increments of time if that better suits your time needs.

##### **CHOOSE MY PLATE INSTRUCTIONS**

1. Go to <http://www.choosemyplate.gov> and in the upper left portion of the screen, under “Popular Topics”, select “Super Tracker”. When the new screen opens, select “Create Profile” in the upper right corner - it is free and easy. (Alternatively, log in if you have already created a profile). You will also want to register to save your profile so that if you are interrupted while working on your intake, it will be saved and you can resume entering your intake later. Submit.
2. After you have created a profile and logged in, select Food Tracker. Your personal profile will populate the fields at the top of the Food Tracker screen showing your calorie limit, physical activity target, etc.
3. In the upper left corner of the Super Tracker screen, you will see "Today" and a date. It will automatically show the current date. This is where you set the date for each day of your food entries.

4. Assess your food intake by entering all food and beverages consumed. In the lower left quadrant you will find the fields in which you will enter the foods you want to record. “Search \_\_\_\_\_ for \_\_\_\_\_ GO”. As soon as you enter a food item, a short list of choices will pop up. If you do not see what you are looking for in the short list, then click on GO and many more choices will come up (usually several pages of choices). Once you have selected the food you want, a new screen will pop up showing you specific information about that food and allowing you to choose the amount, measurement and meal you want. (For example, 2 Cups of 1% Milk for Breakfast.) Make your choices and click on “+Add”. Continue until you have entered all the foods and beverages you have eaten over the past day.
5. Go to upper left corner of screen where date is showing and select a new date for your second day. Repeat #3 above to enter all food and beverages consumed for the second day.
6. Repeat #3 and #4 for the third day.
7. At the top of the page, choose the tab “My Reports”. You need to run the **Nutrients report** and the **Food Details Report**. Enter the start and end dates for your food record and run the report. It will average your intake for all days in the date range you gave it for the Nutrients report. You will need to run a Food Details Report for each day of your data. (You cannot run an average of the three days for this report.) **When getting ready to run the Food Details Report, select Grains, Vegetables, Fruit, Dairy, Protein Foods, Oils, and Total Calories.** Your report should print with nine (9) columns (Food, Amount, and the seven categories just listed). If you do not limit the selection to those categories, your report will not fit on a single page. Export all reports as **pdf or word** documents to your computer.
8. Put all four reports (Nutrients, Food Details (x3)) in the same file you are using for this assignment so that you can upload only the one file when you submit the assignment. You can also upload each report separately in the same submission if you prefer.

### Social Media Use

Please indicate your response to the following question by marking the response that best represents your situation.

Which form(s) of social media did you use throughout this course?

- (a) Facebook
- (b) Twitter
- (c) a combination of both Facebook and Twitter

**BASIC NUTRITION**  
**24 HOUR FOOD & BEVERAGE INTAKE**

Record the food item and the amount you consumed for all food and beverages consumed over a 24-hour period. Use appropriate measurements such as fluid ounces for beverages, cups for vegetables, etc. Portion size is important as well as how an item is prepared such as baked or fried. Use this information to input data in SuperTracker.

	<b>FOOD ITEM</b>	<b>AMOUNT</b>	<b>FOOD ITEM</b>	<b>AMOUNT</b>
<b>Breakfast:</b>				
<b>Snack:</b>				
<b>Lunch:</b>				
<b>Snack:</b>				
<b>Dinner:</b>				
<b>Snack:</b>				



## APPENDIX E

## IRB APPROVAL LETTER UNE



UNIVERSITY OF  
NEW ENGLAND

Institutional Review Board  
Olgun Guvench, Chair

**Bliddeford Campus**  
11 Hills Beach Road  
Bliddeford, ME 04005  
(207)602-2244 T  
(207)602-5905 F

**Portland Campus**  
716 Stevens Avenue  
Portland, ME 04103

To: Cassandra Crawford-Ciglar  
Cc: Carey Clark  
From: Olgun Guvench  
Date: November 2, 2015  
Project # & Title: 102815-018, An Evaluation of College Students' Use of Social Media in Nutrition Education for Lifestyle Behavior Changes (Initial)

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the above captioned project, and has determined that the proposed work is exempt from IRB review and oversight as defined by 45 CFR 46.101 (b)(2).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Olgun Guvench at (207) 221-4171 or [oguvench@une.edu](mailto:oguvench@une.edu) with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Olgun Guvench", is written over a light blue horizontal line.

Olgun Guvench, M.D., Ph.D.  
IRB Chair

IRB#: 102815-018  
Submission Date: 10/27/15  
Status: Exempt, 45 CFR 46.101 (b)(2)  
Status Date: 11/2/15

## APPENDIX F

## UNE DISSERTATION PROPOSAL APPROVAL LETTER

<b>UNE</b>	<b>UNIVERSITY OF NEW ENGLAND</b> College of Graduate and Professional Studies	Portland Campus 118 Stevens Avenue Portland, ME 04103 (207) 251-6654 T (207) 251-1901 F
<b>Doctoral Program in Educational Leadership Proposal Status Form</b>		
Student Name: Cassandra Crawford-Ciglar		Presentation Dates: November 16 <sup>th</sup> , 2015
<b>Title of Presentation:</b>		
<b>An Evaluation of College Students' Use of Social Media in Nutrition Education for Lifestyle Behavior Changes</b>		
The student has presented his or her proposal. Before the student begins data collection, he or she must make the following changes. If none are needed, please write N/A in the space provided:		
<b>Student may begin data collection when IRB is application is approved.</b> Your advisors encourage you to stay immersed in the literature and continue to work on APA and technical edits from Ch 1-3, even as you move on toward data collection and composing Ch 4-5. This form must be returned to the Program Manager.		
Lead Advisor: Carey Clark, Ph.D		
Signature: _____	<i>Carey S Clark</i>	Date: <u>11/20/15</u>
Secondary Advisor: John Lussig, Ed.D	<i>[Signature]</i>	Date: <u>3/10/16</u>
Program Manager: Erin Connor, Ph.D.	<i>[Signature]</i>	Date: <u>2/22/16</u>