

## A Qualitative Study Exploring College Student Nutrition Behaviors Within a Service-Learning Course

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Service-learning has been well established as a high-impact educational pedagogy (Astin et al., 2000; Kuh, 2015; Jacoby, 2015). As service-learning courses increase in higher education, understanding their effectiveness beyond academic outcomes is crucial. Service-learning courses have been demonstrated to influence positive health behaviors in community populations (Gray et al., 2017; Himelein et al., 2010; Jarvis et al., 2004), yet service-learning course outcomes have not been explored for health promotion among the students that are delivering the service. There is limited research available for evidence-based, comprehensive approaches to promoting health and student health behavior change during the college years (ACHA, 2018). An additional method to support improved student health behaviors through self-efficacy development could be through service-learning courses.

Much of the research on non-environmental methods to influence health behaviors in college students is associated with self-efficacy development (Dinger, 1999; Kelly et al., 1991; O'Leary, 1985; Von Ah et al., 2004). Understanding student self-efficacy related to nutrition choices could be an indicator for positive nutrition behavioral changes (Bandura, 2004; Von Ah et al., 2004). The reflective methods already embedded into service-learning platforms can serve as a meaningful way to gather additional data related to the student experience, reflecting on health behaviors. Research has eluded to improved self-efficacy, growth, and self-understanding as a result from service-learning experiences (Astin, 2000; Jacoby, 2015; Kuh, 2015). Understanding students' personal factors such as values, beliefs, and attitudes towards nutrition-related behaviors before, during, and after a service-learning course related to nutrition, can provide an in-depth understanding of the

### ABSTRACT

This qualitative case study explored the influence that service-learning involvement has on undergraduate college students' cognitive, environmental, and behavioral factors related to nutrition. Utilizing the major constructs of the social cognitive theory, the research questions guided the investigation of how participants in a previously established nutrition service-learning course described their cognitive, environment, and behavioral influences related to nutrition throughout the course. Participants also described their nutrition self-efficacy after participating in a service-learning nutrition course. Participants described their experiences through a pre-post survey, reflections, and voluntary interviews. Based on these constructs, this service-learning course was found to improve knowledge, awareness, values, and behaviors related to nutrition for all study participants. Findings show positive changes in nutrition-related self-efficacy, especially related to the meaning-making experience of the service-learning. Results from this study suggest that intentional reflection questions related to health behavior factors in health-based service-learning courses may be utilized to influence behavioral outcomes.

student experience that might lead to behavior change. The purpose of this study is to deepen the understanding of how service-learning courses might impact nutrition-related behaviors among the students providing the service.

## **Background**

Poor dietary lifestyle choices, such as low fruit and vegetable intake and diets high in processed foods, are behaviors that begin in early adulthood and impact the overall quality and productivity of life (Chan & Woo, 2010; Harris et al., 2006). Unhealthy diets are associated with increased non-communicable diseases such as cardiovascular disease, diabetes, chronic respiratory diseases, and some cancers, which are top contributors to morbidity and mortality rates in the United States (Centers for Disease Control [CDC], 2017; Chan & Woo, 2010; World Health Organization [WHO], 2018). Even with large scale preventative efforts, these behaviors and the subsequent chronic disease are continuing to increase (CDC, 2018; Harris et al., 2006; WHO, 2018). Transitioning from high school to college is an opportune time to influence these behaviors, as young adults are becoming independent and have more freedom for choices.

Unfortunately, the majority of college student nutrition behaviors are not good (American College Health Association [ACHA], 2018; CDC, 2018; Crombie et al., 2009). College students tend to have unhealthy diets that are high in fat, sodium, and sugar and low in several vital nutrients (ACHA, 2018; CDC, 2018; Sogari et al., 2018). The health behaviors taken up during college have a direct impact on the quality of life, and many of these habits remain beyond college (CDC 2017; Kuh, 2015, Sogari et al., 2018; Von Ah et al., 2004).

Improving nutrition behaviors during the college years could promote life-long health. With many of these behaviors being shaped in early adulthood, colleges and universities have an essential role in influencing these outcomes. While personal responsibility is important, additional factors that influence self-efficacy, attitudes, and values towards health can further influence these personal health behaviors (Bandura, 1977; Bandura, 2004). Bandura (1997) defines self-efficacy as a person's perceived beliefs in their abilities to carry out an action. Service-learning courses have been shown to influence self-efficacy, attitudes, values, and change behaviors related to students' civic engagement (Jacoby, 2015); however, little research has been found examining the influence of service-learning on health behaviors. If service-learning courses can improve health-related skills, self-efficacy, attitudes, and values, they can be an additional resource for colleges and universities to utilize as methods to enhance health outcomes. Therefore, the purpose of this study is to investigate the influence of service-learning on the nutrition-related personal factors, behaviors, and self-efficacy of the students who are providing the service. The rich description into the students' experiences in the service-learning nutrition course, especially as it relates to nutrition behavior self-efficacy, will add to the service-learning literature. Examining nutrition self-efficacy would include understanding students' beliefs in their abilities to choose healthier foods and overcome perceived barriers (Bandura, 1997). Understanding student's descriptions of their nutrition self-efficacy after participating in a service-learning course can provide additional opportunities to improve nutrition behaviors of college students.

Through service-learning experiences, students providing the service are viewed as professionals, leaders, and role models (Campus Compact, 2010). The reflective nature of the service-learning experience helps students express their personal and professional growth and further relate to the reciprocal impact of the experience (Astin, et al, 2000; Jacoby, 2015). Social cognitive theory can explain the construct of reciprocal determinism taking place within service-learning, demonstrating that students can be both an agent for change and experience change themselves (Bandura, 1997; Jacoby, 2015).

This reciprocal experience influences efficacy beliefs, which influences change and adaptation (Bandura, 1997). Bandura (2004) describes the social cognitive theory as a “multifaceted causal structure in which self-efficacy beliefs operate together with goals, outcome expectations, and perceived environmental impediments and facilitators in the regulation of human motivation, behavior, and well-being” (p. 1).

Social cognitive theory emphasizes the process among the behaviors, individual, and the environment as it influences self-efficacy (Bandura, 2004). Major constructs for the social cognitive theory include cognitive factors, environmental factors, and behavioral factors (Glanz et al., 2015 p. 160). The fundamentals of the theory suggest that a person’s belief in efficacy is affected by psychosocial influences and that self-efficacy is important in behavior change (Bandura, 1977; Bandura, 2004). Furthermore, self-efficacy measures have been a consistent predictor of health-behavior change success (Strecher et al., 1986).

The majority of health promotion research regarding influencing college student health behaviors uses self-efficacy measures within a social cognitive construct (Buckworth, 2017; O’Leary, 1985; Von Ah et al., 2004). Self-efficacy is a perceived belief in the ability to perform a given task (Bandura, 1993; Buckworth, 2017). High self-efficacy has been correlated with improved health behaviors, lower rates of unhealthy behaviors, and sustained behavior changes (Bandura, 2004; Martinelli, 2002; Von Ah et al., 2004). Self-efficacy perceptions influence behavior change (Strecher et al., 1986). Reflective assignments within the service-learning experience can be shaped to highlight major constructs within the social cognitive theory, along with self-efficacy changes. Self-efficacy measures can predict what behavior goals are set and the motivational commitment for sustained change (Bandura, 1997; Bandura, 2004; Clark & Zimmerman, 2014).

Thus, exploring the major constructs of social cognitive theory and self-efficacy, as a component to predict behavior change, can provide a deeper understanding of the experience. These could also highlight challenges and barriers related to environmental conditions to assist in behavioral management (Bandura, 1997). These factors can be explored through a nutrition-themed service-learning course including: knowledge of nutrition needs and benefits, perceived self-efficacy regarding control over the dietary habits, outcome expectations, health goals, and environmental factors (Bandura, 2004). The reflective component of the service-learning model is ideal for exploring influence on behavior change (Jacoby, 2015; Kuh, 2015).

As educators and higher education systems collaborate on solutions to the lifestyle-related health epidemics in the United States, this partnership will be essential for effective change. Multiple avenues for health influences are needed for impact that is more substantial. Influencing health behaviors in college can promote life-long health

benefits. By connecting service-learning to student health behavior outcomes, additional models for this educational method can be employed to create more meaningful learning strategies for our students. Understanding students' experiences as they relate to cognitive, environmental, and behavioral factors regarding nutrition, could provide an in-depth understanding of the student experience. Examining the student experience before, during, and after a service-learning health course can assist in understanding factors that could lead to improved health behaviors because of service-learning courses.

## **Methodology**

This case study provides rich description into the nutrition-related factors described by students through surveys, reflections, and interviews throughout the service-learning experience. The following questions, utilizing the major constructs of the social cognitive theory (Bandura, 1997; Glanz et al., 2015), guided the research:

*(RQ1) How do undergraduate students participating in a nutrition service-learning course describe their cognitive, environment, and behavioral influences related to nutrition throughout the course?*

*(RQ2) How do students describe their nutrition self-efficacy after participating in a service-learning nutrition course?*

## **Design of the Study**

The primary goal of the study was to explore the students' experience of the service-learning as it relates to major constructs of the social cognitive theory and self-efficacy for nutrition behaviors. Major constructs for the social cognitive theory include cognitive factors, environmental factors, and behavioral factors (Glanz et al., 2015 p. 160). A constructivist lens was appropriate as this approach allows for multiple interpretations of experiences as reality is being socially constructed (Merriam & Tisdell, 2016; Patton, 2002). Creswell (2014) describes a constructivist approach to research from a complexity of views, seeking to find meanings that are often subjective through previous perspectives and social experiences. Patton (2002) adds that a constructivist approach examines the perceptions of the experience and those implications for their lives and interactions. Student perceptions of their health, attitudes, self-efficacy, values, and beliefs are subjective concepts. These concepts were explored through interaction with the service-learning experience and assessed through targeted reflection prompts, surveys, and interviews designed to explore the multifaceted aspects of nutrition-related behaviors and self-efficacy beliefs.

Qualitative research methods were used to provide an in-depth understanding of student experiences through rich description described during and after the service-learning course. A qualitative case study design was used, with multiple sources of information that were collected and analyzed to provide an in-depth understanding of

how service-learning courses could influence the students that participate in them. In this study, the outcomes examined are those influences of the service-learning experience on college students' self-efficacy and cognitive, behavioral, and environmental factors; as part of the major constructs of the social cognitive theory.

## **Participants**

All students enrolled in a previously established nutrition-related service-learning course at a small private liberal arts college in the Midwest were invited to participate in this study. Students enrolled in the course were given information regarding the research project during the first week of class and provided with an opportunity for consent for data collection. The participation was voluntary and the data collected was from required course assignments as part of the service-learning course objectives for all students. Students were also invited to participate in a post-experience interview, which was separate from the course expectations. Students were given the opportunity to consent for all, none, or partial participation in the data collection. Participation in the study or not did not affect their opportunity for success in the course. Twelve undergraduate students were enrolled in this course in the Fall 2020 semester. Seven students consented for participation in the research study and five of those students were interviewed post-experience. As shown in Table 1, there were four males and three females surveyed. These gender terms were identified by the students completing the survey. Of the seven students, four were sophomores, two were juniors, and one was a senior. They ranged in majors with four being physical education majors, two elementary education majors, and one exercise science major. Only one of the students had taken a nutrition course prior to this semester.

Table 1

*Demographic Data for Service-Learning Students*

Variables	N=7
Gender	
Female	3
Male	4
Year in school	
Freshman	0
Sophomore	4
Junior	2
Senior	1
Major	
Physical Education	4
Early Elementary Education	2
Exercise Science	1
Previous Nutrition Course	
Yes	1
No	6

**Course Content**

The course is a required course for education majors but was also available for general education elective credit. The course was 16-weeks in length, with 8 weeks consisting of the service-learning experience. The course started with pre-service material for 4 weeks, including background information regarding nutrition and service-learning. The instructor explained the research project during week one and two of the course, providing a consent form in week two. Students had the option to consent for survey data, reflection content, and post-experience interview options. The service-learning experience began in week five with virtual introductions among the site and the students. Following introductions, students, in groups of three, selected a pre-created evidenced-based nutrition lesson for third graders to review and adapt for the first nutrition lesson. The subsequent nutrition lessons were developed through student-selected topics based on their interests along with the needs of third graders. Prior to presenting these self-selected lessons, students went through a peer-reviewed process. Nutrition lessons were then delivered and recorded during class time and sent electronically to the elementary classrooms. Each student delivered one individual lesson and worked on four additional group lessons. The class provided eight total nutrition lessons to two third-grade classrooms.

## **Service-Learning Site**

A local elementary school's third grade classes were selected as the site for the service-learning partnership. Nutrition education has previously been established as a need by the County Health Department (2008) and was an approved area for partnership by the local school district. The third-grade classes at the partner school has a long-standing partnership with various health-related service-learning courses at the college and has agreed to continue in this capacity. The service aspect was adapted during this experience for COVID social distant learning needs. College students performed the lessons via video and the lesson were given to the students from their respective teachers.

## **Data Collection Tools**

To provide a comprehensive understanding of the students' experiences, data was collected from multiple sources including surveys, interviews, and class reflections. First, a pre-experience survey was given in class to provide data related to the demographic background, nutrition knowledge, nutrition environment, and brief fruit and vegetable self-efficacy measures. The self-efficacy measures were adapted from Bandura (2006) and Mainvil et al. (2009). The goals for the survey were to provide early insight to self-efficacy, attitudes, values, and beliefs regarding nutrition behaviors and to assist in the development of reflection discussion prompts and assignments throughout the course experience. Survey questions included open-ended questions and a self-efficacy scale for fruits and vegetables and can be found in Appendix A.

Once the service-learning course began, service-learning reflection assignments were given every 2 weeks during the 8-week service-learning experience, providing four reflections total. Reflecting on the experience through a variety of reflection tools can allow students to express themselves and provide a more in-depth understanding to their experience (Kessler & Burns-Whitmore, 2011). Guided reflection responses were specific to nutrition behavior efficacy including connecting the elementary student lesson to their behaviors and overcoming barriers as a college student. Reflection prompts were tailored to the Campus Compact (2010) best practices, which uses the reflection guidelines of continuous, connected, challenging, and contextualized as a way to connect fully to the experience and assist in the student development process. Reflection prompts can be found in Appendix B.

After the service-learning experience, students were invited to participate in individual interviews. Interviews with five students were conducted via the online platform, Zoom, to provide convenient scheduling and social distancing. These interviews were voluntary and followed an interview protocol. The interview questions were semi-structured to gather additional information regarding the change experience from the students.

## **Findings**

Through the analysis of the reflections and interviews, student reported influences were categorized into cognitive, environmental, and behavioral influences. Cognitive influences included knowledge, awareness, values, and attitudes. Environmental influences included physical and social factors within the environment.

Behavioral influences included skills, intentions, and reinforcements (Glanz et al., 2015). Self-efficacy influences were described as a separate concept. The social cognitive theory (SCT) thematic findings are summarized in Table 2.

**Table 2**  
*SCT Construct Themes*

Influences		
	Categories	Units
<b>Cognitive</b>		
	Knowledge	Primary learning outcomes included: <ul style="list-style-type: none"> <li>• Minimum of 5 servings of fruits and vegetables daily</li> <li>• How to read a food label</li> <li>• Eating regularly and consistently throughout the day</li> <li>• Limiting sugar consumption; especially through drinks.</li> </ul>
	Awareness	Increased methods to incorporate fruits and vegetables in the diet Nutrition-related rationale provided motivation Nutrition-related rationale most important to teaching
	Values	Teaching nutrition was important and impactful Rationale was valued for behavior change Hands-on skill development added meaning to lesson plans
<b>Environmental</b>		
	Barriers	The main barriers for not eating healthy were categorized into three main areas: <ul style="list-style-type: none"> <li>• Time (convenience, cooking methods, frequency of meals)</li> <li>• Taste (preference of unhealthy options)</li> <li>• Cost (more expensive than junk food)</li> </ul> Overcoming barriers included: <ul style="list-style-type: none"> <li>• Planning</li> <li>• Rationale for change</li> <li>• Teaching to 3rd graders</li> </ul>



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## Behavioral

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Skills	Skill-related changes: <ul style="list-style-type: none"><li>• increasing fruits and vegetables</li><li>• reading food labels</li><li>• decreasing sugar intake</li><li>• eating breakfast</li></ul>
Intentions	All students reported expecting continued and additional nutrition-related changes over next couple months
Reinforcements	Nutrition change was strengthened by: <ul style="list-style-type: none"><li>• Teaching nutrition to youth</li><li>• Healthy options in home</li><li>• Athletic involvement</li></ul>

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## Self-Efficacy

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The self-efficacy survey indicated a positive change for confidence in nutrition-related abilities in 10 out of 14 indicators assessed. Survey indicators with 4 or more students (out of 7) indicating positive change (vs. staying the same or decreasing), included:

- I can eat at least two different vegetables during my main meal on most days.
- I can eat vegetables as part of my lunch on most days.
- I can eat vegetables as a snack at least once a day.
- I can eat fruit as part of my lunch on most days

The measures with the least change in confidence were from areas that were not part of the 3rd grade education objectives including:

- I can still eat some fruit or vegetables when I do not have much money. (2 increased, 3 same, 2 decreased)
- I can eat fruit and vegetables when I am eating out. (1 increased, 3 same, 3 decreased)

Personal connection to the materials and rationale for change were reported as primary reasons for improved confidence in abilities through the reflections and interview responses.

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As we turn to the findings, a reminder of the first research question: How do undergraduate students participating in a nutrition service-learning course describe their cognitive, environment, and behavioral influences related to nutrition throughout the course? Beginning with cognitive factors, all students indicated positive changes in their nutrition-related knowledge, awareness, and values. For example, the knowledge factors mentioned as primary learning outcomes by students included the recommended servings for fruits and vegetables, how to read a food label, the importance of eating regularly and consistently throughout the day and limiting sugar consumption (especially from sugar-sweetened beverage intake).

The improvements in these knowledge factors influenced students' awareness of their nutrition behaviors and choices. This was highlighted most through the process of creating lesson plans for third graders.

One student commented:

*"My lesson was over healthy snacks. Through teaching 3rd graders about eating fruits and veggies as snacks and making it fun, I have learned about how to do that more myself."*

Another highlighted student comment was,

*"I learned the amount of fruits and veggies that I needed and the importance of breakfast. Learning and teaching it at the same time was cool and it helped me think about my behaviors more and start changing some things."*

*Finally, one student mentioned that making his lesson hands-on, helped him visually understand portion-size. "Using your hand as a guide for portion-sizes and knowing that ½ your plate should be veggies was helpful for me to do this myself."*

*Most students noted that connecting to the rationale of eating more fruits and vegetables was helpful in motivating them to do it themselves and rationale was most important for them to teach it to 3rd graders. For instance, one student stated, "Learning more about the "why" of eating healthy along with the what to eat was the most important factor to teach to third graders. Learning more about the nutrient's impact in the body." Similarly, another student mentioned how it was most important to teach third graders "...how nutrition helps their body. Not only focusing on weight, that [nutrition] does many other things to improve their well-being. Learning more about nutrients in food and what they do for the body."*

Furthermore, improvements in value were described through student reflections and interviews. All students reported they felt that providing the nutrition lessons to elementary students was important and impactful. Connecting to the importance for the nutrition behaviors was meaningful for the delivery of the lessons and the behavior changes for the students. Students mentioned the importance of teaching nutrition to others included prevention of disease, strength, improved academic ability, improved athletic performance, and improved energy. Students also mentioned that skill development through hands-on learning added meaning to their lessons and behaviors. One student wrote about using food labels for learning how to read and calculate nutrients made it more meaningful. Another mentioned that hands-on learning was more

fun and related to their lives. The combination of the cognitive factors of knowledge, awareness, and value were intertwined throughout the experience and influenced one another.

Along with cognitive factors, the influence of environmental factors were also noted during the analysis. The primary environmental factor assessed in this study was overcoming barriers, identified by Bandura (1993) as a primary aspect for measuring self-efficacy. The main barriers to healthier eating included time (convenience, cooking methods, frequency of meals), taste (preference of unhealthy options), and cost (more expensive than junk food). These barriers emerged during the analysis of the student responses and were categorized by the researcher as primary themes. All participants reported the perceived ability to overcome these barriers through planning. Learning the rationale for nutrition changes helped them prioritize nutrition, which was related to planning. Several participants also mentioned that teaching 3rd graders how to specifically improve nutrition behaviors helped them do it themselves.

Finally, all participants reported nutrition-related behavior changes. After analyzing the reflections and interview responses, the themes of skills, intentions, and reinforcements were categorized by the researcher as the primary behavioral outcome areas. Skill development included increasing fruit and vegetable intake, reading labels, decreasing sugar intake and eating breakfast. One student reported,

*“learning about healthy eating behaviors definitely had an impact on my life. I began to focus more on my meals and swap the to-go desserts from the dining hall for the fruit to-go.”*

Another participant shared:

*“...before learning more about nutrition and completing the service-learning process, I didn't really know much about nutrition or think that it was that big of a deal in my own personal life. Now, after this, I have noticed myself reading nutrition labels. I have started to care a little more and put more effort into my own health and nutrition. After stressing so much to the younger students that they should care about their own nutrition, it started to hit me that I should be doing the same. Not only to be a good influence, but also for myself”.*

Many participants reported intentions of healthier eating related to teaching others about nutrition. The service-learning experience helped them make the needed nutrition changes as well. One highlighted quote was, *“For influencing nutrition, in order to educate others, it starts with you. If you're not taking care of yourself, it would be harder for others to believe in what you're teaching or see you as a credible source.”*

Additionally, a participant stated, *“teaching a 3rd grader made me think if a third grader can do it, I definitely can.”* Finally, one participant stated, *“trying to teach others about health and nutrition forces you (in a good way) to sit down and truly think about your diet and eating habits.”*

Participants also reported improved nutrition-related reinforcements in their lives. Reinforcements described by three of the participants included healthier options in their residence for snacks and breakfast items. As noted by one of these participants, “If you

don't have healthy snacks, it makes it extremely hard to make a healthy change.” Additionally, two participants mentioned athletic involvement reinforcing their healthy eating behaviors.

The results for the second research question: How do students describe their nutrition self-efficacy after participating in a service-learning nutrition course?, was a separate analysis related to cognitive factors (Bandura, 1997). This item was analyzed separately, as self-efficacy improvements, specifically, are related to successes and future continuation of the change (Bandura, 1993; Buckworth, 2017; Martinelli, 2002). Self-efficacy measures are influenced through improved perceptions of skill development and overcoming barriers (Bandura, 1993). The survey results from this study indicated a positive change for confidence in nutrition-related abilities in 10 out of 14 indicators assessed. Survey indicators with 4 or more participants (out of 7) indicating positive change (vs. staying the same or decreasing), included:

I can eat at least two different vegetables during my main meal on most days.

I can eat vegetables as part of my lunch on most days.

I can eat vegetables as a snack at least once a day.

I can eat fruit as part of my lunch on most days

The measures with the least change in confidence were from areas that were not part of the 3rd grade education objectives including:

I can still eat some fruit or vegetables when I do not have much money. (2 increased, 3 same, 2 decreased)

I can eat fruit and vegetables when I am eating out. (1 increased, 3 same, 3 decreased)

Personal connection to the materials and rationale for change were reported as primary reasons for improved confidence in abilities through the reflections and interview responses. These responses assisted in the creation of the reflection assignments and interview questions. The majority of the nutrition education with the 3rd grade class was related to fruits and vegetable intake, so narrowing the self-efficacy measures to this area was helpful in gathering data from the undergraduate students.

The reflection and interview responses further support changes in self-efficacy. Most participants reported the primary reason for improved confidence in abilities related to nutrition behaviors was related to personal connection and the rationale for the nutrition change.

One participant highlighted this connection:

*“I care more about nutrition through learning about [it] and then connecting it to my life.” Another participant connected to their future profession as a P.E. teacher, supporting the importance of eating healthier now to their future goals: “I think I need to do a better job at adding more fruits and vegetables in. I want to teach P.E. courses and I need to be healthier to teach better.”*

All participants reported additional improved nutrition behaviors were expected over the next couple of months. This was mostly because of having a break in academics, having athletic events/performance needs, and having healthier options at home with less temptations for unhealthy eating. Two participants mentioned planning more for healthier eating in the spring semester, by practicing healthy eating meal prepping and cooking.

## Discussion

The purpose of this study was to deepen the understanding of how service-learning courses might impact nutrition-related behaviors among the students providing the service. Utilizing the major constructs of the social cognitive theory (Bandura, 1997; Glanz et al., 2015), the research questions examined how students participating in a nutrition service-learning course described their cognitive, environment, and behavioral influences related to nutrition throughout the course and how students described their nutrition self-efficacy after participating in a service-learning nutrition course. Based on these constructs, this service-learning course was found to improve self-efficacy, awareness, values, attitudes, and behaviors related to nutrition for all study participants. The experience improved the participants' confidence in making needed nutrition changes and indicated intentioned for continued behavior change post-experience. Self-efficacy beliefs, along with knowledge, goals, perceived barriers, and expected outcomes, work together to influence behavior change (Bandura, 2004).

Nutrition education was provided to student participants through lecture, class discussion, and independent research. Previous research on nutrition courses has shown that education alone has not been enough to influence behaviors (Kelly et al., 2013; Poddar et al., 2010; Richards et al., 2006; Worsley, 2002). Findings from this study show that additional learning objectives among the students were influenced through their service-learning related projects. For example, the process of developing the lesson plans influenced skill development and methods for overcoming perceived barriers to nutrition-related behaviors. The additional skill development and reflective activities related to the service-learning experience can influence behavior change along with meeting the academic objectives. The results from this study are similar to other research showing improved academic objectives for nutrition-related service-learning courses (Gray et al., 2017; Rasberry, 2006), however, they have not been used previously to examine behavior changes related to that knowledge.

Nutrition behavior changes are related to increasing nutrition education along with improving nutrition skills, self-efficacy, attitudes, and values (Worsley, 2002). Findings from this study show that establishing meaning was the most reported influence of related to nutrition behavior change. The "meaning-making" described in this study was related to personal outcomes for needed nutrition changes and strengthening those outcomes with the reciprocal learning in the service-learning experience. The intentional reflective component for service-learning courses connects the learning to the service (Campus Compact, 2010). Using the major concepts from the social cognitive theory for prompts, the reflections were intentional to assess nutrition-related personal factors, environment, and the service-related work. The reflective and reciprocity are meaning-making factors that are already present as a part of best practices for service-learning courses (Campus Compact, 2010). The results from this

study suggest the addition of reflection prompts related to these social cognitive concepts for health behavior change could improve self-efficacy and health-related behavior changes among students.

Furthermore, the addition of reflection prompts related to self-efficacy could enhance the meaning-making connections. Self-efficacy develops through meaningful experiences (Bandura, 2004; Chen et al., 2018). Self-efficacy changes were described by all study participants through skill development, planning, goal setting, behavior changes, and advocacy awareness. The reflection activities enhanced the understanding of the nutrition concepts related to the service-learning experience and self-awareness. Similar to other service-learning courses, this study adds to the literature demonstrating that service-learning experiences allow for students to develop a better understanding of themselves along with the material they are studying (Salimbene et al., 2005, p. 337). Service-learning courses have been shown to be transformative experiences related to improved self-awareness and self-development (Astin et al., 2000; Bandura, 1977). The results from this study extend this idea to include nutrition behavior change through these self-efficacy improvements. Service-learning courses should be used more frequently as a method to influence nutrition knowledge and influence the needed nutrition changes among the college-student populations.

## **Summary**

Although this was a small study in short duration, the findings suggest that service-learning courses can positively impact self-efficacy and personal factors related to nutrition behaviors. More research is needed to further explore nutrition-related changes through service-learning courses and measuring long-term nutrition changes after the service-learning experience. There is also potential for examining other health-related behavior change through the use of service-learning courses.

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