Changes in Student-Athletes' Self-Efficacy for Making Healthful Food Choices and Food Preparation following a Social Cognitive Theory-based Cooking Education Intervention

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Authorization to Submit Thesis

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Abstract

The purpose of this study was to determine the effect of Social Cognitive Theory-based cooking workshops on collegiate student-athletes' (N = 22, 18-22 years), self-efficacy for making healthful food choices and preparing food. Previous studies have reported a positive association between self-efficacy and health behavior change. Participants attended four, 1-hour workshops that included food demonstrations, hands-on food preparation, and food sampling. This intervention was an addition to the University of Idaho Life Skills course offered exclusively to student-athletes. A pre and post questionnaire was administered and the Wilcoxon signed-rank test was used to compare student-athletes' responses pre- and post-intervention. Student-athletes reported increased self-efficacy for most healthy food choices and cooking skills. The Wilcoxon signed-rank test indicated greatest improvements in self-efficacy on the post questionnaire for steaming vegetables, stir-frying vegetables, and baking fish. Most (86%) participants reported planning to make the recipes again and all were in favor of including cooking workshops in the Life Skills course in the future. Future research can seek to determine the affect of cooking interventions on student-athletes' dietary intake and identify how demographic factors such as ethnicity, social economic status, past cooking experience, and gender are related to self-efficacy for making healthful food choices and food preparation.

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Dedication

To my mother and sister, for their constant love and support for everything I have chosen to pursue. You both are amazing examples of what it looks like to work hard and be there for the ones you love. Mom and Kayla, I am thankful for your wisdom and the endless reminders that my identity and joy is found in Christ.

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Chapter one

Introduction

Nutrition plays a significant role in an athlete's success (Abood, Black, & Birnbaum, 2004; Manore, Meyer, & Thompson, 2009; Rodriguez, DiMarco, & Langley, 2009). Other factors, including genetics, training, coaching, and work ethic are influential as well (Manore et al., 2009). While most athletes focus on these factors, many fail to address a nutritious dietary intake. Previous research indicates that first-year students living away from home may have poor dietary habits (Garcia, Henry, & Zok, 2000). Collegiate athletes are at an especially high risk for inadequate diets due to high training demands and other factors associated with their transition to college. Therefore, adequate diets are fundamental (Abood et al., 2004; Manore et al., 2009; Rodriguez et al., 2009). The dietary habits established during this time are likely to be maintained later in life (Ha & Caine-Bish, 2009).

The transition from high school to college presents many challenges including time, priority, stress, and energy management (Kroshus, 2015). In addition to a new living environment and school environment, student-athletes must adjust to the new athletic environment (Kroshus, 2015). Currently, student athletes are allowed to spend four hours per day and twenty hours per week on their designated sport (National Collegiate Athletic Association, 2015). This does not include the time athletes spend on out-of-season training. The change in environment also includes a change in where, when, and how student-athletes consume their meals. Student-athletes living on campus may have access to a cafeteria and potentially have a microwave and refrigerator in their dormitory. Those living off campus may be responsible for grocery shopping, storing food, and preparing their own meals. While

traveling, athletes are not responsible to prepare food, but they do decide what they eat. Traveling or not traveling, they have the responsibility to choose what foods they consume.

The inevitable lifestyle changes in the transition from high school to college present an opportunity for growth (Ha & Caine-Bish, 2009). Student-athletes must learn how to fuel their bodies for the new, increased demands. Student-athletes who learn how to fuel their bodies early on will be set up for success in the long run. Part of this learning process should include teaching collegiate student-athletes basic nutrition information regarding their unique energy and nutrient needs (Manore et al., 2009). This includes teaching them how to apply nutritional knowledge to their everyday lives, by teaching them how to choose healthy options and prepare foods on their own.

The increased number of full-time sports dietitians employed at universities is evidence of increased awareness among university athletic administrators regarding the importance of nutrition in relation to sport performance (Markey, 2015). The National Collegiate Athletic Association (NCAA) is a member led organization that regulates the student-athletes and athletic programs at 1,121 universities, 99 athletic conferences, and 39 affiliated organizations (National Collegiate Athletic Association, 2015). In 1991, the NCAA placed limitations on the number of meals and caloric amount of dietary supplements that schools were allowed to provide or offer their athletes (Markey, 2015). Those restrictions were an attempt to warrant a "competitive balance" between schools (Markey, 2015). During the 2014-2015 academic year, these restrictions were removed, including how much and how often the schools are allowed to provide food to athletes (Markey, 2015).

The employment of full-time sports dietitians at the collegiate level is on the rise and changing constantly. Currently, approximately 65 NCAA Division 1 schools, from primarily

the Power 5 conferences, have full-time positions (Collegiate and Professional Sports Dietitians Association, 2016). The value of services that sports dietitians provide, such as meeting with individual athletes to help them develop individualized meal plans are being recognized (Karpinski, 2012).

The University of Idaho athletic department does not employ a sports dietitian. However, the campus dietitian gives presentations to sports teams throughout the year, and provides counseling services and cooking workshops. Although these services are available, student-athletes are not the campus dietitian's only responsibility and it is up to the athletes and athletic department to reach out to the dietitian. For athletes with limited access to a dietitian, other sources of information such as coaches, trainers, peers, and outside resources such as social media, websites, or classes may take precedence. Reliance on the nutritional advice of coaches, trainers, and strength coaches may not yield optimal results. Torres-McGehee et al. (2012) reported that these professionals might have inadequate nutrition knowledge.

The University of Idaho athletic department increased the nutritional services they provide by adding a fueling station in the weight room. This station provides grab-and-go snacks for student-athletes. A nutrition student coordinates with strength coaches, a registered dietitian, and volunteers, to ensure the station is stocked weekly. The athletic director has recognized the need for nutrition services and has partnered with the School of Family and Consumer Science department to provide a cooking education intervention tailored specifically for student-athletes.

First-year student-athletes at the University of Idaho are expected to enroll in INTR 210, Life Skills, which is a course designed to aid freshman student-athletes in the transition

to college. Course topics include NCAA rules and regulations, athletic department standards, study habits, and nutrition. The nutrition education component typically includes one to two brief presentations from the campus dietitian throughout the semester.

Athletes should learn and apply nutrition knowledge for the sake of their health throughout their collegiate athletic career and after their career. Nutrition education may result in improvements in nutritional knowledge and diet quality (Doyle-Lucas & Davy, 2011; Valliant, Pittman, Wenzel, & Garner, 2012). Valliant, Pittman, Wenzel, and Garner (2012) assessed changes in knowledge and diet (measured via food records) among a NCAA Division 1 volleyball team. Following one-on-one consulting with a dietitian, and development of an individualized diet plan, athletes reported positive changes in energy nutrition knowledge ($p = .001$). Improvements in energy intake (average increase of 400 kcals, increase from 50% to 70% of estimated energy needs, $p = .002$), carbohydrate intake (increase from 48% to 66% of estimated carbohydrate needs, $p = .01$), and protein intake (increase from 59% to 70% of estimated protein needs, $p = .01$) were also observed.

In addition to nutritional knowledge, food preparation skills have been associated with better diet quality among young adults (Larson, Perry, Story, & Nemark-Szainer, 2006). Larson, Perry, Story, and Nemark-Szainer (2006) measured food preparation skills with a self-reported questionnaire, which included perceived skill and resources for food preparation. Dietary intake was measured with a food frequency questionnaire. The participants who reported more frequent food preparation had an overall higher quality diet. For example, 31% of those who reported high preparation were consuming five servings of fruits or vegetables daily compared to only 3% of those who reported less frequent food preparation ($p < .001$).

The Social Cognitive Theory (SCT) postulates that behavioral skills and self-efficacy are significant determinants of behavior, both of which can be improved through active mastery experience and the observation of role models (Bandura, 1986). Theory-based health programs have shown to promote active contemplation and activating decision making in changing specific behaviors (Contento, 2007). Previous research indicates that self-efficacy is associated with behaviors such as fruit and vegetable consumption (Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). Few studies have evaluated nutrition education interventions targeting collegiate student-athletes' self-efficacy for selecting healthful food choices and preparing foods. However, multiple studies have assessed these types of programs among young adults.

Brown, Wengreen, Vitale, and Anderson (2011) implemented and evaluated a nutrition education intervention for college students (n = 186), called Viva Vegetables! The results indicated that participants' self-efficacy was positively correlated with vegetable intake. Also noteworthy, was participants' self-efficacy for vegetable preparation was significantly associated with total vegetable intake and target vegetable intake at the end of the program.

Levy and Auld (2004) used a control group and intervention group to compare the food preparation self-efficacy of college sophomores following four, 2-hour cooking classes. The control group received demonstrations and the intervention group attended the cooking classes. The intervention used multiple principles of the SCT. For example, recipes and cooking equipment were provided to address the environmental aspect of reciprocal determinism. All classes were designed to improve participant expectations and expectancies and self-efficacy was targeted as participants engaged in the behavior (cooking).

Observational learning and reinforcement were included as participants watched one another prepare the meals and then ate the food they prepared. The results indicated that the group that received the interactive cooking classes significantly increased their self-efficacy for food preparation.

Abood, Black, and Birnbaum (2004) implemented an 8-week, SCT-based nutrition education intervention aimed at improving collegiate female athletes' nutrition knowledge, self-efficacy for making healthful food choices, and dietary behaviors. Self-efficacy, a primary construct of the SCT, was addressed by efforts to provide mastery experience through hands-on activities and observation of one another's positive dietary behaviors. Following the intervention participants' responses indicated an improvement in nutrition knowledge regarding energy and carbohydrate intake, and calcium, iron, and zinc. Overall, there was a significant change in dietary behavior in the experimental group, in which a 3-day dietary record was used to assess. Specifically, carbohydrate, protein, fiber, iron, and calcium intake increased and fat and alcohol intake decreased. Providing participants with the opportunity to gain mastery experience through activities, such as calculating their individual energy requirements, likely contributed to the positive changes observed in this study.

These nutrition education interventions imply that incorporating aspects of the SCT such as observational learning and mastery experience through demonstrations and hands-on activities may positively influence self-efficacy, knowledge, and behavior (Abood et al., 2004; Brown, Wengreen, Vitale, & Anderson, 2011; Levy & Auld, 2004). These interventions provide guidance and rationale for future intervention design and framework.

Interventions targeting athletes need to take into consideration the varying energy requirements they may have depending on training load. Specifically, an athlete's energy

needs may increase or decrease from day to day depending on their physical activity. Registered sports dietitians from the Sports and Cardiovascular and Wellness Nutrition (SCAN) group and the Collegiate and Professional Dietitian Association (CPSDA) developed the Performance Plate model, which is a visual representation of specific food groups (lean protein sources, whole grain foods, fruits, vegetables, healthy fats, and fluids) that make up a balanced plate in relation to an athlete's perceived level (light/off or hard) of training that day (National Collegiate Athletic Association, 2014). This may be an effective tool to incorporate in nutrition and cooking education for athletes.

The current study aimed to add to the limited research on nutrition and cooking education for the college-aged population. Specifically, it targeted collegiate student-athletes and was incorporated into a pre-existing university course.

Problem Statement

Previous research indicates that cooking skills are associated with diet quality among college students, and that educational interventions may result in improved knowledge, self-efficacy and dietary choices. However, many of these studies solely target either food preparation or nutrition education, and few are designed specifically for athletes. Research is needed to examine the effect of cooking interventions on student-athletes' self-efficacy for food preparation and making healthful food choices.

Statement of Purpose

The purpose of this study was to determine the effect of Social Cognitive Theory-based cooking workshops on collegiate student-athletes' self-efficacy for making healthful food choices and preparing food. The healthful food choices assessed were related to Performance Plate concepts including selecting lean protein sources, whole grain foods, fruits,

vegetables, healthy fats, and fluids. Confidence in food preparation skills including cooking, scrambling eggs, cooking quinoa, cooking brown rice, stir-frying, steaming vegetables, baking fish, using a microwave, using a kitchen knife, and following recipes were assessed at pre and post intervention.

Research Question

Does student-athletes' self-efficacy for making healthful food choices and preparing food increase following participation in a four-week, SCT-based cooking intervention?

Significance of Study

Previous research indicates that the student-athlete population may have inadequate nutrition knowledge and may not receive adequate nutrition information (Benari & Quatromoni, 2008). Due to the key role nutrition plays in promoting optimal sports performance and lifelong health, it is important to find effective methods to deliver nutrition education and promote positive changes in dietary choices (Thomas, Erdman, & Burke, 2016). The intervention in the current study is unique because it utilized the Performance Plate as a guide for meal planning and to educate athletes about their nutritional needs. To our knowledge, this is the first study to assess collegiate student-athletes' self-efficacy for preparing foods and making healthful food choices

Limitations

The sample of athletes was from one university; therefore, results cannot be generalized to other collegiate student-athletes attending other universities. Most of the participants were living on campus and had little access to food preparation equipment. For this reason they may have been less interested in the educational intervention because they could not apply all cooking techniques in their current living situation. However, the food

selection skills (the Performance Plate concept) learned could be applied to their food choices made in the dining hall and when eating out. Food preparation and food choices self-efficacy were measured using a self-reported questionnaire. Self-efficacy is an attitude and therefore may have been variable from day to day (Bernacki, Nokes-Malach, & Aleven, 2015).

A further limitation is that the study was a single-group design. As such, a control group was not utilized. Finally, self-efficacy was the only construct measured within the study. Ideally, knowledge and behavior would be assessed as well. However, it should be noted self-efficacy is a predictor to behavior change (Bandura, 1977).

Summary

Proper energy and nutrient intake is essential to optimal athlete performance, especially at the high level at which collegiate student-athletes compete. First year student-athletes experience a substantial change in their living, social, and athletic environment, in which presents a wide variety of challenges. Acquiring self-efficacy for specific skills and behaviors may result in positive behavior change (Bandura, 1986).

In addition to nutritional knowledge, food preparation skills have been associated with better diet quality (Larson et al., 2006). Although studies assessing student-athletes' food choices and meal preparation skills are limited, the literature suggests that SCT-based, hands-on nutrition and cooking education may be beneficial at improving nutrition and cooking knowledge and self-efficacy for making healthful food choices and food preparation (Abood et al., 2004; Levy & Auld, 2004).

Nutrition and cooking educational interventions for collegiate student-athletes to promote healthful diets and lifestyles is needed. Student-athletes' diets may be influenced by lack of self-efficacy to prepare food and choose healthful options.

Currently, at the University of Idaho, there is no course exclusively offered to student-athletes teaching food preparation. However, the campus dietitian offers a variety of food demonstrations for student-athletes to attend throughout the year. The School of Family and Consumer Sciences offers food preparation courses that are available to FCS majors. Therefore, the purpose of this study was to determine the effect of SCT-based cooking workshops on collegiate student-athletes' self-efficacy for making healthful food choices and preparing food.

The first chapter provides the introduction, problem statement, purpose statement, research question, significance of study, and limitations of the study. The second chapter reviews the available literature on collegiate student-athletes dietary needs, factors influencing their nutrition and food preparation, the relationship between nutrition knowledge, self-efficacy, and behaviors, and previous theory-based nutrition and cooking interventions. The third chapter is written in journal-style format and includes the following sections: introduction, methodology, results, discussion, and implications for future research and practice.

Chapter Two

Literature Review

The purpose of this literature review will be to provide a summary of the factors that affect student-athlete dietary habits, including their ability to prepare and choose healthful foods. The relationship between nutrition knowledge, self-efficacy for food preparation and making healthful food choices, and dietary behaviors will be discussed in further detail. Finally, educational interventions aimed at improving student-athletes' nutrition knowledge, self-efficacy, dietary behaviors and cooking skills will be reviewed.

The Effect of Nutrition on Student-Athletes

Optimal athletic performance does not only include an athlete's training, work ethic, and genetics, but also optimal nutrition. Proper nutrition influences athletes' health, body weight and body composition, substrate availability during exercise, recovery time, and promotes optimal performance (Thomas, Erdman, & Burke, 2016). Additionally, proper nutrition may aid in injury prevention and weight control (Manore, Barr, & Butterfield, 2009).

The International Society for Sports Nutrition, American Dietetic Association, and American College of Sports Medicine state that there is a direct relationship between optimal nutrition and athletic performance (Manore et al., 2009). More specifically, it is essential for energy and macronutrient needs to be met during periods of high physical activity to maintain body weight, replenish glycogen stores, and to build and repair tissue (Manore et al., 2009). Fat intake must be met to provide essential fatty acids and fat-soluble vitamins (Manore et al., 2009). It is recommended that athletes consume sufficient food and fluids before, during, and after exercise to help sustain blood glucose concentration during exercise, maximize

performance, and improve recovery time (Manore et al., 2009). These evidenced-based, recommendations can be adjusted to fit each athlete's unique needs (Manore et al., 2009).

Previous research indicates that the general college-age student's diet does not meet the dietary recommendations. Typically, college students consume diets that are excessive in fat, sugar, and sodium, and low in servings of calcium foods, fruits, deep yellow and green vegetables, and whole grains (American College Health Association, 2016; Strong, Parks, Anderson, Winett, & Davy, 2008). Inadequate intake is concerning because nutritional intake supports physical health, impacts the risk for future disease, and plays a role in weight management (Larson et al., 2006). Larson et al. (2006) reported that adults who regularly prepared food consumed significantly less fast food and met the dietary recommendations for fat, calcium, fruit, vegetable, and whole-grain consumption. Student-athletes are young adults, with increased dietary needs, which puts them at an even greater risk for poor food preparation and inadequate intake.

Athletes should be made aware of the significant role nutrition plays. Increasing awareness begins with various forms of nutrition education. Benari and Quatromini (2008) interviewed six female student-athletes at a Division 1 university. The following topics were discussed: perceptions of the need for nutrition education services, sources of nutrition information, influences on personal nutrition behavior, beliefs about nutrition and performance, and recommendations for nutrition interventions. Key findings from the interviews revealed that the athletes wanted practical information, cooking demonstrations that help translate knowledge in to food choices and cooking skills, and lessons on how to shop on a budget (Benari & Quatromini, 2008). Franciscy, McArthur, and Holbert (2004) administered a survey to college men (n = 205) to describe their attitudes and behaviors

regarding food preparation. The results indicated that the three most common food preparation methods were microwaving, toasting, and grilling and the majority (67%) wanted to learn more about food preparation.

Factors Affecting Student-Athlete Nutrition and Food Preparation

Previous research has identified factors that may affect student-athletes' nutrition. Time, services available to student-athletes, resources, environment, nutritional knowledge, and self-efficacy are all factors that influence an athlete's nutrition and food preparation. Though some studies reviewed here utilized a general college or young adult population, the factors may still apply to student-athletes.

Time. Collegiate student-athletes encounter many challenges as they transition to college. Their schedules become demanding as they are expected to balance class, practice, travel, homework, and social activities (Penn, Schoen, & Berland, 2015). Time greatly influences what and where student-athletes choose to eat (Abood et al., 2004; Manore et al., 2009; Rodriguez et al., 2009). For athletes who cook for themselves, quick and easy meals may be preferred. Additionally, for those who do not have pre-made foods available to them at the cafeteria, knowledge of how to make healthful food choices at restaurants are necessary.

Previous research suggests that time spent in food preparation is associated with healthier eating habits among young adults (18-23 years) (Larson, Perry, Story, & Nemark-Szainer, 2006). Of the 1,709 young adults Larson, Perry, Story, and Nemark-Szainer (2006) surveyed, 36% reported that lack of time was a prominent barrier to food preparation. Young adults value simplicity and convenience when preparing food (Betts, Amos, Keim, Peters, & Stewart, 1997; Hertzler & Frary, 1992; Larson et al., 2006). The frequency in which

individuals use recipes to prepare meals, along with the amount of ingredients and utensils that are used has been steadily decreasing over time (Sloan, 1998). Time has shown to be a significant barrier to food preparation for the general population (Betts et al., 1997; Hertzler & Frary, 1992; Larson et al., 2006; Sloan, 1998). It is predicted, that by 2030, the "ideal time" for meal preparation will be less than 15 minutes (Sloan, 1998). The time available will always affect what and when student-athletes eat, but teaching them how to prepare quick, easy meals, may help them eat healthful, despite their busy schedules.

Environment and Resources. As student-athletes transition to college they experience a change in the environment in which they live, go to school, and participate in athletics. As with other college students, moving away from home may impact student-athletes' diets. Papadaki, Hondros, Scott, and Kapsokefalou (2007) found that when students move away from home and assume the responsibility of purchasing and preparing food, their dietary habits are affected. Specifically, students (n = 84) living away from home consumed significantly fewer meals they prepared on their own per week and consumed significantly more convenience meals compared to students still living at home. Students living away from home also reported a decreased weekly intake of fresh fruit and vegetables, fish and seafood and an increased intake of sugar, alcohol and fast food. The authors suggested that these changes may have been influenced by a lack of confidence in their food preparation skills (Papadaki, Hondros, Scott, & Kapsokefalou, 2007). Similarly, Soliah, Walter, and Antosh (2006) assessed the frequency in which college women (n = 115) were dining out or ordering take-out and found that 59% ate out one to three times per week. The remaining 41% ate out four or more days per week. Participants identified multiple barriers, two of these barriers being insufficient kitchen resources and money. These findings are concerning because eating

out is associated with less healthful options (Gillman et al., 2000; Lin, Guthrie, & Frazao, 1998).

In addition to a tight schedule and new environment, resources such as budget to buy food, home appliances, and cooking skills may also influence a student's willingness to prepare their own meals (Betts et al., 1997). These findings highlight the importance of providing nutrition education interventions to the college-aged population that addresses factors that affect nutrition including environment and resources (Larson et al, 2006).

Services Available to Student-Athletes. Universities offer a multitude of services to their athletes including orientation, career and life skills development, career planning and placement, academic advising, and other academic support services (Satterfield & Godfrey, 2010). In addition to academic services, many universities have a multidisciplinary collegiate sports medicine team, which may include medical physicians, athletic trainers, strength and conditioning coaches, academic counselors, sports psychologists, and sports dietitians (Benari & Quatromoni, 2008).

Sports Dietitians. Currently, approximately 19% of National Collegiate Athletic Association (NCAA) Division 1 schools have full-time sports dietitians, working 40 or more hours per week (Collegiate and Professional Sports Dietitians Association, 2016). Some NCAA Division 1 schools have no sports dietitian position, whereas other schools may have up to eight full-time positions. Although there are a small percentage of full-time positions, this number is increasing nationwide. This is promising considering the many services sports dietitians can bring to student-athletes as a part of the multidisciplinary team. For example, they provide consultations, group classes, cooking workshops, management of food resources, and the distribution of nutrition brochures and handouts (Karpinski, 2012).

The services sports dietitians are able to provide may make a difference for student-athletes in regards to their nutrition practices. A previous study compared the difference in nutrition knowledge and self-efficacy of student-athletes attending two separate (NCAA) Division 1 universities with and without a sports dietitian (Wallinga et al., 2013). The athletes from the school without the dietitian reported obtaining most of their nutrition information from the strength and conditioning coach, family, or the internet (Wallinga et al., 2013). In contrast, athletes from the school with the dietitian reported that a registered dietitian was their main source of nutrition education ($p < .05$). Overall, the athletes from the school with the dietitian actively sought out nutrition information, had higher nutrition knowledge, were aware of calorie needs, identified the benefit of having a sports RD, and were significantly more confident in making nutrition decisions related to fueling, weight management, and hydration (Wallinga et al., 2013).

Food. University-provided food is another service offered to student athletes. Many freshman student-athletes are required to live on campus, in which they have regular access to a cafeteria. A service being implemented at many NCAA Division 1 universities is offering pre- and post-workout food at "fueling stations." Fueling stations are usually located in or near the weight room, allowing for easy and quick access by student-athletes. They are intended to provide pre and post workout fuel in snack size portions. Foods that may be offered fueling stations include protein shakes, milk, cheese sticks, boiled eggs, fruit, vegetables, bars, boiled eggs, trail mix, and sandwiches. In response to the 2014-2015 changes in NCAA policy, which lifted restrictions on what foods and supplements schools were allowed to provide or offer to their athletes, and how often and how much they were allowed to feed them, some universities have added "training tables" (Thomas, 2014).

Training tables offer full meals and not only serve as a means to provide student-athletes with fuel, but also as a means to educate them on proper nutrition (Thomas, 2014). This education process may take place through the use of signs that include nutrition facts and the benefits of the foods being offered. The types and variety of foods offered may also serve as a way to educate athletes about nutrition. Offering a variety of healthful options enable student-athletes to build Performance Plates. NCAA institutions have provided training tables in the following ways: using a foodservice company to operate the dining facility, hiring a private culinary expert to purchase and prepare high quality, fresh, local foods, and catering a meal from local restaurants or other caterers (Thomas, 2014). Thomas (2014) suggests that in circumstances in which there is no training table, it could be beneficial to have a sports RD walk through the food line and food stations in cafeterias describing the healthy versus less healthy options and show them how to build a balanced plate (Thomas, 2014). It is essential that student-athletes learn how to assemble balanced meals in the dining hall, as this may promote healthy food choices outside of the dining hall such as when dining out, or preparing foods for themselves (Parks et al., 2016).

Nutritional Knowledge. In addition to the services that are available to student-athletes such as dietitians, fueling stations, training tables, and cafeterias, nutritional knowledge influences their nutrition. Previous studies have indicated that many student-athletes lack nutrition knowledge (Dunn, Turner, & Denny, 2007; Rash, Malinauskas, Duffrin, Barber-Heidal, & Overton, 2008; Rosenbloom, Jonnalagadda, & Skinner, 2002; Zawila, Steib, & Hoogenboom, 2003). For example, Dunn, Turner, and Denny (2007) administered a Nutrition Knowledge Questionnaire, developed by Parameter and Wardle (2000) to collegiate student-athletes (n = 190). The questionnaire included the following

categories: recommendations on food groups, nutrient knowledge, food choices (asking them to choose between different options), and the relationships between diet and disease. The average score for this questionnaire was a 51.49%. Additionally, Shiflett, Timm, and Kahanov (2002) reported that athletes may have unfounded dietary beliefs. This may be a result of the sources in which they obtain nutrition information. According to Benari & Quatromoni (2008) athletes may receive inadequate nutrition information from the media, coaches, teammates, personal trainers, parents, and supplement manufacturers. Acquiring nutrition information from these sources may increase their likelihood of using unhealthy diet practices and consuming inadequate nutrients (Benari & Quatromoni, 2008). The media, and the internal and external sport performance expectations, may urge student-athletes to participate in popular diets or nutritional supplements that are not safe (Benari & Quatromoni, 2008).

Collegiate student-athletes may not be aware of their knowledge deficit. Shifflett et al. (2002) discovered that athletes overestimated or had high confidence in their understanding of nutrition knowledge. On average, student-athletes perceived nutrition knowledge score was a 6.8 out of 10 (SD = 1.9); however, their average actual score was a 55% (20 questions). Athletes commonly missed questions about dehydration, weight gain, fat consumption, and protein consumption (Shifflett, Timm, & Kahanov, 2002). If athletes perceive they practice healthy dietary habits, but in reality do not practice healthy dietary habits, there may be adverse consequences including poor athletic performance, longer recovery time, reduced immune system, and weight changes.

Zawila, Steib, and Hoogenboom (2003) also reported low nutrition knowledge among student-athletes (n =60). Nineteen of the 76 questions were answered correctly by fewer than 35% of participants. In addition, participants' comments in free-response questions suggest

that their knowledge may influence their dietary choices. Examples of the runners' written statements included, "I feel the less you weigh, the faster you run, "if you know more about nutrition, you are more likely to make more healthy food choices," and "I want to eat better, but I really don't know enough."

Consistent with Benari and Quatromoni (2008), Burns, Schiller, Merrick, and Wolf (2004) identified that athletes may receive information from a variety of sources. Burns et al. (2004) identified nutrition information sources being coaches, athletic trainers (AT), strength and conditioning specialists (SCS), sports dietitians, medical practitioners, and other sources such books, magazines, mass media, and the internet. Relying only on coaches, ATs, and SCSs is not ideal because delivering nutrition information is not in their job descriptions and is out of the scope of their practice (Torres-McGehee et al., 2012). In addition, these professionals may have limited nutrition knowledge. Torres-McGehee et al. (2012) administered a sports nutrition knowledge questionnaire to athletes (n = 185), coaches (n = 131), ATs (n = 192), and SCSs (n = 71). The questionnaire assessed knowledge related to micronutrients and macronutrients, supplements and performance, weight management and eating disorders, and hydration. After each question, the participant had to select how confident they were in the correctness of their responses on a 4-point Likert scale (1 = not at all confident to 4 = very confident). ATs and SCSs reported high confidence on multiple incorrect answers. For example, ATs had a high average micro and macronutrients score, (M = 70.7, SD = 20.9, $p < .001$), but they were highly confident on their incorrect answers (M = 2.9, SD = .33, $p < .001$). A question relating to micro and macronutrients on the questionnaire was, "From a sports performance perspective, which is the most significant and/or detrimental dietary deficiency?" The choices included: iron, zinc, calcium, and vitamin

C, with the correct answer being "iron." The SCSs and ATs had the highest confidence in incorrect answers than any other group in the supplements and performance section ($M = 2.8$, $SD = .26$, $p < .001$), the weight management and eating disorders section ($M = 3.3$, $SD = .38$, $p < .001$), and in the hydration section ($M = 3.0$, $SD = .42$, $p < .001$). Although SCSs indicated the highest confidence in their incorrect answers, they had the highest overall nutrition knowledge score (83%), compared to athletes ($n = 16$, 9%), coaches ($n = 49$, 36%), and athletic trainers ($n = 137$, 71%). Incorrect information, especially from trusted sources may increase athletes' risk for poor nutrition. Therefore, where student-athletes obtain nutrition information and how adequate their nutrition knowledge is will affect their nutrition habits.

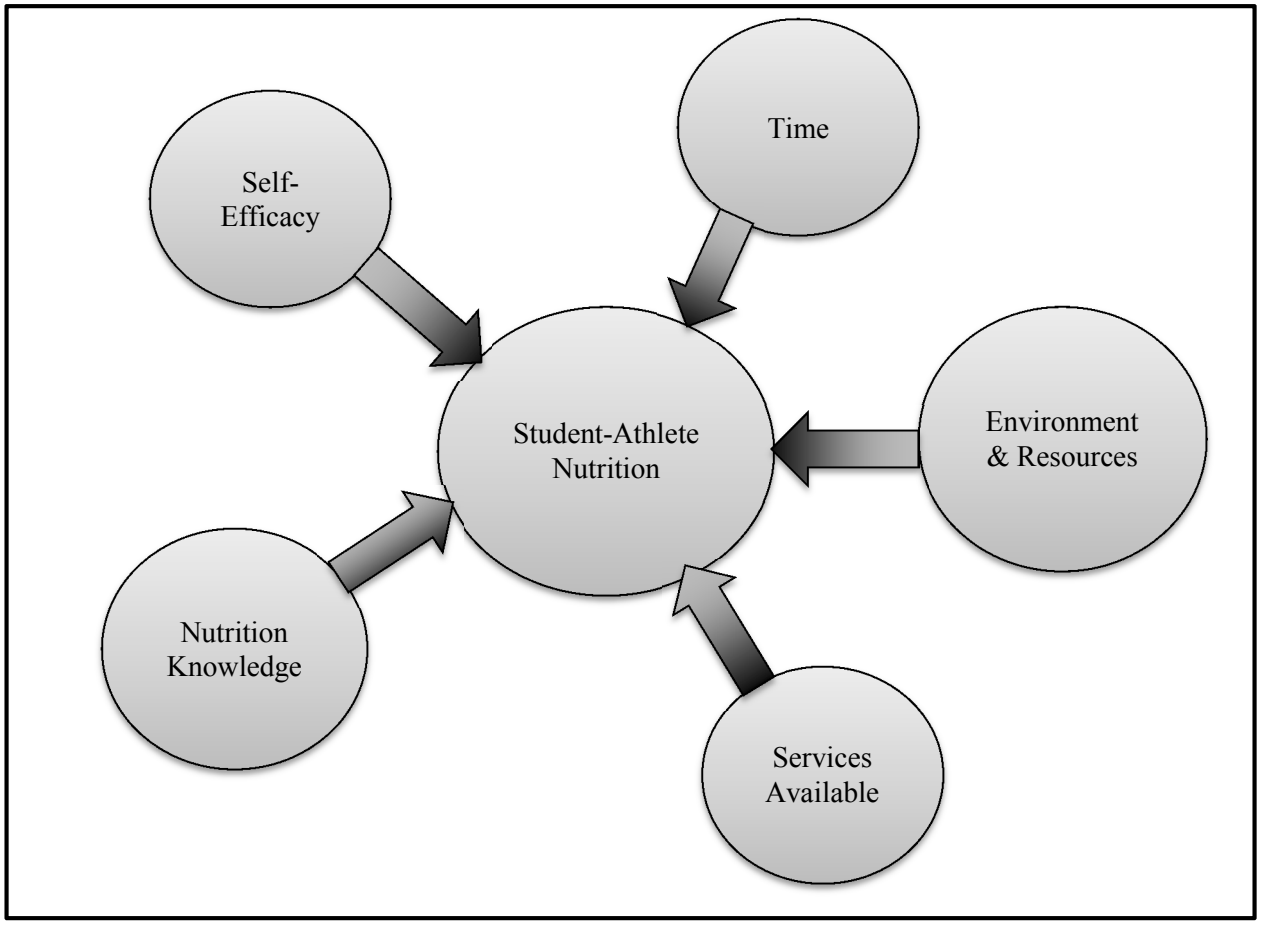
Self-Efficacy: Predictor to Behavior Change. Self-efficacy is the belief one has in his or her capability to perform a certain behavior or skill (Bandura, 1986). Shaikh, Yaroch, Nebeling, Yeh, and Reniscow (2008) reviewed thirty-five studies regarding psychosocial constructs as predictors for fruit and vegetable consumption among adults. The results provided evidence supporting that self-efficacy, social support, and knowledge are successful predictors of adult fruit and vegetable intake. There was weaker evidence for the following variables: barriers, intentions, attitudes/beliefs, stages of change, and autonomous motivation. Specifically, seven of nine descriptive studies reported a positive association between self-efficacy for fruit and vegetable intake and actual fruit and vegetable intake. Five of these nine studies used the SCT as the study framework. Ten prospective studies were reviewed, in which seven indicated that self-efficacy for fruit and vegetable intake was a significant predictor of fruit and vegetable consumption. For example, Van Duyn et al. (2002), examined adult ($n = 2605$) awareness of the "5 a Day for Better Health" program, along with stage of change, taste preferences, self-efficacy, and perceived benefits, barriers, threats, social

support, and norms related to fruit and vegetable consumption. The results indicated that self-efficacy and taste preference were the two factors most strongly correlated with fruit and vegetable consumption. For each unit that self-efficacy increased, vegetable intake increased 8.6% and fruit intake increased 6.8%. Chung and Hoerr (2005) identified predictors of fruit and vegetable consumption gender among college young adults (n = 294). Participants were asked to rate their self-efficacy for eating the recommended of servings fruits and vegetable using a 5-point Likert scale. The self-efficacy categories were separate for fruits and vegetables and included the following: confidence to keep fruits and vegetables available, eat the recommended amount, shop for them, make time to eat them, and eat them at home. The results indicated that for men, self-efficacy was positively associated with total fruit consumption, and that for women self-efficacy was positively associated with both total fruit intake and total vegetable intake. Chung and Hoerr (2005) concluded that the findings of this study support the notion that targeting self-efficacy might be important for health professionals to address in their interventions.

Additionally, Brown, Wengreen, Vitale, and Anderson (2011) reported that self-efficacy for vegetable preparation was associated with consumption of vegetables among college students. Brown et al. (2011) implemented and evaluated a nutrition education intervention for college students (n = 186), called Viva Vegetables! The program targeted one vegetable each month, for four months. Components of the program included online video instruction for selecting, storing, and preparing each vegetable, in-class tasting experiences, and step-by-step demonstrations on how to prepare each vegetable. The self-efficacy of the skills needed to prepare vegetables was measured at the beginning and end of the program, using a 5-point Likert scale. The scale asked participants to rate their level of agreement to the

statement; “I can prepare vegetables in many different ways. Participants’ self-efficacy for preparing vegetables was positively correlated with vegetable intake, r (184) = .26. Also noteworthy, was participants’ self-efficacy for vegetable preparation was significantly associated with total vegetable intake and target vegetable intake at the end of the program. The results suggest that improving the self-efficacy for a specific behavior may result in actual change in that behavior. These findings suggest that the self-efficacy student-athletes have for specific behaviors such as making healthful choices and preparing food will affect their nutrition.

Figure 2.1 Factors Affecting Student-Athlete Nutrition and Food Preparation



Relationship between Nutrition Knowledge, Self-Efficacy, and Behaviors

Time, environment and resources, services, nutrition knowledge, and self-efficacy are all factors that may influence student-athletes' nutrition, food choices, and food preparation. Previous studies suggest that nutrition knowledge is associated with attitudes (Benari & Quatromoni, 2008; Shifflett et al., 2002) and that receiving nutrition information from sources other than a registered dietitian may be inadequate (Torres-McGehee et al., 2012). Previous research also has identified correlations between self-efficacy and behaviors. The results of Brown et al.'s (2011) study indicated that college students' self-efficacy for preparing and consuming vegetables is associated with their overall vegetable intake. Shaikh et al. (2008) identified numerous studies, finding that self-efficacy, social support, and knowledge are the strongest predictors for fruit and vegetable intake. The findings of these studies suggest that nutrition knowledge, self-efficacy, and behaviors or skills should be aspects of educational interventions (Jonnalagadda, Rosenbloom, & Skinner, 2001).

Nichols, Jonnalagadda, Rosenbloom, and Trinkaus (2005) reported a significant correlation between the knowledge and attitude scores, $r(137) = .38$, knowledge and behavior scores, $r(137) = .46$, and attitude and behavior scores, $r(137) = .22$, among college athletes ($n = 139$). In contrast to this study, Murphy and Jeanes (2006) reported no significant findings between professional soccer players' knowledge and dietary behavior. These athletes ($n = 22$) consumed too few of calories for their specific needs, yet indicated that their knowledge of their specific calorie needs was adequate. Nutrition knowledge was not correlated with carbohydrate or protein intake. This may be a result of a small sample size. It may suggest the need for education focusing on how to apply nutrition knowledge.

Chapman, Toma, Tuveson, and Jacob (1997) implemented a nutrition education program for high school female athletes (n = 72) that consisted of two, 45-minute lectures each week for six weeks, as well as nutrition demonstrations and educational handouts. Participants completed nutrition knowledge questionnaires and 24-hour dietary recalls before and after the educational program (Chapman et al., 1997). The results indicated a significant increase in nutrition knowledge post program, but no change in dietary intake and food choices. The authors noted this might have been due to the limited duration of the program. In nutrition education interventions, how adequately nutrition knowledge, self-efficacy, and behaviors are addressed will influence outcomes. The length and frequency of exposure may also be important when addressing knowledge, self-efficacy and behaviors as indicated from previous studies.

A descriptive study by Soliah et al. (2006) aimed to determine college women's (n = 115) food preparation knowledge and practices and assess why they did not prepare certain foods. They found that greater than 90% knew how to prepare basic foods such as hamburgers, tacos, mashed potatoes, and scrambled eggs. Less than 25% knew how to prepare quiche, pizza sauce, basic salad dressings, or mayonnaise. The most frequent reasons participants cited for not being able to prepare foods was that they had never been taught (knowledge barrier), that they had no interest learning (attitude barrier), and had a lack of time. The majority of participants in this study (59%) ate out one to three times per week and the remainder (41%) ate out four or more times per week. The results indicated that as the perceived ability to prepare foods decreased, eating out frequency increased. These findings may be applicable to student athletes because they have similar barriers (Dunn, Turner, &

Denny, 2007; Larson et al., 2006). The authors suggested that nutrition education interventions should include both what to eat, and how to prepare healthy foods.

Food preparation behaviors may be associated with nutrition knowledge. Zawila et al. (2003) asked collegiate female runners (n = 60) from six different universities to classify their eating situation from the following categories: 1) I buy or prepare most of my own food; thus, I generally control what I eat or 2) my food is normally prepared by a family member, roommate, food service of a dorm, sorority house, student union, etc.; thus I am somewhat limited to my food selection. Thirty-five percent of runners reported preparing their own food, and 65% reported minimal food preparation and limited food selection. The runners who prepared their own food scored significantly higher on the nutrition knowledge questionnaire than the runners who had food prepared for them. An athlete, who has more control over what they eat, is obligated to make decisions such as what groceries to buy, what foods to prepare and how to prepare them. These findings suggest that having this responsibility may lead athletes to become aware of nutritional habits and seek out nutrition information.

Nutrition and Cooking Education is Warranted

Student athletes may have limited knowledge (Dunn et al., 2007; Rash et al., 2008; Rosenbloom et al., 2002; Zawila et al., 2003) and cooking skills (Franciscy, McArthur, & Holbert, 2004). Athletes reported that they want to learn more about nutrition (Benari & Quatromini, 2008; Franciscy et al., 2004), and prefer practical information, cooking demonstrations that help translate knowledge in to food choices and cooking skills, and lessons on how to shop on a budget (Benari & Quatromini, 2008). Given that food preparation has been associated with healthier eating habits among young adults (Larson et al., 2006) and

may be associated with nutrition knowledge among college athletes (Zawila et al., 2003), education on food preparation may positively influence the college student-athlete population.

Theory-based Nutrition Interventions

There are multiple behavior change theories including the Social Cognitive Theory (SCT), Health Belief Model (HBM), Trans theoretical Model (TTM), Theory of Reasoned Action, Theory of Planned Behavior, and Health Action Process Approach (HAPA) (Lippke & Ziegelmann, 2008). Behavioral models are regularly used to design nutrition education interventions because they encourage positive changes in health behaviors and aid in predicting behavioral changes (Abood et al., 2004; Clifford et al., 2009; Lippke & Ziegelmann, 2008). Many behavior change theories encourage targeting participant self-efficacy. Doing so can be done through demonstrations or hands-on experiences.

The SCT includes the following constructs: self-efficacy, observational learning/behavioral capability, outcome expectations, self-regulation, reinforcement, perceived barriers, and social support (Bandura, 1986; Bensley & Brookins-Fisher, 2009). Self-efficacy is a primary component of the SCT and targeting it may affect student-athletes' food choices and food preparation behaviors. Albert Bandura, a psychologist and researcher known as the originator of the SCT, acknowledges that having knowledge of health risks and benefits is a step towards behavior change, but that people need to believe in their ability to change in order to adopt new habits (Bandura, 2004).

Previous studies targeting the college population have used the SCT to promote changes in nutrition knowledge, self-efficacy, and dietary intake. Refer to Table 2.1 for a summary of previous nutrition education interventions. An educational intervention implemented and evaluated by Doyle-Lucas and Davy (2011) provided information on how to

make healthful breakfasts, lunches, dinners, and how to monitor hydration status to promote improvements in sports nutrition knowledge and self-efficacy for making healthful dietary choices among professional ballet dancers. The intervention included an intervention group (n = 146) and a control group (n = 64). It was based on the SCT and consisted of 3, 30-minute DVDs, and was focused on the following constructs: expectations, reinforcements, observational learning, self-efficacy, and goals (Doyle-Lucas & Davy, 2011). Significant Improvements in basic sports nutrition knowledge (66% to 93%) were observed for those in the intervention group (n =146). Similarly, healthy habits self-efficacy score (max score of 20) increased from M = 15.5, SEM = 0.2 to M = 17.9, SEM = 0.2 following the intervention. The intervention group participants also reported significantly improved dietary habits such as reduced candy intake, reduced fast food intake, and increased milk consumption. Doyle-Lucas and Davy (2011) suggested that the improvements might have been due to increased nutrition awareness. They suggested that the lack of improvement in other dietary variables could be related to the following factors: the tools used to assess intake may have not been adequate to measure all changes, and that the post-assessment was conducted in a different environment that the baseline assessment. A 6-month follow-up assessment was administered, in which 75 participants responded. At follow-up, nutrition knowledge scores declined, but remained significantly higher than the baseline scores. Improvements in fat intake and candy intake remained the same at follow-up. Fruit and vegetable consumption declined at follow-up and water intake returned to the baseline levels at follow-up. Doyle-Lucas and Davy (2011) recommended that future interventions include cooking classes, food preparation demonstrations, and grocery store tours to promote dietary change.

Similar to Doyle-Lucas and Davy (2011), but having a stronger focus on food preparation, Clifford et al. (2008) designed an SCT-based intervention targeting college students (N = 101) living off-campus. The intervention consisted of four, 15-minute cooking TV episodes aimed at improving cooking self-efficacy, cooking knowledge, cooking attitudes, and behaviors concerning fruit and vegetable intake. Most of the 15-minute show was in a kitchen, where the dietitian demonstrated ways to overcome meal-planning barriers. There were significant improvements on the knowledge score in the intervention group compared to the control group (33.5% to 58% vs. 25.5% to 33.8%). The intervention group showed a significant reduction in cooking barriers and significant improvement in cooking self-efficacy. However, participants' improvements were not maintained at four months post-intervention. Additionally, the follow-up food frequency questionnaire (FFQ) and personal factors survey indicated that there were no significant improvements in fruit and vegetable consumption or cooking behaviors. According to Clifford et al. (2008), this finding was consistent with other nutrition research studies that have used television. Clifford et al. (2008) suggests that using hands-on cooking classes may be more influential on self-efficacy. Also suggested was that the four, 15-minute episodes may have not been sufficient to influence dietary behaviors long term (Clifford et al, 2008).

Levy and Auld (2004) implemented an SCT based intervention, in which focused on food preparation and incorporated hands-on learning. This study compared a "hands-on" group versus a group that only attended a cooking demonstration. They found that the group receiving hands-on experience had greater improvements in self-efficacy. The two groups were college sophomores (N = 65); the intervention group (n = 33) received four, 2 hour cooking classes and the other group (n = 32) attended one cooking demonstration. The results

indicated that the intervention group had a significantly greater increase for the following self-efficacy statements (all questions used a 5-point Likert-type scale); I like to cook (*LS M* = 0.4, *SEM* = 0.1), cooking helps you eat more healthily and save money (*LS M* = 0.4, *SEM* = 0.1), and confidence using various cooking techniques (*LS M* = 0.7, *SEM* = 0.1). All participants showed a significant increase for two items relating to cooking knowledge and self-efficacy (4-point Likert-type scale); I know how to use a knife (*LS M* = 1.3, *SEM* = 0.2) and I know how to stir-fry (*LS M* = 1.3, *SEM* = 0.2). The results of this intervention suggest that hands-on experience in the kitchen may positively influence young adults confidence to prepare foods.

Kubota and Freedman (2009) implemented and evaluated a 4-week hands-on basic cooking skills development program for college students. The cooking classes were taught by a professional chef and held in the nutrition department's food laboratory. There were four cooking classes, each 2.25 hours long and focused on kitchen basics and knife skills; breakfasts; lunches, and dinners; and desserts and snacks. Participants completed FFQs and 3-day dietary recalls before and after the intervention. Self-efficacy for food preparation was assessed for preparing sauces/dressings, side dishes, egg and meat dishes, salads, soups, and baked goods using a 5-point Likert-type scale ranging from "not at all confident" to "extremely confident." Participants were asked through an open-ended question to report any barriers they had in regards to food preparation. After completion of the classes, the participants' (*n* = 20) Self-efficacy increased significantly in 6 of 7 foods preparation categories listed above. Participants reported access to groceries as the most prominent barrier to their food preparation. Participants' food group intake was compared to USDA recommendations and no significant changes were seen. The authors suggested that programs must address environmental factors (access to groceries and fresh produce), lack of

equipment, time and money, in addition addressing the cooking skills and confidence people have in cooking.

Bristow (2010) designed an intervention that addressed the following factors from the SCT: behavioral, personal, and environmental. It was a food preparation focused intervention, "Can't cook, don't cook," for first year college students. This intervention focused on improving cooking confidence and skills and incorporated discussions about how to grocery shop efficiently. The cooking lessons included making food from basic, fresh ingredients. This study reported significant increases in participant's self-efficacy to cook, confidence in cooking skills, and food choices. The median scores for self-efficacy to cook significantly increased from 6 pre-intervention to 8 post-intervention, how easy students found cooking to be significantly increased from 6 to 7, and the self-efficacy in their ability to cook from fresh ingredients significantly increased from 6 to 7.5. Significant improvements for self-efficacy for various cooking skills were also observed for using sharp knives (7 to 8) and using a frying pan to cook (7 to 8). Knowledge of the cooking times of food significantly increased from 5 to 7. Lastly, significant improvements were seen for self-efficacy in interpreting food labels (6 to 8) and the self-efficacy for consuming healthful meals (7 to 8). Overall, the results of this study indicated that the cooking intervention was successful at increasing the students' cooking knowledge and self-efficacy to cook for themselves.

Another intervention, which included hands-on learning and targeted student-athletes, was successful at improving knowledge, dietary choice self-efficacy, and dietary intake. Abood et al. (2004) conducted an 8-week, SCT-based nutrition education intervention aimed at improving nutrition knowledge, self-efficacy for making healthful food choices, and dietary behaviors among collegiate female athletes. Two teams from a Division 1 university were

selected; a women's soccer team (n = 15) was selected to be the experimental group and women's swim team was selected to be the control group (n = 15). The group to receive the intervention was randomly selected. All of the eight, 1-hour educational sessions provided a chance to gain mastery experience of in class activities and self-efficacy for making healthful dietary choices. Compared to the control group, the experimental group showed a significant increase in nutrition knowledge regarding energy intake, calcium, iron, and zinc from the pretest (M = 29.5, SD = .54) to the posttest (M = 32, SD = .68). The experimental group also showed significant increase for dietary choice self-efficacy regarding calcium-rich and low-fat foods from the pretest (M = 32, SD = .32) to posttest (M = 36, SD = .71) compared to the control group. Dietary intake was assessed using 3-day dietary records. The experimental group significantly increased calorie, carbohydrate, protein, calcium, and iron intake, and significantly decreased fat and alcohol intake following the intervention. These results are consistent with the SCT, which indicates that the self-efficacy is a common precursor to behavior change (Bandura, 1977).

The specific programs and interventions discussed focused on a myriad of basic nutrition concepts and skills, including the cooking knowledge, self-efficacy, and skill of the college-age population. Given that many used different behavioral theories and had different designs, it is challenging to accurately compare and contrast results. Over half of the studies reviewed, used a hands-on learning component, but had different behavioral outcomes. All of the theory based interventions reviewed, were successful at increasing self-efficacy for making healthful dietary choices or food preparation. The intervention implemented by Abood et al. (2004) was successful at increasing nutritional knowledge, self-efficacy for making healthful dietary choices, and improving dietary intake. Levy and Auld's (2004)

intervention was also successful at increasing knowledge of cooking skills, self-efficacy for cooking, and improving food preparation skills. Both of these studies incorporated hands-on learning activities. The intervention implemented by Doyle-Lucas and Davy (2011) did not include a hands-on component, but was successful in increasing nutrition knowledge, self-efficacy for making healthful dietary choices, and improved dietary intake. However, these changes were not observed at a 4-month follow-up. The SCT model was consistently used in all of these interventions, suggesting it may be a useful framework for future nutrition education interventions.

Many of the authors reported that future interventions should incorporate hands-on learning and cooking experience as a way to teach college students the skills they need to apply nutrition knowledge. Targeting nutritional knowledge and cooking skills in the same intervention, as seen in the Clifford et al. (2009) intervention, yet using hands-on learning versus DVDs, may be beneficial for the college age population. More descriptive and experimental studies are needed among the college population, and specifically among collegiate student-athletes. Although not all of the studies saw changes in behavior, change in self-efficacy was a common result, which has previously shown to be a predictor of behavior change (Shaikh et al., 2008). Table 2.1 provides a summary of theory-based nutrition education interventions.

Table 2.1 Theory-based Nutrition Interventions

Author (s)	Population (*n*)	Theory	Description	Knowledge	Self-Efficacy	Behavior
Abood, Black, & Birnbaum (2004)	College female athletes (control group, *n*= 15; experimental group, *n* = 15)	SCT	8, 1 hour educational sessions (hands on)	↑ Nutrition knowledge: ↑ energy intake, calcium, iron, & zinc	↑ SE for making healthful dietary choices	↑ carbohydrate, protein, fiber, iron, & calcium intake ↓fat, alcohol, & zinc intake
Bristow (2010)	Freshman college students (*n* = 44)	SCT	Intervention consisted of 3, 2 hour sessions in foods lab	↑ Knowledge of food and how to cook foods	↑ SE to cook and make healthful food choices	X
Clifford, Anderson, Auld, & Champ (2009)	College students living off-campus (intervention group, *n* = 50; control group, *n* = 51)	SCT	Intervention consisted of 4, 15-minute episodes of a cooking show	↑ Knowledge of fruit and vegetable recommendations *Not maintained at 4-month follow up	↑SE for eating and cooking fruits and vegetables *Not maintained at 4-month follow up	X
Doyle-Lucas & Davy (2011)	Pre-professional ballet dancers (intervention group; *n* = 231; control group, *n* = 90).	SCT	Intervention consisted of 3, 30-minute DVDs	↑Sports Nutrition Knowledge	↑ SE for healthful dietary habits	↑ Consumption of fruits, vegetables, calcium *Not maintained at 6-month follow up
Kubota & Freedman (2009)	College students living in apartment style suites (*n* = 20)	SCT	4-week, hands-on basic cooking skills classes	X	↑ SE for food preparing sauces/dressings, side dishes, egg and meat dishes, salads, soups, and baked goods	X
Levy & Auld (2004)	College sophomores (intervention group, *n* = 33; demonstration group, *n* = 32)	SCT	Intervention: 4, 2-hour cooking skill classes Demonstration: 1-hour class that included lecture and demonstration of cooking class topics	↑ knowledge of cooking skills	↑SE for cooking	↑ Food preparation skills

Conclusions

Nutrition directly affects sports performance and health (Manore et al., 2009). The transition that collegiate student-athletes undergo presents new challenges and responsibilities that can be used as an opportunity to gain or add to existing life skills. Student-athletes have high training demands, which increases their energy and nutrient needs. Young adults who prepare food at home may eat fast food less frequently and may be more likely to follow dietary recommendations (Larson et al., 2006). Therefore, using cooking education as a means to teach student-athletes how to specifically use foods to fuel their bodies may be an effective approach. As evidenced by Levy and Auld's (2004) findings, hands-on cooking classes may promote increased confidence in students' cooking abilities compared to cooking demonstrations.

Further research on nutrition knowledge, dietary intake, self-efficacy, food choices, and food preparation skills among collegiate student-athletes is needed. Therefore, the purpose of this study was to determine the effect of SCT-based cooking workshops on collegiate student-athletes' self-efficacy for making healthful food choices and preparing food. The main outcome measure was changes in self-efficacy for preparing food and making healthful food choices pre and post cooking intervention.

Chapter Three

Changes in Student-Athletes' Self-Efficacy for Making Healthful Food Choices and Food Preparation following a Social Cognitive Theory-based Cooking Education Intervention

Introduction

The eating habits of collegiate athletes are of particular concern due to unique calorie and nutrient needs, misguided nutritional practices, a demanding schedule, the increased risk for suboptimal eating, and the determination to excel in sport (Abood, Black, & Birnbaum, 2004; Rosenbloom, Jonnalagadda, & Skinner, 2002; Smith-Rockwell, Nickols-Richardson, & Thye, 2001). Many universities provide career and life skills development, career planning and placement, academic advising, and other academic support services, but do not provide credible nutrition education opportunities for their student-athletes (Karpinski, 2012).

Collegiate student-athletes have the responsibility of balancing practice, class, travel, and meal times. Eating nutritious meals may not be a top priority if there are barriers such as a nutrition knowledge deficit, lack of cooking skills, or inadequate resources. Social Cognitive Theory (SCT) based interventions incorporate multiple constructs that focus on behavioral, personal, and environmental factors. Self-efficacy is a primary component of the SCT and the literature has identified it as a predictor to behavior change (Bandura, 1986; Brown, Wengreen, Vitale, & Anderson, 2011; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). Although multiple descriptive and experimental studies have targeted the college population, few have evaluated SCT cooking and nutrition programs designed specifically for collegiate student-athletes. This study was unique in that it used the Performance Plate model, which is a visual representation of food groups that make up a balanced meal, including suggested

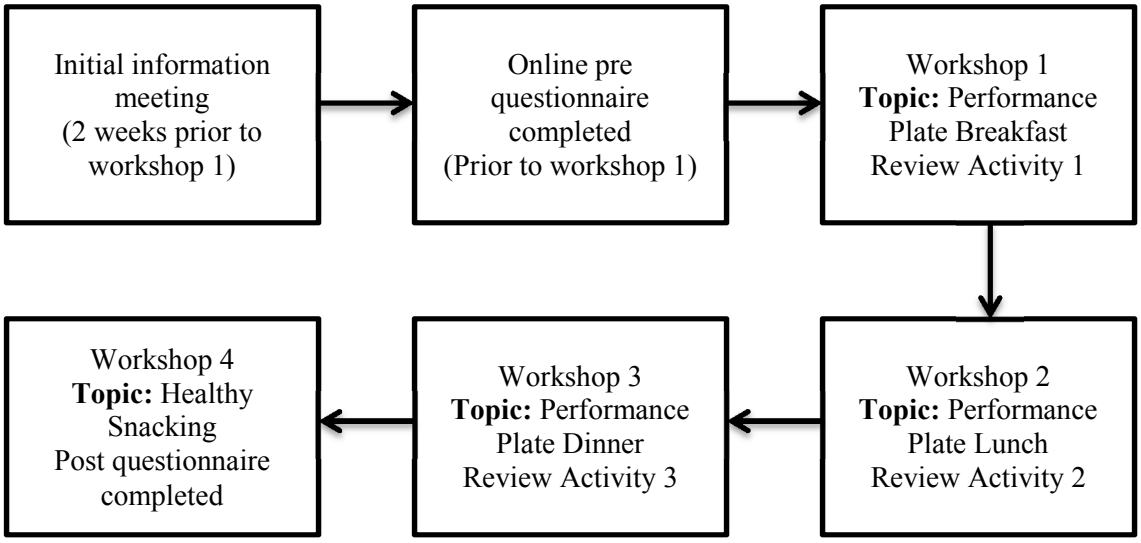
portion sizes based on an athlete's perceived training day (light/off or hard) (National Collegiate Athletic Association, 2014).

The purpose of this study was to determine the effect of SCT-based cooking workshops on collegiate student-athletes' self-efficacy for making healthful food choices and preparing food. Does student-athletes' self-efficacy for making healthful food choices and preparing food increase following participation in a four-week, SCT-based cooking intervention?

Methods

This intervention was conducted in fall 2015. Participants attended four hands-on cooking workshops. A pre and post questionnaire design was used to assess self-efficacy for making healthful food choices and preparing food. The University of Idaho Institutional Review Board certified this study as exempt (see Appendix A), and the University's Athletic Director approved this study. Refer to Figure 3.1 for the intervention timeline.

Figure 3.1 Intervention Timeline

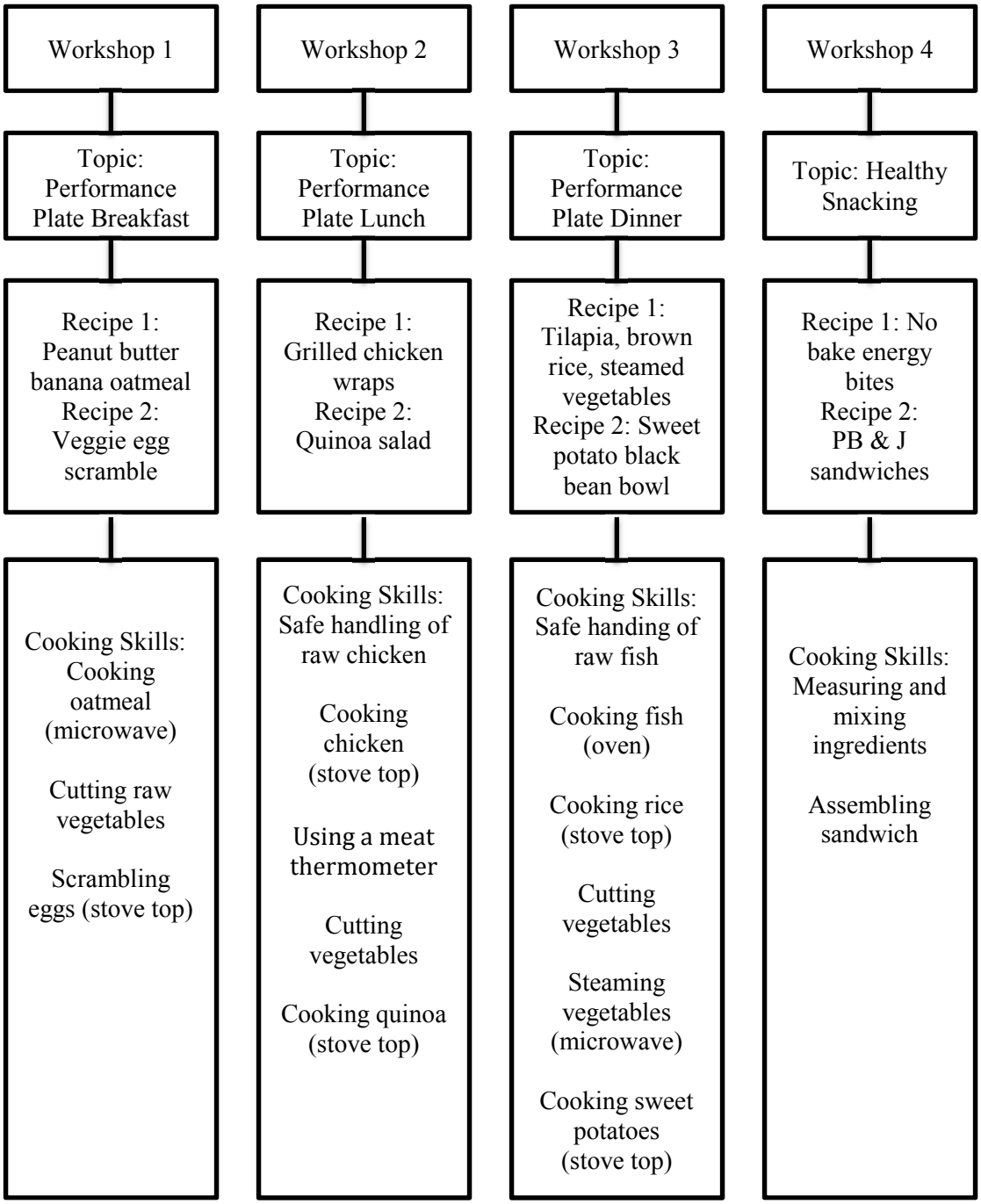


Participant Sample. A purposeful convenience sample of student-athletes attending the University of Idaho and enrolled in INTR 210, Life Skills, were invited to participate in the study ($N = 27$). Although the student-athletes enrolled in the Life Skills course were required to attend the cooking workshops as a part of class time, participation in the study was optional. Twenty-two out of twenty-seven attended each workshop and completed the pre and post questionnaires. Participation included completion of the pre and post questionnaire and the in-class review activities. Participants benefited by receiving food, recipe cards, and food preparation experience. No additional incentives were offered.

Intervention Design and Outline. The four workshops were offered during the Life Skills class time and were held in the Carmelita Spencer Foods Laboratory on the University of Idaho campus. During each workshop, a graduate student provided a step-by-step demonstration on how to prepare each recipe and participants took part in hands-on experiences by preparing each of the recipes demonstrated. Participants were taught knife skills and how to use a stovetop, oven, and microwave. Every workshop emphasized how to create easy, quick meals, adhere to food safety practices, and create a Performance Plate. The workshops consisted of different teaching techniques that have been used in previous interventions including lecture, discussion, food demonstrations, and hands-on group work (Abood et al., 2004; Chapman, Toma, Tuvenson, & Jacob, 1997; Clifford, Anderson, Auld, & Champ, 2009; Levy & Auld, 2004). At the end of workshops 1, 2, and 3, participants were asked to complete a review activity individually to help with memory retention (Appendix E). The review activities asked participants to identify components of the Performance Plate in addition to what role each component serves in regards to performance. Figure 3.2 is a

summary of the topics that were covered in each workshop. See Appendix F for a detailed outline of the workshop lesson plans and protocol.

Figure 3.2 Student-Athlete Cooking Workshop Topics



Development of Intervention using Social Cognitive Theory. Two registered dietitians and a graduate student used the SCT framework to design the workshops. The intervention aimed to incorporate main constructs of the SCT. The following components were addressed in each workshop: self-efficacy, observational learning, self-regulation, outcome expectations, behavioral capability, and reinforcement.

Behavioral skills and self-efficacy are thought to be significant determinants of behavior, both of which can be improved through active mastery experience and the observation of role models (Bandura, 1986). Self-efficacy is the confidence one has in his or her ability to perform a certain behavior (Bandura, 1986). Observational learning occurs when individuals watch others performing certain behaviors (Bandura, 1986).

Self-regulation, another component of the SCT, involves individual's engaging in goal setting and monitoring tasks in which they perform to target behavior change (Bandura, 1986). The outcome expectations individuals have are the beliefs and attitudes towards behaviors regarding what benefits may come from the behavior (Bandura, 1986). Behavioral capability is the process in which individuals acquire the knowledge and skills necessary to carry out a behavior (Bandura, 1986). Another component covered, reinforcement, includes the responses and activities that may either increase or decrease the likelihood of a person repeating the behavior. For a summary of how each of these components were applied to the intervention see Table 3.1.

Table 3.1 Intervention Application of SCT

Theory Construct	Application
Self-efficacy	• Participants engaged in food preparation techniques
Observational learning	• Instructor demonstrated how to prepare all foods • Participants worked in groups, observing one another prepare the foods
Self-regulation	• Participants prepared recipes within allotted time frame and were expected to clean up
Outcome expectations	• At the end of each workshop, participants sampled the food together and engaged in discussion (likes/dislikes, summary of class) • The goal was to make the workshops fun and interactive and provide recipes that were easy and quick to influence participants attitudes about cooking
Behavioral Capability	• Cooking skills were taught and the skills were practiced
Reinforcement	• Participants sampled each food they prepared • Participants received recipe handouts to take home • Participants completed review activities, which reinforced workshop topics

Development and Review of Workshop Curriculum. The cooking workshops were developed to focus on basic cooking skills as well as provide brief nutrition education. Cooking skills addressed in Levy and Auld's (2004) study were used for this intervention. Two registered dietitians reviewed the outline, recipes, and Power Point presentations for each workshop. The primary changes made were decreasing the "lecture" component, incorporating more images, and putting more emphasis on teaching the cooking skills.

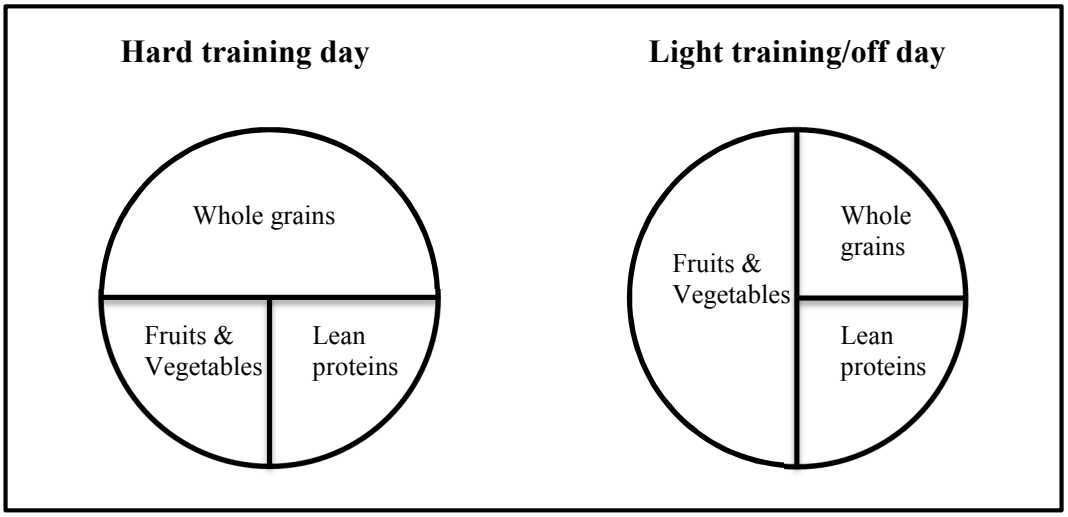
The workshops were piloted tested on four graduate students. Two graduate students participated in workshops 1 and 2 and two different graduate students participated in workshops 3 and 4. Each set of students watched the instructor prepare the foods first and then worked together to prepare the recipes. This pilot test served as an aid to improving the way in which the instructor taught the food preparation skills. In the workshops, the instructor stood at the front of the classroom at the demonstration station and verbally explained each step while demonstrating how to prepare each food. The pilot session also helped identify how long the workshops would last and what foods needed to be prepared or measured out ahead of time.

Nutrition Education Component: Performance Plate. The Performance Plate was used as a guide to select the meals presented and prepared in each workshop (Figure 3.3). Registered sports dietitians from the Sports and Cardiovascular and Wellness Nutrition (SCAN) group and the Collegiate and Professional Dietitian Association (CPSDA) developed the Performance Plate model (National Collegiate Athletic Association, 2014). The Performance Plate concept encourages athletes to consider every meal they consume an essential part of their training regimen. It provides athletes with a visual of what combinations of food groups should be included on their plate based on their perceived "training level" that day. Two basic "performance plates" were used: one representing a perceived light or off training day and one representing a perceived hard training day (Figure 3.3). The light training day places emphasis on fruits and vegetables and the hard training day plate places emphasis on grains and carbohydrate foods.

The performance plate concept suggests that each of the following components be included at each meal: whole grains (energy-enhancing foods), lean proteins (recovery/muscle

building foods), fruits and vegetables (antioxidant-rich foods), fat (immunity/flavor-boosting foods), and fluid or hydration-promoting beverages. The activities and content of each workshop provided an opportunity for participants to learn effective ways to balance their plate and how to prepare these performance plate components.

Figure 3.3 Performance Plates



Research Instruments. Participants completed a structured questionnaire to obtain descriptive information on perceived self-efficacy to make healthy food choices and prepare food. The questionnaire consisted of six sections and twenty-seven questions. See Appendix B for the full pre and post intervention questionnaires. Participants also completed written review activities after workshops 1, 2, and 3, See Appendix E for each review activity.

The questionnaire consisted of closed-ended questions regarding healthful food choices that student-athletes make on a regular basis. The goal was to gather information on the participants' level of confidence in their ability to select and prepare whole grains, lean proteins, fruits and vegetables, and healthy fats and fluid. Responses were categorized using a 4-point Likert-type scale of "Strongly Agree," "Agree," "Disagree," and "Strongly

Disagree." Additionally, there was one question that asked student-athletes how confident they were at planning meals or snacks in advance.

Participants also were asked to report the location and nature of their meals (Bob's Place, Refuel Station, home, premade meals, dining out, and skipping meals). Each question included options 1-7, representing times per week. Bob's Place is the main dining hall on campus and offers a variety of options in "all-you-can-eat" style. Student-athletes also have access during weekdays to the Refuel Station. The Refuel Station provides foods exclusively to student athletes and is located in the student athlete weight room. The goal of the Refuel Station is to provide foods that fuel and replenish student-athletes pre and post workout. However, the items offered are not intended to replace meals. Examples of foods provided at the Refuel Station include bars (Muscle Milk, Nutri-grain, Protein Puck), trail mix, fruit, vegetables, boiled eggs, peanut butter and jelly sandwiches, cheese sticks, milk, and protein shakes.

The questionnaire concluded with the following demographic questions: sex, age, ethnicity, and self-reported height and weight. Additionally, two open-ended questions followed, asking participants to identify past cooking experiences.

The post intervention questionnaire consisted of all the sections provided on the pre intervention questionnaire, except for the demographic section. An additional workshop evaluation section was included on the post questionnaire. Participants were asked to rate their comfort with cooking, their desire to learn more about cooking, and if they intended to make the recipes learned in the workshops. These questions used the same 4-point Likert-type Scale of "Strongly Agree," "Agree," "Disagree," and "Strongly Disagree." The next two closed-ended questions assessed overall interest and enjoyment in the workshops. There were

two open-ended questions, which asked participants to indicate which workshop was most useful and which was least useful. Last, participants were asked to provide suggestions for future workshops.

Development of the pre and post questionnaire. Two registered dietitians and a graduate student developed the questionnaire instrument and used nine validated questions; seven from Levy and Auld (2004) and two from Clifford, Anderson, Auld, and Champ (2008). The questionnaire was initially reviewed by experts from the nutrition department and education department and piloted with three college students for question understanding and organization. It was given face validity by the same two expert, registered dietitians from the nutrition department. The questionnaire was tested for test-retest reliability using an introductory nutrition class (n = 50) and was taken twice, one day apart. See Appendix C for the pilot questionnaire. Spearman's correlations were used to assess reliability. The majority of questions were correlated $r \geq .70$ (see Table 3.2). We set the criteria for including questions that had a correlation of $r \geq .60$, which is considered minimally acceptable (Multon, 2010). Other researchers have determined $r \geq .70$ as adequate (Litwin, 1995).

Development of the review activities. The review activities were created by a graduate student and reviewed by an expert in the nutrition department. The goal of each review activity was to reinforce the foods prepared in the workshop in regards to the Performance Plate. Each review activity included questions that asked participants to indicate what food group each food they prepared belonged in. Additionally, there were questions asking the participants to identify what role specific food groups contribute to their bodies. The answers were either right or wrong, therefore each question was closed-ended categorical.

Table 3.2 Questionnaire Reliability

Participants (n = 50) Questions	Spearman Correlation
Food Selection	
I feel confident selecting foods to fuel performance	0.80
I feel confident selecting lean protein sources	0.83
I feel confident selecting whole grain foods	0.63
I feel confident selecting fruits	0.60
I feel confident selecting vegetables	0.76
I feel confident selecting healthy fats	0.70
I feel confident selecting fluids	0.62
Meal Planning	
I feel confident planning meals & snacks one day in advance	0.68
Cooking	
I feel confident cooking	0.83
I feel confident scrambling eggs	0.65
I feel confident cooking quinoa	0.85
I feel confident cooking brown rice	0.89
I feel confident baking fish	0.90
Meal Patterns	
Do you typically eat your meals on campus or off-campus?	0.96
How many times a week, on average, do you eat at Bob's?	
a. Breakfast	1.00
b. Lunch	0.96
c. Dinner	1.00
How many times per week, on average, do you replace a meal with snack items?	
a. Breakfast	1.00
b. Lunch	0.77
c. Dinner	0.57

Procedure for administering the research instruments. Prior to the study, an initial meeting was held during the Life Skills class time. The primary researcher explained the purpose of the questionnaire and intervention, the benefits of participation, and assured complete anonymity of responses. Participants were provided with a Letter of Information (see Appendix D) prior to receiving access to the pre questionnaire. The Letter of Information

described study procedures, voluntary participation, confidentiality, and indicated that discontinued participation would not result in consequences.

The pre questionnaire was posted on the Life Skills online course management website two weeks prior to workshop one. After week one, reminder emails were sent to participants, requesting them to complete the questionnaire. All participants completed the pre questionnaire prior to workshop one. Following workshop four, all participants were asked to complete a paper-based, post questionnaire. See Figure 3.1 for the complete research timeline.

Three review activities were completed, following workshops 1, 2, and 3. One review activity was passed out at the end of each workshop and participants were asked to complete it individually. See Figure 3.1 for the complete research timeline.

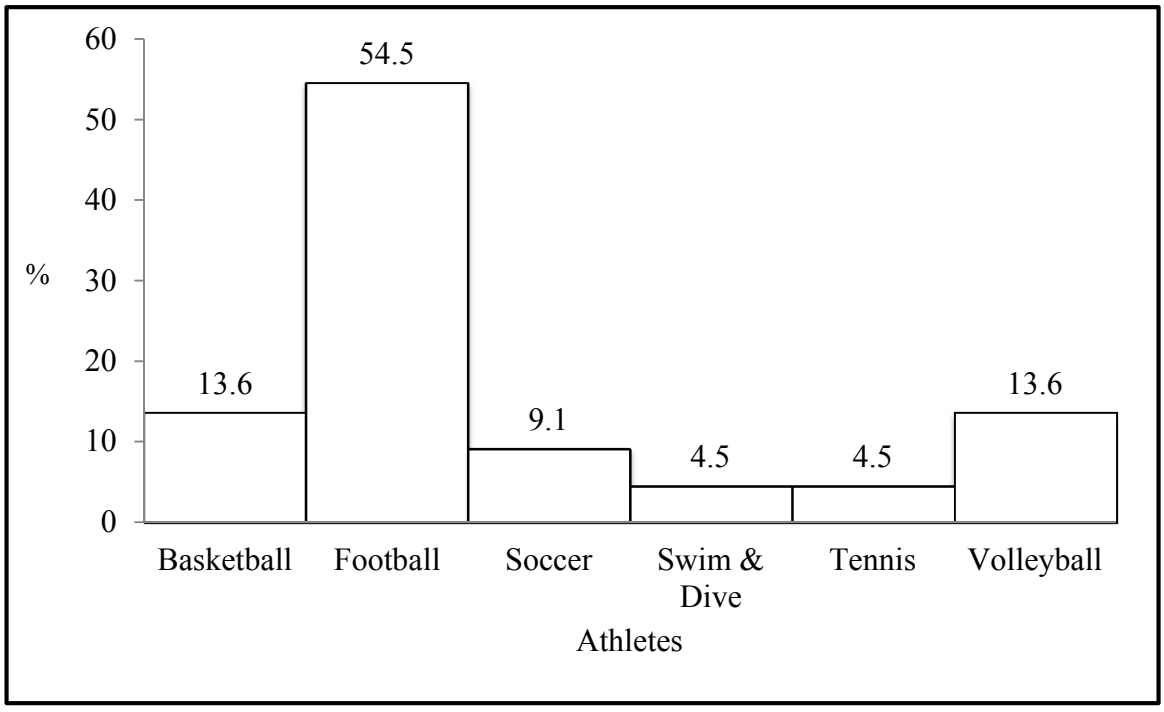
Data Analysis. Descriptive statistics were summarized from close-ended categorical questions. Means, standard deviations, frequencies, and percentages were calculated for demographic variables including age, height, weight, ethnicity, sport, major, and year in school. Body mass index (BMI) was calculated for each participant using self-reported height and weight. The review activities were also analyzed using descriptive statistics, including frequencies for correct versus incorrect for each question.

The Shapiro-Wilk test was used to test for normality on the pre and post data sets. All questions had a p-value > .05; therefore the data was not normally distributed and nonparametric tests were used to analyze all data. Differences in self-efficacy between males and females were determined using the Kruskal-Wallis test. The Wilcoxon Signed Rank Test was used to assess the difference in self-efficacy between pre and post intervention for all participants. The level of significance for all statistical tests was set at $p < .05$. All data was analyzed using SPSS Statistics Version 24.0.0.0.

Results

Participant Characteristics. Twenty-seven questionnaires were administered to student-athletes in the Life Skills class. Five participants did not attend all workshops and were therefore not included in the analysis of the pre and post questionnaire (n = 22). Participants who were present during one or more of the workshops were included in the analysis of the in-class review activities. The mean age of participants was 18 years. The majority of participants were football players (n = 12, 54.5%), but other fall and winter sports represented included basketball, swim and dive, tennis, and volleyball (Figure 3.4).

Figure 3.4 Percent of Participants Representing Each Sport



All participants were freshmen (true, red shirt, and gray shirt) and the majority lived on campus (86%), and typically ate meals on campus (89%). See Table 3.3 for the complete student-athlete characteristics. Table 3.4 describes how many times per week participants typically ate at Bob's, replaced a meal with food from the refuel station, cooked or prepared meals, ate pre-made meals, and take out for breakfast, lunch, and dinner.

Table 3.3 Student-Athletes Characteristics

Participants (n = 22)	n (%) / Mean +/- SD
Sex	
Female	9 (40.9)
Male	13 (59.1)
Age	18.18 ± .501
Ethnicity	
American Indian or Alaskan	1 (4.5)
Asian or Pacific Islander	2 (9.1)
Black or African American	2 (9.1)
Black or African American and Hispanic	2 (9.1)
Hispanic or Latino	2 (9.1)
White or Caucasian	13 (59.1)
BMI [a]	
Underweight <18.5	0 (0.0)
Normal 18.5-24.9	11 (50)
Overweight 25-29.9	8 (36.4)
Obese ≥ 30	3 (13.6)
Major	
Applied Physics	1 (4.5)
Business	9 (40.5)
Communications	1 (4.5)
Education	1 (4.5)
Engineering	1 (4.5)
Exercise Science and Health	1 (4.5)
Finance	1 (4.5)
General Studies	2 (9.0)
Nutrition	1 (4.5)
Undeclared	4 (18)
Year in school [b]	
True freshman	15 (68.2)
Red shirt freshman	6 (27.3)
Grey shirt freshmen	1 (4.5)

[a] BMI is a measurement of relative body weight and not body composition.
A high BMI for an athlete is most likely a result of lean body mass rather than excess fat mass; therefore, an athlete with a high BMI is likely not at increased health risk.
BMI does not necessarily determine when an athlete is too fat or thin (Torstveit & Sundgot-Borgen, 2012).

[b] True freshmen: first year out of high school and has both athletic and academic eligibility
Red shirt freshmen: academic sophomore and participating in first season athletically
Grey shirt freshmen: postponed enrollment in classes until the second term of freshmen year; no practice or conditioning with team

Table 3.4 Meal Locations and Content

How many times per week on average do you… (n = 22)	Breakfast Median (range)	Lunch Median (range)	Dinner Median (range)
Eat at Bobs?	3.00 (0-5, 7)	4.00 (0, 1, 3-7)	5.00 (0-7)
Replace a meal with food from the refuel station?	3.00 (0-6)	1.00 (0-4)	0.00 (0,1, 3, 5)
Cook or prepare meals?[a]	1.00 (0-5)	1.00 (0-5)	1.00 (0-2, 4, 5)
Eat pre-made meals?[a]	0.00 (0, 2, 3)	1.00 (0-5)	0.00 (0-3, 5, 6)
Eat take-out?[a]	0.00 (0)	0.00 (0-6)	1.00 (0-5)
Skip meals?[a]	0.00 (0-3, 5)	0.00 (0-2, 4)	0.00 (0, 1, 6)

Note. The ranges represent the "times" per week that were selected at least once.
[a] Levy, J. & Auld, G. (2004). Cooking classes outperform cooking demonstrations for college sophomores. Journal of Nutrition Education Behavior; 36: 197-203.

Questionnaire Results. Participants reported a significant increase in self-efficacy for the majority of healthy food choices and cooking skills ($p < .05$). Greatest improvements in median self-efficacy were reported for the following cooking skills: steaming vegetables increased from a median of 2 to 4 ($p < .0001$), stir-frying vegetables increased from a median of 2 to 3.5 ($p = .001$), and baking fish increased from a median of 2 to 4 ($p = .001$). The full results appear in Table 3.5. There was not a significant difference in participants' meal planning median self-efficacy from pre to post intervention ($p = .400$).

Male and female participants did not differ in self-efficacy for most measures. However, males reported a significantly higher self-efficacy for selecting lean protein sources on the pre questionnaire, with a mean rank score of 14.12 compared to the female mean rank score of 7.72 ($p = .008$). Females reported a significantly higher self-efficacy for following recipes on the post questionnaire with a mean rank score of 14.00, compared to the male mean rank score of 9.77 ($p = .039$).

Table 3.5 Self-Efficacy for Healthful Food Choices and Food Preparation

Food Selection Questions[a] *(n* = 22) I feel confident selecting…	Pre Median	Post Median	*Z*	*P*
Foods to fuel performance	3.00	4.00	-2.53	.011
Lean protein sources	3.00	4.00	-2.50	.13
Whole grain foods	3.00	4.00	-2.97	.003
Fruits	3.50	4.00	-2.67	.008
Vegetables	3.00	4.00	-2.67	.008
Healthy fats	3.00	3.00	-3.13	.002
Fluids	4.00	4.00	-2.12	.34
Cooking Questions[a] (*n* = 22) I feel confident…				
Cooking	3.00	3.00	-3.50	.000
Scrambling eggs	3.00	4.00	-2.89	.004
Cooking quinoa	2.00	3.00	-2.27	.23
Cooking brown rice	2.00	3.00	-3.45	.001
Stir-frying[b]	2.00	3.50	-3.47	.001
Steaming vegetables	2.50	4.00	-3.58	.000
Baking fish	2.00	4.00	-3.19	.001
Using a microwave[b]	3.00	4.00	-2.89	.004
Using a kitchen knife[b]	3.00	4.00	-3.21	.001
I feel comfortable in the kitchen[b]	3.00	3.50	-3.50	.000
I feel comfortable following recipes[b]	3.00	4.00	-3.50	.000
I like to cook[b]	3.00	3.50	-3.13	.002
I feel confident planning my meals one day in advance	3.00	3.00	-3.13	.400

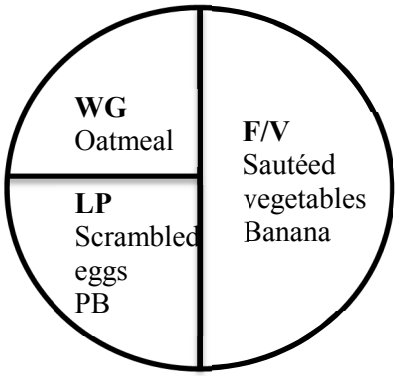
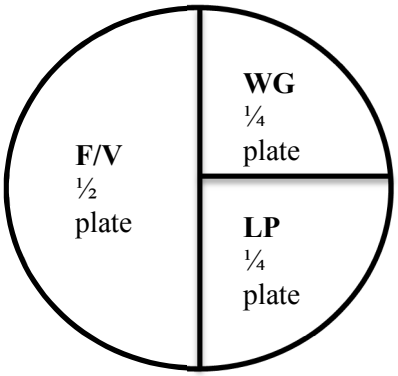
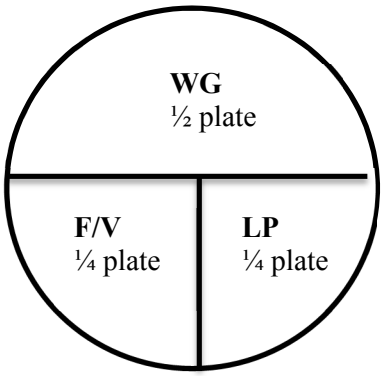
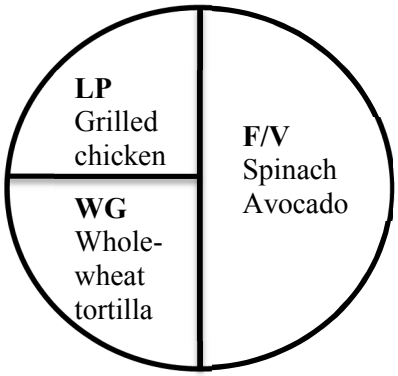
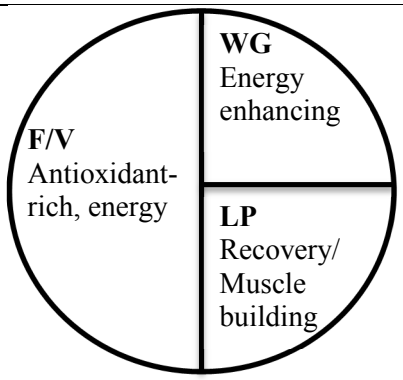
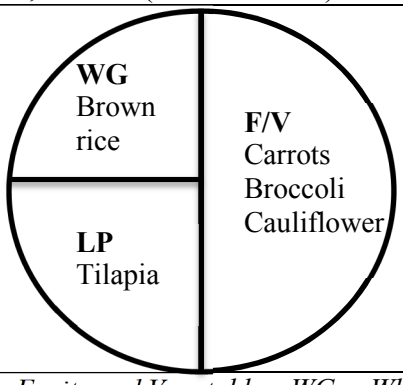
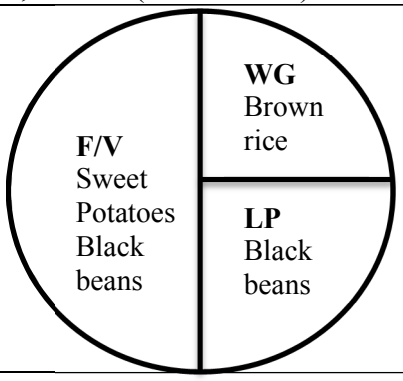
Note. Wilcoxon Test: Medians are derived from the 50th percentile and based off of total responses. Z scores are based on negative ranks

[a] All questions used a 4-point Likert-type scale: 1.00 (strongly disagree), 2.00 (disagree), 3.00 (agree), 4.00 (strongly agree).

[b] Levy, J. & Auld, G. (2004). Cooking classes outperform cooking demonstrations for college sophomores. Journal of Nutrition Education Behavior; 36: 197-203.

Review Activity Results. On Review Activity #1, all participants were able to identify each food item they made that day with a Performance Plate component. Participants also scored high on indicating the portions of the plate each food group should make up on a light versus hard training day. On review activity #2 participants were only asked to identify each food they made with a Performance Plate component and to identify the function of Performance Plate components, in which the scores were also high. On review activity #3 participants were also asked to identify each food they made in that workshop with the Performance Plate components and identify the functions of each component. For a summary of the review activity results, see Table 3.6. To view the original review activities, see Appendix E.

Table 3.6 Applications of Performance Plate Knowledge Results

<table>
<tr><th colspan="3">Review Activity #1 (n = 27)</th></tr>
<tr><td>Identify your Performance Plate Breakfast components. (100% correct)</td><td>Describe what a Performance Plate should look like for a light/off training day. (85% correct)</td><td>Describe what a Performance Plate should look like for a hard training day. (70% correct)</td></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><th colspan="3">Review Activity #2 (n = 25)</th></tr>
<tr><td colspan="2">Identify your Performance Plate lunch components. (96% correct)</td><td>Indicate the main function of each Performance Plate component. (84% correct)</td></tr>
<tr><td colspan="2"> 
</td><td> 
</td></tr>
<tr><th colspan="3">Review Activity #3 (n = 24)</th></tr>
<tr><td colspan="2">Identify your Performance Plate dinner components, Meal 1 (100% correct)</td><td>Identify your Performance Plate dinner components, Meal 2 (96% correct)</td></tr>
<tr><td colspan="2"> 
</td><td> 
</td></tr>
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Key: F/V = Fruits and Vegetables, WG = Whole grains, LP = Lean proteins

Participants' Workshop Feedback. Following the workshops, all participants (*n* = 22) indicated that they felt more comfortable cooking, would recommend this program to a friend, were interested in the topics covered, want to learn how to cook more foods, and in favor of including cooking workshops in Life Skills class in the future. Most reported (86%) that they plan to make the recipes again. The majority (40%) of participants indicated that the dinner workshop was the most useful, followed by breakfast (14%), lunch (9%), and snack (5%) workshops.

Thirty-percent of participants (*n* = 22) provided suggestions for future cooking workshops. Participants indicated that they wanted to gain more mastery experiences as evidenced by recommendations to cook more food, start earlier, and have the intervention last longer than 4 weeks. Additionally, three participants gave content requests. These requests included providing shape cutters for the energy bites, learning how to make smoothies, and focusing more on lunch and dinner foods.

Discussion

This study aimed to determine the effect of Social Cognitive Theory-based cooking workshops on collegiate student-athletes' self-efficacy for making healthful food choices and preparing food. Previous research has indicated specific factors that influence self-efficacy for food preparation and healthful food choices, including mastery experience, demonstration, and discussion (Abood et al., 2004; Bristow, 2010; Levy & Auld, 2004). This intervention provided participants with the opportunity to gain mastery experience in preparing a variety of foods, following instructor demonstrations and self-efficacy improved for the majority of healthy food choices and cooking skills. Greatest improvements were seen for the following cooking skills: steaming vegetables, stir-frying vegetables, and baking fish. Not only do these

findings show that participants became more confident in their skills, but they became more confident in new skills. In the future, these participants may be more likely to consume the foods prepared such as vegetables and fish, given they have been taught how to prepare these foods and gained confidence in doing so. Previous studies have reported that having self-efficacy to consume vegetables and prepare them is a predictor to behavior change (Shaikh et al., 2008). Providing exposure to foods and aiming to increase skills through interventions, may encourage behavior change (Abood et al., 2004; Doyle-lucas & Davy, 2011; Levy & Auld, 2004).

Participants did not indicate a change in their self-efficacy for meal planning from pre to post intervention (p = .400). This finding is not surprising because concepts regarding meal planning were not addressed in this intervention. As described previously, there were significant increases in those aspects that were specifically addressed in the intervention (self-efficacy for healthful food choices and food preparation).

In this intervention, hands-on experience included student-athletes preparing Performance Plates using real food. The Performance Plate concept can be taught alone, without using actual food. However, it was helpful to teach the concepts with real recipes. The recipes can be taught alone, without applying them to a nutrition concept, such as the Performance Plate. However, giving the recipes nutritional categories completed the goal of the intervention, which was to influence healthful dietary choices and food preparation. The visual Performance Plate guide contributes to choices student-athletes are expected to make outside of their kitchen such as at the cafeteria, or at a restaurant. No published research has reported student-athletes' self-efficacy, knowledge, or intake in relation to receiving education about the Performance Plate.

Athletes reported increased self-efficacy for making healthful food choices and preparing food following the intervention. The outcomes of this intervention demonstrate the potential benefits of implementing a hands-on cooking class designed specifically for student-athletes. Pre intervention data suggest that freshman student-athletes lack food preparation skills and the self-efficacy to prepare food. The services that are available to NCAA Division 1 student-athletes vary. Some schools provide their athletes with training tables and fueling stations, eliminating the responsibility of food preparation (Thomas, 2014). Other schools may provide fueling stations, but no training tables, therefore leaving athletes with the responsibility to get meals on their own (Thomas, 2014). Schools may not offer fueling stations or training tables, thus snacks and meals that athletes consume are independently bought and prepared. Specifically, the University of Idaho currently provides athletes with a fueling station, offering pre and post workout snacks, but a training table does not exist. Whether student-athletes have all of their meals provided throughout their collegiate career or no meals provided, food preparation skills are life skills that they can use following graduation (Ha & Caine-Bish, 2009). Habits created in the time span student-athletes are participating in collegiate athletics have the potential to affect them later in life (Ha & Caine-Bish, 2009). Thus it is extremely important to provide student-athletes with education regarding dietary choices and food preparation.

Limitations. The present study used a small, convenience sample (n = 22) from one university. The study was a single-group design and using a control group would have allowed us to address confounding variables. Using randomization would have provided evidence that the results of this study did not happen due to chance. The intervention in the current study was added to a university class; thus students were expected to attend even if

they did not participate in the study. Therefore, the results cannot be generalized to the entire collegiate student-athlete population. The questionnaire was self-reported, resulting in response errors or bias towards desirable responses. The majority of participants were living on campus, and had access to a cafeteria. Although self-efficacy for food preparation and healthful food choices improved, it is most applicable for student-athletes to apply their the food selection skills (the Performance Plate concept) in the dining hall, given they do not have the immediate responsibility to prepare food for themselves.

Finally, self-efficacy was the only construct measured within the study. Ideally, knowledge and behavior would be assessed as well, in order to get a full scope of the effectiveness of the intervention. Additionally, self-efficacy is an attitude, which may have been variable from day to day (Bernacki, Nokes-Malach, & Aleven, 2015). However, self-efficacy has been shown to be a predictor for behavior change and has been used as a primary target in multiple interventions aimed at the college population. Nevertheless, using this intervention for collegiate student-athletes was a novel approach, aiming to influence their self-efficacy for food preparation skills and ability to make healthful dietary choices.

Implications for Future Research and Practice

The improvements in self-efficacy among collegiate student-athletes highlight the potential benefit of providing hands-on cooking workshops. Acquiring self-efficacy for specific skills and behaviors may be a precursor to behavior change (Bandura, 2004). Cooking has been associated with healthier eating and nutritional skills among young adults (Larson, Perry, Story, & NeMark-Szainer, 2006). Hands-on cooking experiences in conjunction with nutrition education should continue to be assessed for effectiveness in the student-athlete population.

Replications of this intervention should consider increasing the number of workshops to increase kitchen experience and to allow for a wider variety and more in-depth content. Based on feedback from participants, emphasis was placed on each meal being healthy, easy, and quick. Future interventions targeting primarily freshman should place a focus on healthy, easy, and quick meals that can be prepared in a dorm room. This concept could be added as an additional workshop, replace the snack workshop, or be incorporated into the existing workshops. For example, for workshop 1, breakfast, a vegetable scramble on the stovetop was prepared. How to make this in the microwave could be taught as well.

The Performance Plate and basic cooking skills taught were well received in this intervention. However, future interventions should consider using a different approach for the nutrition education component. The Performance Plate model used in this study was based on an athletes' perceived training day load classified as either a light/off day or a hard training day. Other plate models specific to athletes may take into account a moderate training day as well. Each student-athlete has unique nutrient needs that vary from day to day; therefore using the Performance Plate method may cause confusion on portion sizes and how much of each food group they should be consuming throughout the day. Although the Performance Plate provides a visual of what balanced meals may look like, it fails to cover the complexity of an athlete's diet. Future cooking interventions can aim to take an individualized approach to nutrition education, giving student-athletes the tools to assess their unique needs and how to meet those needs with food. Another approach is narrowing the scope of the cooking intervention by focusing solely on cooking skills and recipes that are healthy and quick, while providing information on why each recipe and/or meal is nutritionally significant.

The SCT suggests that behavioral, personal, and environmental factors all influence each other to effect behavior change (Bandura, 1986). Future cooking interventions need to address all three factors: dietary intake and food preparation skills (behavioral), self-efficacy for food preparation and healthful dietary choices (personal), and barriers such as how to access grocery stores, how to shop effectively, kitchen equipment, time, and money (environmental). Future studies should use a randomized control trial and track student-athletes diets' before, during, and after the intervention in addition to assessing self-efficacy. Given that student-athletes typically move off campus after their freshman year, future interventions may consider targeting student-athletes living off-campus, teaching them how to prepare nutritious foods.

In this study, males indicated significantly higher self-efficacy for selecting lean protein sources on the pre questionnaire and females indicated significantly higher self-efficacy for following recipes on the post questionnaire. Future interventions may consider tailoring workshops for males and females separately. This intervention identified a need for further combined nutrition and cooking education, particularly for collegiate student-athletes. In addition to asking how this cooking intervention affects student-athlete dietary intake, the next cooking intervention for student-athletes may seek to describe and evaluate demographic factors such as ethnicity, social economic status, past cooking experience, and gender and the relation to cooking skills and diet behaviors. This will require a larger sample size and a randomized control trial.

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Appendix A: University of Idaho Institutional Review Board Approval Letter

To: Katie Brown

From: Jennifer Walker
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

Date: 8/10/2015 3:39:15 PM

Title: Student-Athlete Cooking Program: Examining Student-Athletes' Self-Efficacy for Cooking Skills and Making Healthy Food Choices

Project: 15-872

Certified: Certified as exempt under category 1,2 at 45 CFR 46.101(b)(1,2).

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the above-named research project has been certified as exempt under category 1,2 at 45 CFR 46.101(b)(1,2).

This study may be conducted according to the protocol described in the Application without further review by the IRB. As specific instruments are developed, modify the protocol and upload the instruments in the portal. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice.

It is important to note that certification of exemption is NOT approval by the IRB. Do not include the statement that the UI IRB has reviewed and approved the study for human subject participation. Remove all statements of IRB Approval and IRB contact information from study materials that will be disseminated to participants. Instead please indicate, 'The University of Idaho Institutional Review Board has Certified this project as Exempt.'

Certification of exemption is not to be construed as authorization to recruit participants or conduct research in schools or other institutions, including on Native Reserved lands or within Native Institutions, which have their own policies that require approvals before Human Subjects Research Projects can begin. This authorization must be obtained from the appropriate Tribal Government (or equivalent) and/or Institutional Administration. This may include independent review by a tribal or institutional IRB or equivalent. It is the investigator's responsibility to obtain all such necessary approvals and provide copies of these approvals to ORA, in order to allow the IRB to maintain current records.

As Principal Investigator, you are responsible for ensuring compliance with all applicable FERPA regulations, University of Idaho policies, state and federal regulations.

This certification is valid only for the study protocol as it was submitted to the ORA. Studies certified as Exempt are not subject to continuing review (this Certification does not expire). If any changes are made to the study protocol, you must submit the changes to the ORA for determination that the study remains Exempt before implementing the changes. Should there be significant changes in the protocol for this project, it will be necessary for you to submit an amendment to this protocol for review by the Committee using the Portal. If you have any additional questions about this process, please contact me through the portal's messaging system by clicking the 'Reply' button at either the top or bottom of this message.

Jennifer Walker

Appendix B: Pre- and Post-Intervention Questionnaires
Pre Questionnaire

(administered on Survey Monkey)

Healthful food choices self-efficacy.

1. Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident selecting foods to fuel sports performance	O	O	O	O
I feel confident selecting lean protein sources	O	O	O	O
I feel confident selecting whole grain foods	O	O	O	O
I feel confident selecting fruits	O	O	O	O
I feel confident selecting vegetables	O	O	O	O
I feel confident selecting healthy fats	O	O	O	O
I feel confident selecting fluids	O	O	O	O

Meal planning self-efficacy.

2. Please indicate how much you agree or disagree with the following statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident planning my meals and snacks one day in advance	O	O	O	O

Cooking self-efficacy.

3. Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident cooking	O	O	O	O
*I feel comfortable in the kitchen	O	O	O	O
*I like to cook	O	O	O	O
*I feel comfortable following recipes	O	O	O	O
*I feel confident using a kitchen knife	O	O	O	O
*I feel confident microwaving	O	O	O	O
I feel confident scrambling eggs	O	O	O	O

I feel confident cooking quinoa	O	O	O	O
I feel confident cooking brown rice	O	O	O	O
*I feel confident stir-frying	O	O	O	O
I feel confident steaming vegetables	O	O	O	O
I feel confident baking fish	O	O	O	O

4. *Have you ever taken a cooking class?
   - O Yes
   - O No

5. If you answered yes, please give details about the cooking class or classes you have taken.

6. Please describe any other cooking training or experiences you have had.

7. Do you typically eat your meals on-campus or off-campus?
   - O On-campus
   - O Off-campus

Eating patterns.

When answering questions 8-14 be sure that the total number of breakfasts, lunches, and dinners add up to 7.

8. How many times per week, on average, do you eat at Bob's?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

9. How many times per week, on average, do you replace a meal with items from the refuel station in the weight room (ex/ PB & J, milk, fruit, trail mix, bar, etc.)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

10. *How many times per week, on average, do you cook/prepare meals (cooking/preparing meals includes cereal, making sandwiches, and cooking from basic ingredients)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

11. *How many times per week, on average, do you eat pre-made meals (pre-made meals include frozen dinners, frozen pizzas, etc.)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

12. *How many times per week, on average, do you eat takeout?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

13. *How many times per week, on average, do you eat out?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

14. *How many times per week, on average, do you skip or don't eat?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

Demographics.

15. What is your first name?

16. What is your last name?

17. What is your sex?
    - O Female
    - O Male

18. What is your ethnicity? (Please select all that apply)
    - O American Indian or Alaskan Native
    - O Asian or Pacific Islander

- O Black or African American
- O Hispanic or Latino
- O White/Caucasian
- O Other
- O Prefer not to answer

19. What is your height? (Feet and inches)

20. What is your current weight in pounds?

21. What is your age in years?

22. Please indicate any special dietary needs including food intolerances and allergies.

23. Please select the sport or sports you play for the University of Idaho
    - O Basketball
    - O Cross Country
    - O Football
    - O Golf
    - O Soccer
    - O Swim and Dive
    - O Tennis
    - O Track and Field
    - O Volleyball

24. What is your major?

25. **Are you currently taking a college-level nutrition class?
    - O Yes
    - O No

26. **Have you taken a college-level nutrition class in the past?
    - O Yes
    - O No

27. What year in school are you?
    - O Freshman
    - O Sophomore
    - O Junior
    - O Senior

    Please specify if you are a redshirt, transfer, etc.

*Questions 3,4, 10-14 are from:
Levy, J. & Auld, G. (2004). Cooking classes outperform cooking demonstrations for college sophomores. Journal of Nutrition Education Behavior; 36: 197-203.
**Questions 25 & 26 are from:
Clifford, D., Anderson, J., Auld, G., Champ, J. (2008). Good Grubbin': Impact of a tv cooking show for college students living off campus. Journal of Nutrition Education and Behavior; 41(3) 194-200.

Post Questionnaire

(administered on hard paper copies)

Name (First and Last)_____

1. Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident selecting foods to fuel sports performance	O	O	O	O
I feel confident selecting lean protein sources	O	O	O	O
I feel confident selecting whole grain foods	O	O	O	O
I feel confident selecting fruits	O	O	O	O
I feel confident selecting vegetables	O	O	O	O
I feel confident selecting healthy fats	O	O	O	O
I feel confident selecting fluids	O	O	O	O

2. Please indicate how much you agree or disagree with the following statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident planning my meals and snacks one day in advance	O	O	O	O

3. *Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident cooking	O	O	O	O
*I feel comfortable in the kitchen	O	O	O	O
*I like to cook	O	O	O	O
*I feel comfortable following recipes	O	O	O	O
*I feel confident using a kitchen knife	O	O	O	O
*I feel confident microwaving	O	O	O	O
I feel confident scrambling eggs	O	O	O	O

I feel confident cooking quinoa	O	O	O	O
I feel confident cooking brown rice	O	O	O	O
*I feel confident stir-frying	O	O	O	O
I feel confident steaming vegetables	O	O	O	O
I feel confident baking fish	O	O	O	O

When answering questions 4-10 be sure that the total number of breakfasts, lunches, and dinners add up to 7.

4. How many times per week, on average, do you eat at Bob's?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

5. How many times per week, on average, do you replace a meal with items from the refuel station in the weight room (ex/ PB & J, milk, fruit, trail mix, bar, etc.)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

6. *How many times per week, on average, do you cook/prepare meals (cooking/preparing meals includes cereal, making sandwiches, and cooking from basic ingredients)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

7. *How many times per week, on average, do you eat pre-made meals (pre-made meals include frozen dinners, frozen pizzas, etc.)?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

8. *How many times per week, on average, do you eat takeout?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

9. *How many times per week, on average, do you eat out?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

10. *How many times per week, on average, do you skip or don't eat?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

11. After taking this class…

	Strongly Agree	Agree	Disagree	Strongly Disagree
**I feel more comfortable cooking	O	O	O	O
**I want to learn how to cook more foods	O	O	O	O
**I intend to make recipes learned in the classes	O	O	O	O
I think these cooking classes should be a part of the Life Skills course in the future	O	O	O	O
*I would recommend this class to my friends	O	O	O	O

12. *Rate your overall interest in the topics that were covered in the cooking classes.

O Very interested
O Somewhat interested
O Not very interested
O Not at all interested

13. **Please rate your overall enjoyment of the cooking workshops.

    O Enjoyed very much
    O Somewhat enjoyed
    O Didn't really enjoy
    O Didn't enjoy at all

14. *Which class was most useful?

15. *Which class was least useful?

16. Please share any suggestions you have for future cooking classes.

*3, 6-10, 11, 14, 15: Levy, J. & Auld, G. (2004). Cooking classes outperform cooking demonstrations for college sophomores. *Journal of Nutrition Education and Behavior;* 36: 197-203.
**11-13: Clifford, D., Anderson, j., Auld, G., & Champ, J. (2008). Good Grubbin': impact of a tv cooking show for college students living off campus. *Journal of Nutrition Education and Behavior;* 41(3) 194-200.

Appendix C: Pilot Questionnaire

(administered on Survey Monkey)

1. What is your first name?

2. What is your last name?

3. Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident selecting foods to fuel sports performance	O	O	O	O
I feel confident selecting lean protein sources	O	O	O	O
I feel confident selecting whole grain foods	O	O	O	O
I feel confident selecting fruits	O	O	O	O
I feel confident selecting vegetables	O	O	O	O
I feel confident selecting healthy fats	O	O	O	O
I feel confident selecting fluids	O	O	O	O

4. Please indicate how much you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I feel confident planning my meals and snacks one day in advance.	O	O	O	O
I feel confident cooking.	O	O	O	O
I feel confident scrambling eggs.	O	O	O	O
I feel confident cooking quinoa.	O	O	O	O
I feel confident cooking brown rice.	O	O	O	O
I feel confident baking fish.	O	O	O	O

5. Do you typically eat your meals on-campus or off-campus?

   O On-campus

   O Off-campus

6. How many times per week, on average, do you eat at Bob's?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

7. How many times per week, on average, do you replace a meal with snack items?

	0	1	2	3	4	5	6	7
Breakfast								
Lunch								
Dinner								

Appendix D: Letter of Information

UNIVERSITY OF IDAHO

Letter of Information Form

"Social Cognitive Theory-based Cooking Program for Student-Athletes' Healthful Food Choices and Food Preparation Self-Efficacy."

Dear Participant,

You are invited to participate in a survey that contributes to a study being conducted by Dr. Katie Brown and Master's Student Jenna Ellis. The self-efficacy that student-athletes have for cooking, making healthy meal choices, and meal planning is being investigated.

Although all students enrolled in Life Skills will complete this survey for credit, releasing your documents for this study is voluntary and you may choose to withdraw your information from the study at any time.

All information you provide is considered completely confidential. Data collected during this study will only be accessed by researchers associated with the study and the course instructor. There are minimal risks associated with this study. One potential risk is that you may feel mental discomfort in answering questions about your personal nutrition habits and cooking skills.

The Institutional Review Board at the University of Idaho has classified this research as exempt. If you have any comments or concerns please contact primary investigator, Dr. Katie Brown, or student investigator, Jenna Ellis.

Thank you for your assistance in this project.

Jenna Ellis, Graduate Student, School of Family and Consumer Science, University of Idaho

Katie Brown, PhD, RDN, LD, Assistant Professor of Foods and Nutrition, School of Family & Consumer Sciences, University of Idaho

Appendix E: Cooking Workshop Review Activities

Workshop 1 Review Activity

Name (First & Last)

_____

IDENTIFY YOUR PERFORMANCE PLATE BREAKFAST

1. Today's Breakfast: Today in class, you made scrambled eggs with veggies and peanut butter banana oatmeal. Indicate what each item is by selecting one of the following choices and write in the letter in the blank:

    a. Whole grains
    b. Fruit/vegetables
    c. Lean protein

    _____ Scrambled Eggs
    _____Sautéed vegetables
    _____Peanut butter
    _____Banana
    _____Oatmeal

2. Think about the performance plate model. On a light training day, how much of your plate should consist of whole grains, lean proteins, and fruits and vegetables? Fill in the blank, by selecting a. or b.

    _____Whole grains a. 1/4 plate
    _____Lean proteins b. ½ plate
    _____ Fruits/vegetables

3. Think about the performance plate model. On a hard training day, how much of your plate should consist of whole grains, lean proteins, and fruits and vegetables? Fill in the blank with the correct letter.

    _____Whole grains a. 1/4 plate
    _____Lean proteins b. ½ plate
    _____ Fruits/vegetables

Workshop 2 Review Activity

Name (First & Last)

_____

IDENTIFY YOUR PERFORMANCE PLATE LUNCH

4. Today's Lunch: Today in class, you made a grilled chicken wrap. Indicate what each item is by selecting one of the following choices and write the letter in the blank:

    a. Whole grain
    b. Fruit/vegetable
    c. Lean protein

    _____ Grilled chicken
    _____Spinach
    _____Dried cranberries
    _____Avocado
    _____Whole wheat tortilla

5. Think about the components of a performance plate. Indicate what the main function of each component is by putting the correct letter in the blank.

_____Whole grains	a. recovery/muscle-building
_____Lean proteins	b. energy enhancing
_____ Fruits/vegetables	c. antioxidant-rich, energy

Workshop 3 Review Activity

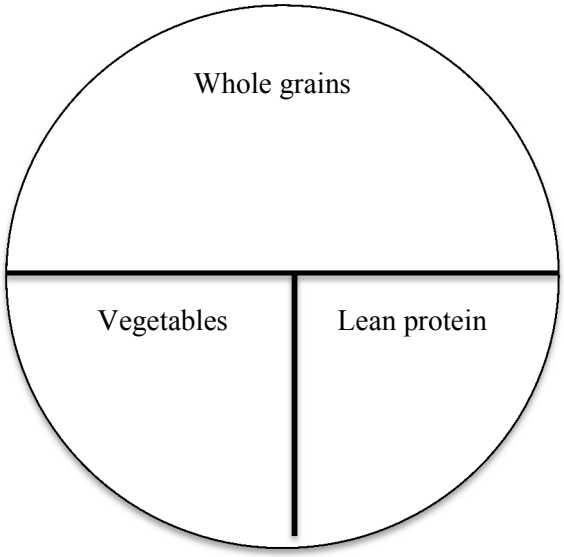
Name (First & Last)

_____

IDENTIFY YOUR PERFORMANCE PLATE DINNER

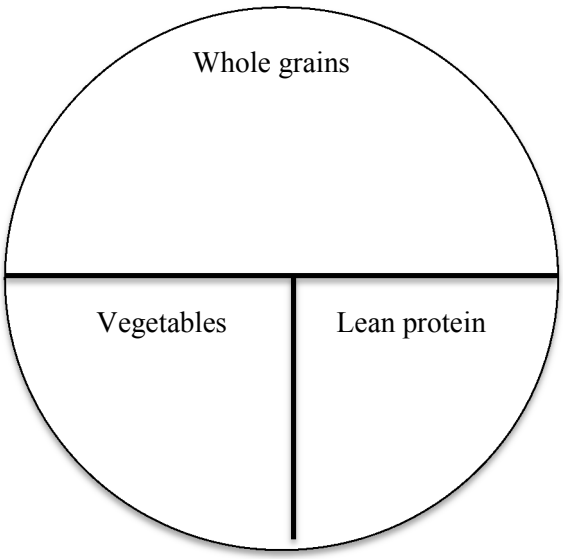
6. Today's dinner: Today in class, you made tilapia with rice and steamed vegetables. Indicate what part of the performance plate each food item would be, by filling in the performance plate sections with the correct letter.

    a. Tilapia
    b. Carrots, broccoli, & cauliflower
    c. Brown rice



7. Today's dinner: Today in class, you made a sweet potato black bean bowl. Indicate what part of the performance plate each food item would be, by filling in the performance plate sections with the correct letter.

    a. Sweet potatoes
    b. Black beans
    c. Brown rice



8. Think about the components of a performance plate. Indicate what the main function of each component is by putting the correct letter in the blank.

_____Whole grains	a. recovery/muscle-building
_____Lean proteins	b. energy enhancing
_____ Fruits/vegetables	c. antioxidant-rich, energy

Appendix F: Workshop Protocols

Lesson 1 Protocol

Students will arrive at Nichols food lab and be directed to put on a lab coat, wash their hands at the hand washing station, and go to assigned number station.

Introduction
Good morning, today we are making a performance plate breakfast. All of you have the ingredients to make meal one at your stations. Pay attention to the power point and front of the classroom for step-by-step instructions.

Meal 1: scrambled eggs and veggies

Performance plate: Getting vegetables throughout the day is essential. Adding vegetables to your eggs in the morning is an easy way to get a serving of vegetables. Vegetables are low-calorie and high in fiber, vitamins, and minerals.

Step 1: Vegetable prep. Place the onion on the cutting board with the flat part facing down. Put your left hand in a "claw" like position to keep fingers back away from the knife and grip the knife in your right hand like this (three fingers on the bolster and thumb and index on the blade). Avoid the center of the onion and cut down vertically. Then, turn the onion and make perpendicular cuts to produce cubes. Continue this process until the onion is diced.

Place the bell pepper on the cutting board with the rough inside facing up (knife can grip this side better). Cut the pepper into lengthwise strips and then dice these strips into cubes.

Place the mushrooms on the cutting board. Group a couple of mushrooms together at a time and cut into smaller pieces. Continue until all the mushrooms are chopped.

Step 2: Sauté veggies. At your stations, raise the fan for ventilation. This is done with the "up/down" button.

At the gas stations, turn on the burner by turning the knob to the left until it shows "medium-high" heat. At the induction stations, hold down the lock button until icon disappears. Then click "on," for the burner you intend to use and use the plus signs to increase the heat. Pour the pre-measured olive oil into the pan. Add the mushrooms, bell pepper, and onion. Sauté until the onions are transparent.

*Click "next" on slideshow

Performance plate: Eggs are a great source of lean protein. It is important to incorporate protein in your breakfast for muscle recovery and muscle building. Eggs are a quick option that will also leave you filling full.

Step 3: The eggs. Crack two eggs into a bowl. Whisk the eggs with a fork until small bubbles start to form. Add the eggs to the vegetables. Move around the skillet with a spatula as they start to set. Cook until eggs are set

Put the eggs on the three serving plates to sample within your group.

Garnish with salsa and cheese to your liking.

TURN OFF burner, lower ventilation fan

"Next" on slide show

STOP
Place all materials and excess food at the edge of your station.

"Next" on slide show

Performance Plate: Oatmeal is a whole grain that provides complex carbohydrates to fuel your body and brain. It is also a great source of fiber, which helps your digestive system. Complex carbs such as oatmeal and whole-grain toast will provide energy that lasts longer. Adding peanut butter adds healthy fats and protein and adding a banana is a good way to get a serving of fruit for the day, more energy, and many vitamins and minerals. The amount you eat for breakfast should depend on your training intensity and individual needs. On a lighter training day you may only need a bowl of oatmeal with peanut butter and fruit or just eggs and toast and on a harder training day, you may need both an egg scramble and oatmeal.

Meal 2: Peanut butter banana oatmeal

Step 1: Microwave oatmeal. Put the pre-measured 1-cup of oats into the glass bowl. Use a measuring cup to put approximately 1 and ¾ cup of water over the oats.

Stations 1-3 will go microwave their oats first. To microwave the oats, press "time-cook" then select 2:00 minutes. Have one person from your group keep an eye on them to make sure they do not overflow. Then groups 4-7 will go and then groups 8-10.

Step 2: After your oats are microwaved, stir in 2 tbsp. of peanut butter, which is pre-measured at your station. Cut up the banana and put it in the oatmeal and add cinnamon and milk if you desire. Sample the oatmeal that you made in your group.
"Next" on slide show

STOP
Look to front of classroom and listen for closing discussion.
Make sure to complete the meal evaluation handout and bring to the front of the classroom

Lesson 2 Protocol

Students will arrive at the Nichols food lab and be directed to put on a lab coat, wash their hands, and be assigned to a station.

Introduction
Good morning, today we are making a performance plate lunch. All of you have the ingredients to make the meals that I will be demonstrating, at your stations. Pay attention to the power point and the front of the classroom for step by step instructions.

Review what a performance plate is and give PowerPoint visuals.

Go to slide 7 (chicken prep)

Meal 1: Grilled chicken wraps

Performance plate: Grilled chicken wraps have all the key nutritional components for performance: whole grains, protein, and vegetables. The first item we are making is chicken, which is a lean protein source and quick and easy to prepare.

Step 1: Chicken prep. It is really important that all of you wash your hands again if you touch the raw chicken, to prevent cross-contamination. Raise the ventilation station at your station, using the ”up/down” button. Turn on a burner to “medium” heat and pour the olive oil on the pan. Place the chicken in the pan and coat in the olive oil. If you would like, coat both sides with salt and pepper.

Cook each side for 5 to 8 minutes. Only move the chicken breast to flip it to the other side.

You will know the chicken is done when the internal temperature is 165 degrees F. To check this, insert the meat thermometer into the center of the chicken breast.

When your chicken is finished cooking, TURN OFF that burner and set chicken on a clean cutting board to cut into strips.

*Click “next” on slideshow

Step 2: Assemble wrap. Place a whole grain tortilla on a clean plate and use the butter knife to spread avocado onto the wrap. Avocado is a source of “healthy fats” and vitamins and minerals. Add a handful of spinach to the tortilla, sprinkle on dried cranberries and the cut chicken strips. Lastly, drizzle on the dressing of your choice.

*To sample within your groups, roll it up and cut into circle pieces and stick toothpicks in the middle.

STOP
Place all materials and excess food at the edge of your station

“Next” on slideshow

Performance Plate: Quinoa is a complete protein, which means that it the nine essential amino acids that your body needs. Remember, our bodies need protein to function; specifically protein aids in muscle recovery. Additionally, quinoa provides carbohydrates, which give your body energy.

Meal 2: Mediterranean quinoa salad

Step 1: quinoa prep. Make sure the ventilation fans are still raised and turn on one burner to medium heat. Plat a small pot on the burner and add ½ cup of quinoa and 1 cup of water. Bring to a boil. You will know it is boiling when you see rapid bubbles.

Reduce the heat to low or simmer, which will be apparent when the bubbles slow down, and cover the pot. Cook for approximately 10 minutes or until all the water is absorbed. Keep an eye on the quinoa to make sure it doesn't burn.

When it is finished, you will empty it into a bowl to be mixed with the other ingredients.

Performance Plate: Adding vegetables to quinoa, or rice, is another great way to get a serving in throughout the day. Vegetables are an important part of the performance plate because not only are they high in fiber, which helps your digestive system, but they are also full of vitamins and minerals that help keep your immunity strong, and keep your body functioning properly.

Step 2: Vegetable prep. Now, you are going to prepare the vegetables to add to the quinoa. First, dice the cucumber. You will do this by setting the cucumber on the cutting board and keeping you left hand in a "claw" like or fingers back position and right hand gripping the knife. Start by cutting the cucumber into round slices and then cut it up into smaller pieces from there.

Peel the red onion, and place the flat part on the cutting board. Use the onion cutting skills you learned last week, to dice the onion. Remember, fingers back and you may have to turn the onion have you make lengthwise cuts to make perpendicular cuts.

Now that the vegetables are cut, add all the ingredients, including the tomatoes and olives, to one bowl. Mix in the quinoa and feta cheese.

TURN OFF burner and lower ventilation fan.

*The tomatoes and olives are from a can and all of these ingredients can be purchased at Winco or Wal-Mart.

STOP
Sample food, listen to class discussion

"Next" on slideshow

Clean Station: Paper and plastic spoons and forks can be thrown away in any of the trashcans. Bring your dishes to the dish washing station (have one side do this at a time to avoid chaos). Spray and wipe down your station.

Lesson 3 Protocol

Students will arrive at the Nichols food lab and be directed to put on a lab coat, wash their hands, and be assigned to a station.

Introduction
Good morning, today we are making a performance plate dinner. All of you have the ingredients to make the meals that I will be demonstrating, at your stations. Pay attention to the front of the classroom for step-by-step instructions.

Review what a performance plate is and give PowerPoint visuals.

Go to slide 6: Explanation of Tilapia with rice and vegetables, components of performance plate

Meal 1: Tilapia with rice and steamed vegetables

Performance plate: Tilapia is a great way to get lean protein. Per filet, there is approximately 20 grams of protein. It is a lean protein because it has little fat and is nutrient dense. Additionally, it provides B vitamins and vitamin D.

"Slide 7"

Step 1: Tilapia prep. It is really important that all of you wash your hands again if you touch the raw fish to prevent cross-contamination. Place the tilapia filet on the baking sheet, on top of the tin foil. The tin foil prevents the fish from sticking to the pan.

Squeeze lemon over the fish and drizzle a little bit of olive oil on top. Sprinkle it with garlic, parsley, and pepper.

Bake in the pre-heated oven (375 degrees) until the fish has reached an internal temperature of 145 degrees or is white and flakes when pulled apart.

"Slide 8"

Performance Plate: Brown rice is a nutrient-rich carbohydrate and makes up the whole grain component of the performance plate. It is an energy enhancing food and can be paired with almost any dinner item.

Step 2: brown rice preparation. Turn on the ventilation fans by pressing the "up/down" button. Turn on a burner to high heat and bring 1 cup of water to a boil. Stir in the 1 cup of rice and boil and then reduce heat to low, cover the pot, and let it simmer for 5 minutes.

*Once the rice has finished, put half of it in a bowl to use in meal 2.
"Slide 9"

Performance plate: The steamed vegetables, carrots, broccoli, and cauliflower are an essential part of the performance plate. They are nutrient-dense, meaning that they provide an array of vitamins and minerals to keep your body functioning properly.

Step 3: steamed vegetable prep. Place broccoli on a cutting board and chop into smaller pieces. Remember to use the knife safety and cutting techniques we have reviews (fingers back in a claw-like

position). Place one large carrot on cutting board and cut it into ½ inch "coins." Do this by making perpendicular cuts along the carrot. The cauliflower was prepared ahead of time.

Add 1 inch of water to a microwavable bowl. Add all the cut vegetables to the microwavable bowl and cover with a lid. Place in the microwave for 5 minutes.
Vegetables are done when they are tender. Toss vegetables with a little bit of olive oil or butter and lime and serve them by themselves or with the rice.

*Note that frozen, pre-cut vegetables can be purchased at any grocery store and prepared the same way.

* Divide the fish, vegetables, and rice within your groups by using the paper plates and forks.

"slide 10": Visual performance plate review

"slide 11"

STOP
Place all materials and excess food at the edge of your station

"slide 12": Explanation of sweet potato and black bean bowl components of a performance plate

Meal 2: Sweet potato and black bean bowl

Performance plate: sweet potatoes are a starchy vegetable, which means that they are rich in carbohydrates, which provide energy. They are nutrient dense, providing vitamins and minerals such as vitamin a, b, and magnesium. Black beans are a lean protein source because they are low in fat and nutrient dense. Per 1 cup of black beans there is about 40 grams of protein.

"slide 13"

Step 1: sweet potato prep. The skin is edible, but within your groups you can choose to use a potato peeler if you do not want the skin. The potato at your station has been washed and dried. Place the potato on the cutting board and cut it in half. Now place the flat part on the cutting board and slice it. Once you have slices, make "french fries," and then cut these into cubes.

Turn a burner on to medium heat and add the diced sweet potatoes to the skillet and toss them with olive oil, paprika, and a little bit of salt. Cover the skillet and cook until the potatoes become more tender (about 10 minutes). Once the potatoes are softer, add the black beans, cumin, chili powder, and lime juice to the skillet. Cook until the beans are heated.

"slide 14": assemble all ingredients

Step 2: rice. Add the sweet potatoes and black beans to the rice that you set aside from meal 1.

Step 3: additional garnishes. Additional items that make this meal more complete, include avocado, salsa, plain nonfat Greek yogurt (sour cream replacement), and chopped cilantro. As a group, add as much of these items as preferred.

TURN OFF burner and lower ventilation fan.

“Slide 15”: Performance plate visual

“Slide 16”

STOP
Sample food, listen to class discussion

Clean Station: Paper and plastic spoons and forks can be thrown away in any of the trashcans. Bring your dishes to the dish washing station (have one side do this at a time to avoid chaos). Spray and wipe down your station.

Lesson 4 Protocol

Students will arrive at the Nichols food lab and be directed to put on a lab coat, wash their hands, and be assigned to a station.

Introduction
Good morning, today we are making no bake energy bites and peanut butter banana sandwiches. All of you have the ingredients to make both of these snack items at your station. Pay attention to the front of the classroom for step-by-step instructions.

The past three weeks, we have been discussing the performance plate idea and emphasizing how important it is to make sure as athletes, that you consume lean proteins, whole grains, and fruits and vegetables not only daily, but at each meal time.

Slide show
"Slide 2"
Recap on last weeks lesson, dinner.
Tilapia (lean protein) with steamed vegetables and brown rice (whole grains).

"Slide 3"
Sweet potato (vegetable) and black bean (lean protein) bowl with additional garnishes; Greek yogurt (protein), avocado (vegetable), cilantro, and salsa

Ask class for feedback and if they have any questions.

"Slide 4"
Objectives:
- Students will make no bake energy bites
- Students will make peanut butter banana sandwiches
- Students will identify what snacks the refuel station provides

"Slide 5"
Snack 1: No-bake energy bites

No-bake energy bites have 3 major components; oatmeal, peanut butter, and ground flax. They also have coconut flakes, chocolate chips, and honey. Oatmeal is a whole grain, which provides energy and nutrients, peanut butter is a protein, which will aid in muscle recovery, and ground flax is a fiber that aids in digestion. Because of the fiber and protein, these are recommended to be consumed after a workout.

"Slide 6 "

No-bake energy bites directions:

First, you will add oatmeal, coconut flakes, and ground flax seed to the bowl. Mix all of this together with a spoon. Then, you will add peanut butter, chocolate chips, craisins, honey, and vanilla extract and mix all the ingredients together with your hands. Then roll into bite size balls and place in the refrigerator to cool.

*Important to tell students that measurements do not have to be exact. They can eye ingredients and add more or less of something to make it the consistency they want. Adding more peanut butter and honey will make the balls stick together more firmly.

Students do this as a group at their stations.

"Slide 7"

Snack 2: Peanut butter banana sandwich

A peanut butter banana sandwiches is a great snack to have a couple of hours before a workout or practice or after. The peanut butter provides protein and healthy fats, the whole-grain bread provides fiber, the banana adds energy and nutrients, and the honey gives the sandwich a sweet flavor.

"Slide 8"
Sandwich directions:

Place both of the slices of bread on the cutting board or a clean plate. Spread peanut butter on both pieces of bread. Slice the banana into small slices and place on one piece of bread. Put the two pieces of bread together and enjoy.

Students do this individually at their stations.

After sandwich prep, remove no-bake energy bites from fridge and taste test.

STOP

Discussion

"Slide 10"
Discussion about the refuel station

Location: Weight Room by the offices
When: Whenever the weight room is open
Purpose: to provide foods that refuel athletes after working out or give them fuel before working out

"Slide 11"
Ask: what is offered at the refuel station?
Discussion

- Fruit: apples, oranges, bananas
- Trail mix
- Bars
- Pb and honey/J sandwiches
- Milk
- Protein Shakes
- Carrots

"Slide 12"

Fuel

- The body is building muscle and recovering 24 hours a day
- **Pre-workout snacks:** 30-60 minutes before workout
- Give your body the fuel to power through workout or practice
- Carbohydrates
- Stay away from foods high in fat, protein, and fiber before workout

"Slide 13"

Refuel

- **Post-workout**: need to restore energy and rebuild muscle
- Consume a snack within 30 minutes after exercise
- Consume a meal within 2 hours after exercise
- Carbohydrates and Protein

"Slide 14"

Take paper questionnaire

- By yourself
- Pick ONE answer per question
- Fill in circles all the way
- Use the pens provided at stations
- Bring to front of classroom when done

**Clean Station: Paper and plastic spoons and forks can be thrown away in any of the trashcans. Take sandwiches to go if want

Appendix G: Workshop Power Points

Workshop 1: Breakfast

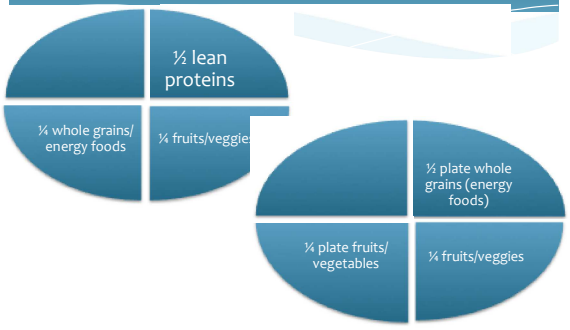
Life Skills

Breakfast

Objectives

* Students will practice creating a "performance plate" breakfast after watching a demonstration; scrambled eggs with veggies and peanut butter banana oatmeal
* Students will show their understanding of the "performance plate" by completing a meal evaluation worksheet during class

Performance Plates



Today's Breakfast

Veggie Scramble

PB Banana Oatmeal

1. Vegetable Prep (on cutting board)

- onion: flat part facing down. Dice
- bell pepper: rough part facing up , cut lengthwise then cut strips into cubes
- mushrooms: group together, dice

2. Sauté Veggies (in skillet)

- Raise fan (up/down button)
- Turn on burner, pour olive oil in pan
- Add all veggies to pan
- Sauté until onions are transparent

3. Add eggs

- Crack two eggs into a bowl
- Whisk eggs with a fork
- Add eggs to vegetables
- Cook until eggs are set
- Transfer to serving plate
- Garnish with salsa and cheese

TURN OFF BURNER, LOWER FAN

Move all materials to end of station

1.Microwave Oatmeal

- 1 cup (pre-measured) oats into glass bowl
- 1 ¾ cup water over oats in bowl
- Microwave ~2 minutes (watch for overflow)

2. Add pb, banana, milk, and cinnamon

- Stir in 2 tbsp. pb. (pre-measured) with oats
- Cut banana and add to oats
- Add milk and cinnamon to liking (front of class)
- Sample in bowls within group

Look to front of classroom and listen to closing discussion

Complete assessment and bring to the front

Workshop 2: Lunch

Life Skills

Lunch

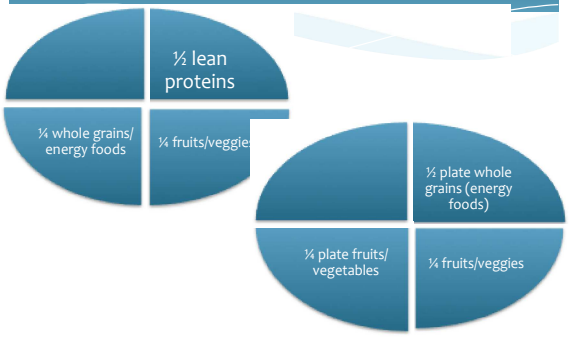
Objectives

* Students will practice creating a "performance plate" lunch after watching a demonstration; grilled chicken wraps and Mediterranean quinoa salad.
* Students will show their understanding of the "performance plate" by completing a meal evaluation worksheet during class

Performance Plate

1. Whole grains/energy enhancing foods
2. Lean proteins/muscle-building foods
3. Fruits and vegetables/antioxidant-rich foodsi
4. Fat, immunity/flavor-boosting foods
5. flud /hydration promoting beverages

Performance Plates



Today's Lunch

Grilled Chicken wraps

* Lean protein
* Whole grains
* Vegetables

Mediterranean quinoa salad

* Lean protein
* Whole grains
* Vegetables

Hard vs. Light training days

Pre-season, in-season, Hard training days

Calorie and carbohydrate needs

Off-season, lighter training days

Reduced calorie and carbohydrate intake

1. Chicken Prep

- Raise fan (up/down button)
- Turn on burner to medium, pour olive oil in pan
- Place chicken in pan and coat both side in olive oil
- Salt and pepper both sides (optional)
- Cook 5-8 minutes EACH side
- Done when internal temp is 165 degrees
- Lay on cutting board and cut into strips

2. Assemble wrap

- Place tortilla on plate
- Spread avocado onto tortilla
- Add a handful of spinach
- Sprinkle on dried cranberries
- Add cut chicken
- Drizzle on a light amount of dressing
- Roll tortilla up!

Move all materials to end of station

1. Quinoa Prep

- Place pot on cooktop and turn on to medium heat.
- Add 1/4 cup of quinoa and 1//2 cup of water. Bring to a boil (rapid bubbles)
- Reduce heat to a simmer (slow bubbles) and cover quinoa. Cook approximately 10 minutes, or until all water is absorbed
- Remove from heat and let sit for 2-3 minutes then dump quinoa into small bowl

2. Vegetable Prep

- Dice cucumber, add to mixture bowl
- Peel onion, dice, add to mixture bowl
- Add tomatoes and olives to mixture bowl
- add feta cheese to mixture

Sample food, listen to class discussion

CLEAN STATION

* Paper and plastic- throw in garbage can
* Bring dishes to dish wash sink
* Spray and wipe down

Complete assessment and bring to the front

Workshop 3: Dinner

Life Skills

Dinner

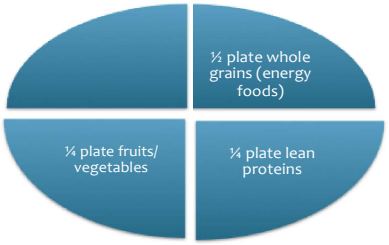
Objectives

* Students will practice creating a "performance plate" dinner after watching a demonstration; Tilapia with brown rice and vegetables and a sweet potato and black bean bowl.
* Students will show their understanding of the "performance plate" by completing a meal evaluation worksheet during class.

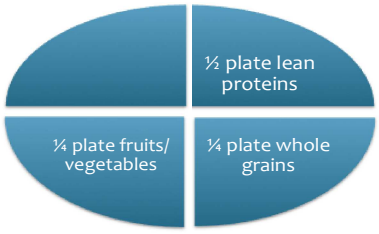
Performance Plate

1. Whole grains/energy enhancing foods
2. Lean proteins/muscle-building foods
3. Fruits and vegetables/antioxidant-rich foodsi
4. Fat, immunity/flavor-boosting foods
5. flud /hydration promoting beverages

Hard training day dinner



Light training day dinner



Today: Tilapia with steamed vegetables and Rice

* 1 Tilapia fillet (PROTEIN)
* 1 cup Steamed Vegetables (VEGETABLES)
* 1 cup Brown Rice (GRAINS)

1. Tilapia prep

- Preheat oven to 375 degrees (done already)
- Put tilapia on tinfoil on baking sheet
- Coat with lemon, olive oil, and parsley
- Place in preheated oven and set timer to 25 minutes
- After 25 minutes, check to see if internal temp is **145** degrees

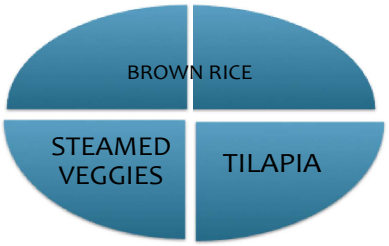
2. Rice Prep

- Turn on burner to high heat
- Bring 1 cup of water to a boil
- Add 1 cup of rice
- Reduce to low, cover, and simmer for five minutes
- Put half of the rice in a separate bowl for meal 2

3. Veggie prep

- Place broccoli on cutting board and chop into smaller pieces
- Place carrot on cutting board and chop into "coins"
- Cauliflower has been pre-chopped
- Add a 1-inch layer of water to the glass bowl, then add ALL vegetables and cover with lid.
- Steam in microwave for 5 minutes

Today's performance plate



Move all materials to end of station

Today: Sweet potato and black bean bowl

* ½ cup Black Beans (PROTEIN)
* ½ Sweet Potato (VEGETABLE)
* 1 cup Brown Rice (GRAINS)
* Low-fat Greek yogurt (DAIRY)

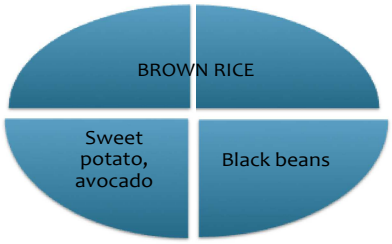
1. Sweet potato prep

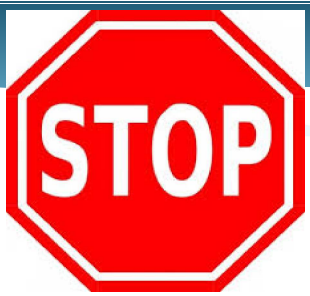
- Place on cutting board and cut in half
- Cut into slices, then "french fries" and then into cubes
- Turn on burner to medium heat
- Put sweet potatoes in and coat with olive oil and paprika
- Cover, cook until tender
- Add black beans, cumin, chili powder, and lime juice and cook until heated

2. Assemble

- Add sweet potato/black beans to bowl of rice
- Add additional garnishes; avocado, salsa, Greek yogurt, cilantro

Today's performance plate (bowl)





Sample food, listen to class discussion

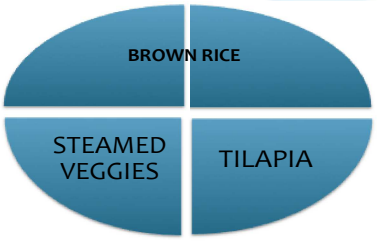
Please complete assessment and bring to front of class

Workshop 4: Snacks

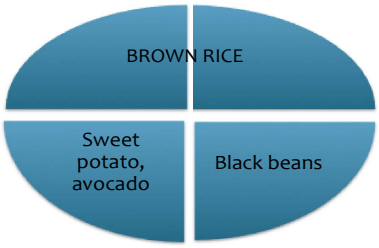
Life Skills

Snacks

RECAP (Dinner)



RECAP (dinner)



Objectives

* Students will make no bake energy bites
* Students will make peanut butter banana sandwiches
* Students will identify what snacks the refuel station provides

No bake energy bites

1. Add oatmeal, coconut flakes, and ground flax seed to the bowl and mix with spoon
2. Then add peanut butter, chocolate chips, honey, and vanilla extract. Combine all ingredients together with hands until well combined
3. Roll into bite size balls with hands
4. Refrigerate

No bake Energy Bites

OATMEAL: whole grain (energy)

PEANUT BUTTER: Protein

FLAX: Fiber

PB Banana Sandwich

PEANUT BUTTER: protein

WHEAT BREAD: whole grain (energy)

BANANA: fruit

HONEY: taste, energy

PB Banana Sandwich

1. Place both slices of bread on cutting board surface or clean plate.
2. Spread half of the peanut butter evenly onto one slice of bread and the other half of peanut butter on the other piece of bread using the knife.
3. Cut the banana into small slices.
4. Place 4-5 slices on one piece of the bread.
5. Drizzle on honey

Refuel Station

Location: Weight Room by the offices

When: Whenever the weight room is open

Purpose: to provide foods that refuel athletes after working out or give them fuel before working out

What does the refuel station provide?

FUEL

* The body is building muscle and recovering 24 hours a day
* **Pre-workout snacks:** 30-60 minutes before workout
* Give your body the fuel to power through workout or practice
* Carbohydrates
* Stay away from foods high in fat, protein, and fiber before workout

REFUEL

* **Post-workout:** need to restore energy and rebuild muscle
* Consume a snack within 30 minutes after exercise
* Consume a meal within 2 hours after exercise
* Carbohydrates and Protein

Questionnaire

* Take it by yourself
* Pick ONE answer per question
* FILL THE CIRCLES IN ALL THE WAY
* Bring to front of classroom when you are done ☺