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Abstract

Objectives: The purpose of this study is to examine the impact of a sports nutrition counseling experiential learning opportunity on self-efficacy and nutrition counseling skills in the undergraduate dietetic students and dietary goal adherence in collegiate athlete clients after receiving the student-led nutrition counseling intervention. Methods: This mixed methods design, using a thematic analysis and pre- and post-testing, was implemented at a mid-sized university in the Midwestern United States. There were fifteen undergraduate dietetic students and nine collegiate athletes. Results: Counseling confidence in the dietetic students improved significantly from session one to session three ($p < 0.001$). Conclusions and Implications: Similar programs can be implemented in undergraduate dietetic programs within the academic setting to provide a valuable nutrition resource for collegiate athletes and experience for dietetic students. Examining the program with a larger population can allow for analysis of a causal relationship between the intervention and measured outcomes.

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ABSTRACT

Objectives: The purpose of this study is to examine the impact of a sports nutrition counseling experiential learning opportunity on self-efficacy and nutrition counseling skills in the undergraduate dietetic students and dietary goal adherence in collegiate athlete clients after receiving the student-led nutrition counseling intervention. **Methods:** This mixed methods design, using a thematic analysis and pre- and post-testing, was implemented at a mid-sized university in the Midwestern United States. There were fifteen undergraduate dietetic students and nine collegiate athletes. **Results:** Counseling confidence in the dietetic students improved significantly from session one to session three ($p < 0.001$). **Conclusions and Implications:** Similar programs can be implemented in undergraduate dietetic programs within the academic setting to provide a valuable nutrition resource for collegiate athletes and experience for dietetic students. Examining the program with a larger population can allow for analysis of a causal relationship between the intervention and measured outcomes.

Keywords: dietetic student, sports nutrition counseling, experiential learning, counseling, goal-adherence

INTRODUCTION

Athletes' nutrition needs are highly individualized and are influenced by the athlete's sport, position, schedule, age, and gender. Sports nutrition is growing at a rapid pace which has led to the evolution of registered sports dietitians.[1] Gibson found that sports dietitians felt unprepared for the specialized field which resulted in seeking training beyond their undergraduate and internship experiences.[2] In order to become a registered sports dietitian, it requires specialization that is often not provided in undergraduate courses or internship experiences. Currently, specialization occurs by a self-guided certification provided by the Academy of Nutrition and Dietetics or another organization such as the International Society for Sports Nutrition to obtain additional credentials such as a Certified Specialist in Sport Dietetics (CSSD).[3] Improved career development pathways and formal education routes may support a sports dietitian's ability to move from a competent Registered Dietitian Nutritionist (RDN) in Sports and Human Performance (SHP) to an expert RDN. By following the standards of practice, this allows sports dietitians to properly educate and inform athletes on proper nutritional recommendations.[2,3]

Registered dietitians can choose to implement and lead a nutrition education program specifically directed for collegiate athletes who may have limited nutrition-related educational resources available.[2] Using comprehensive methods and an interdisciplinary approach, a targeted sports nutrition program can guide collegiate athletes to attaining their nutrition-related goals and potentially enhancing athletic performance.[4-8] The comprehensive approach includes a multilevel strategy that involves implementing nutrition education, monitoring, and opportunities; whereas an interdisciplinary approach utilizes multiple team members such as dietitians, students, athletic trainers, coaches, and the athlete.[8] Comprehensive methods and an interdisciplinary approach could be beneficial for nutrition education programs.[5,7,8] A partnership between coaches, a sports dietitian, athlete trainers and the athletes is important for the sustainability of a sports nutrition program.[7,8]

For universities that do not employ sports dietitians, engaging the dietetics program at the university to support sport-specific nutrition for athletes may create a win-win opportunity. It can create experiential-learning opportunities for dietetic students and provide a service to the athletes. Experiential-learning opportunities have shown to enhance the dietetic students' knowledge, confidence, and skills for nutrition counseling and interventions by maximizing exposure of learning.[9] Chen utilized a real-life "adopt-a-patient" approach with dietetic students and found an increase in the perception of learning, confidence in completing a nutrition assessment, and enhancement in critical thinking skills.[10] Undergraduate students who have the opportunity to work in an environment that provides an experiential-learning experience can be an effective training model that improves their knowledge of sports nutrition counseling.[9,10]

Developing these opportunities may not only impact the dietetic student but also provides an opportunity for an athlete to receive nutrition services not otherwise available. This is important to consider as adequate dietary intake is strongly linked to enhanced athletic performance.[11] Meeting dietary needs for collegiate athletes can be difficult due inadequate proper nutrition education, living situations, and busy schedules. In female volleyball players, Kieckhaefer et al found nutrition-related counseling increased adherence to energy and macronutrient goals to promote optimal athletic performance.[11]

With the lack of specific sport nutrition undergraduate programs and sports dietitians employed by universities, an interdisciplinary program utilizing dietitians, dietetic students, and collegiate athletes could benefit both dietetic student learning and athlete performance. Therefore, the aim of this study was to examine the impact of a sports nutrition counseling experiential-learning opportunity on self-efficacy, defined as a student's confidence in providing sport nutrition counseling, and actual counseling skills in undergraduate dietetic students and resulting dietary goal adherence in collegiate athlete clients. A reported measures design was utilized to explore student and athlete perceptions of the program. Further, using a pre- and post-test approach, changes in counseling confidence in the students and athlete nutrition goal adherence could be determined quantitatively to evaluate program impact.

METHODS

Overview of Study Design

This research is a mixed methods design using thematic analysis and a pre- and post-test repeated measures design to examine counseling confidence and perception of the learning experience in dietetic students as well as goal adherence and attendance in athletes. This study was approved by the Institutional Review Board at the University of Daytona.

Participants

The undergraduate dietetic students and University athletes were recruited through convenience sampling methods and were a part of the on-campus Sports Nutrition and Wellness Club (SNWC) and University athletics. All fifteen undergraduate dietetics student members of the SNWC participated in this study. The SNWC has two licensed RDNs that work with the dietetic club members. The athlete participants were recruited from various club athletic teams at the university including varsity rowing, club

gymnastics, club powerlifting, and the club baseball team. There were 18 athletes who participated in a fitness assessment clinic at the University, and all were asked to participate in the sport nutrition intervention. Of the 18 athletes asked, nine agreed to participate. All participants were from a mid-sized private university in the Midwestern United States. Informed consent was provided and signed by all subjects who participated in this study. All aspects of this study were conducted via Zoom due to the Coronavirus-19 pandemic.

Procedures

The initial data collection occurred from March 2021 to May 2021, and the secondary data collection occurred from May 2021 to July 2021. Data collection occurred in two phases, and the delivery of nutrition counseling sessions occurred in the same manner. Approximately two weeks separated each of the three counseling sessions. The dietetic students were placed into groups consisting of one group lead, who was a dietetic upperclassman, and two other dietetic students, who were either a dietetic underclassman or someone who had recently join the club. The dietetic students remained with the same participant throughout all three sessions. The nutrition counseling sessions consisted of three sessions conducted by two to three dietetic students, a registered dietitian nutritionist (RDN), and the primary investigator for licensure purposes. The dietetic students were previously trained on sports nutrition and were educated on proper counseling skills, rooted in motivational interviewing, for approximately three to four hours prior to meeting with any participant. This training was provided by a RDN who supervises the SNWC. This education included practice problems on how to calculate sports tailored nutritional requirements, training on the Nutrition Data System for Research (NDSR) on how to analyze food record findings, and a session discussing motivational interviewing skills to acquire proper counseling techniques that support client self-efficacy building.

Session one consisted of a 30-minute meeting to delineate the structure of future sessions including a brief interview of targets for these meetings and paperwork for the client to log three days of their activity and diet. The dietetic students explained how to record the athlete's intake on the three-day food and activity record along with discussion regarding goals to obtain from the nutrition counseling sessions. Prior to Session two, the undergraduate dietetic students met with one of the RDNs to discuss findings from the diet analysis and nutrition calculations. During this meeting, the RDN and dietetic student's discussed Session two information that needed to be shared with the athlete to create an appropriate intervention. Session two consisted of a 30 to 45 minute session to discuss the findings from the nutrient analysis of the three-day food and activity record. The dietetic students provided and discussed results from the three-day food and activity logs analysis and the relationship with the athlete's initial goals. The dietetic students collaborated with the athlete and created one to three nutrition-related goals. Session three consisted of a 30-minute follow-up meeting with the athlete to review the goals, discuss goal achievement, discuss if additional goals were warranted, and identified the barriers/successes from their goal adherence.

Instruments

First, a pre- and post-test consisting of six closed ended questions via a Likert-type scale was provided to the undergraduate dietetic students to measure their counseling confidence before and after delivering nutrition counseling sessions. A higher score indicated higher confidence. The minimum score was zero and the maximum score was 18. Second, a dietetic student evaluation scoring sheet consisting of three closed ended questions was completed by a faculty advisor and the primary investigator. This evaluation measured the performance of the nutrition care process for each undergraduate dietetic student after session two and three. A higher score indicated greater performance. The minimum score was one and the maximum score was three. Third, a reflection writing prompt consisting of eight open-ended questions and four closed-ended questions was provided to the undergraduate dietetic students in order to gain insight from their learning experience. Finally, the primary investigator administered semi-structured interviews with each athlete who participated in the sessions. The semi-structured interview guide consisted of five open-ended questions regarding goal adherence and three open-ended questions regarding attendance.

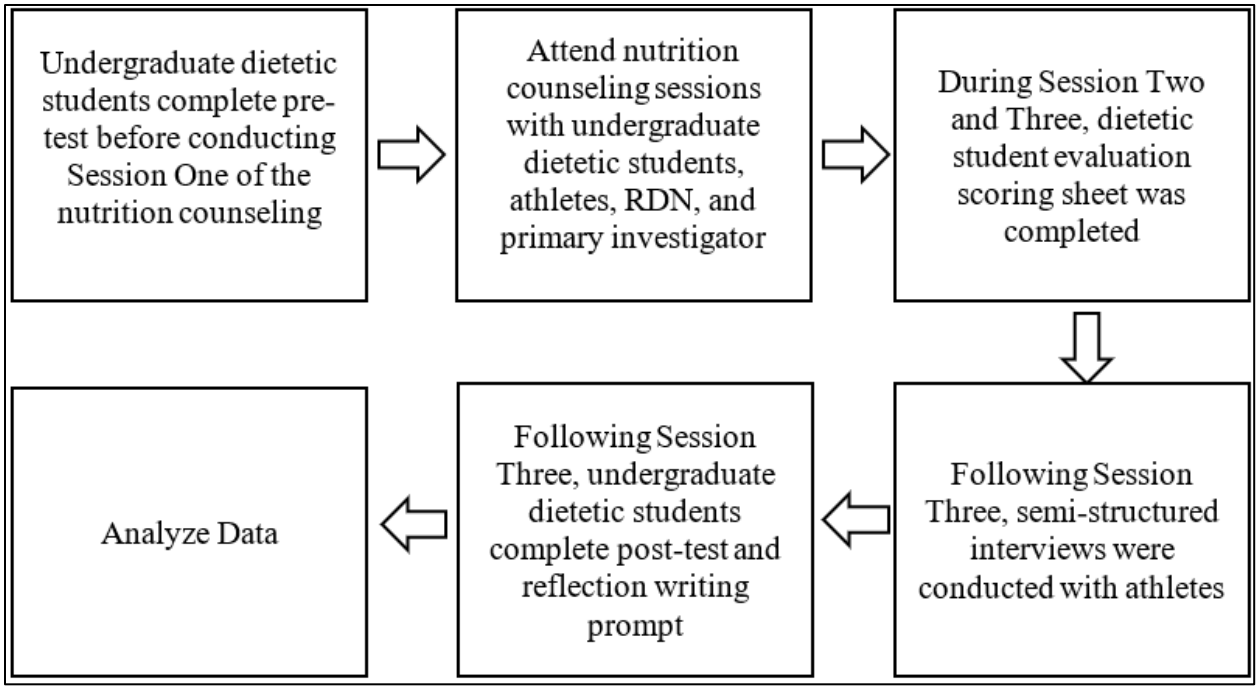

Figure: Overview of Research Instruments

Data and Statistical Analysis

All semi-structured interviews that explored factors associated with goal adherence and attendance of the athletes were transcribed using line-by-line coding and then axial coding to identify core themes related to the different barriers and motivators of goal adherence and attendance. A document analysis was performed on the journal entries obtained from the dietetic students to give meaning to the reflection experience of the experiential-learning-component. A pre- and post-descriptive analysis and a paired sample *t*-test were used to evaluate the counseling confidence of the undergraduate dietetic students. To obtain sufficient statistical power using $\alpha = .70$; $\beta = .80$; $p<.05$ for sample size estimation, 15 students were needed. Finally, a descriptive analysis was used to measure the dietetic student evaluation score.

RESULTS

Of the dietetic students in the SNWC, four students were in the SNWC for one year, eight students were in the SNWC for two years, and three students were in the SNWC for three years. Of the athletes who participated in the SNWC, five athletes were on the rowing team, two athletes were in the powerlifting club, one athlete was in club baseball, and one in club gymnastics.

Counseling Confidence in Dietetic Students

A paired sample t-test was conducted to compare the counseling confidence before and after delivering nutrition education sessions to the athletes. Counseling confidence scores increased significantly from pre-test (M=9.80, SD=3.00) to post-test (M=12.87, SD=1.85; t(14)=-5.602, $p < 0.001$). These results suggest that utilizing the nutrition education sessions improved the counseling confidence in the dietetic students from before to after implementation.

Dietetic Student Evaluation Scoring from The Nutrition Counseling Sessions

Table 1 provides the outcomes for the dietetic student evaluation scores designated to specific grade levels. The results showed a wide variety of skill level amongst the fifteen dietetic students that participated in the SNWC.

Table. Frequency Table for Dietetic Student Evaluation Scoring

	Not Met	Progressing	Met
Competency 1: Did the students apply motivational interviewing appropriately?			
Freshman	**3**	**0**	**0**
Sophomore	**2**	**1**	**0**
Junior	**2**	**4**	**1**
Senior	**0**	**1**	**1**
Competency 2: Establishes, develops, and implements a nutrition care plan for the athlete			
Freshman	**1**	**3**	**0**
Sophomore	**1**	**2**	**0**
Junior	**0**	**4**	**3**
Senior	**0**	**0**	**2**
Competency 3: Evaluated goal that is set and develops future plan for continuous improvement			
Freshman	**1**	**2**	**0**
Sophomore	**2**	**1**	**0**
Junior	**2**	**2**	**3**
Senior	**0**	**2**	**0**

Reflections Reported by the Dietetic Students

Reflections from the dietetic students analyzed experiential-learning of the nutrition counseling sessions. Of the fifteen students that participated, 100% of the students (N=15) recommended the experiential-learning to other dietetic students at the University. The emerging reasons for recommending this experience included the enhancement of nutrition counseling knowledge and skills; exposure to the nutrition care process in a real-life setting; and the opportunity to learn more sport-specific nutrition needs for an athlete.

The dietetic students reported being able to learn and apply nutrition-related skills during experiential-learning that are not utilized in the traditional classroom setting. The dietetic students expressed that this form of learning allowed for a hands-on and interactive learning setting, a real-world setting and application style, and an engaging learning environment. Of the fifteen dietetics students, there were only positive comments regarding the experiential-learning opportunity or the SNWC were noted.

Goal Adherence and Attendance Outcomes from Athletes

One hundred percent (100%) of the athletes (N=9) attended all three sessions of the nutrition counseling program. Six of the athletes felt they met their goals at the end of the sessions and three of the athletes felt they were still progressing towards their goals at the end of the sessions. Some common nutrition-related goals that were created included having a more structured eating plan, such as consuming more nutrient dense foods i.e., fruits and vegetables; increasing exercise performance to promote muscle gain and decrease body fat percentage; and changing eating behaviors and habits.

The athletes did face some challenges and barriers to meeting their goals by the end of the nutrition counseling sessions. 55.5% of the athletes reported that the biggest barrier to attending the sessions was scheduling issues due to work, school, and time restraints from homework. Some other barriers included having to create new nutritional behaviors and eating habits in a short period of time; holding themselves accountable while in a college setting; food accessibility due to minimal transportation; and adapting to increased energy needs as an athlete. Forty-four percent (44.4%) of the athletes reported that there were not barriers to attending these sessions due to the Zoom structure. Although barriers arose when working with the goals created, most of the athletes felt there were positive takeaways from the nutrition counseling sessions. The athletes expressed that it was helpful to discuss needed changes to their daily eating habits and understand the reasoning behind the proposed modifications. They also felt that the three-day food log was beneficial as a visual representation to enhance dietary awareness. Last, the athletes felt that the creation of goals was beneficial as it produced accountability to want to succeed before future sessions. Revisions suggested from the athletes included adding more tracking methods for food intake between sessions and enhancing discussion related to goal attainment. However, 44% of the athletes stated that the nutrition counseling sessions needed no revisions.

The athletes expressed there were several different motivators that enhanced their willingness to participate in the SNWC program. These motivators included the improvements of how the athlete felt in everyday life, accountability to achieve their desired goals, and the chance to learn more about nutrition due to limited nutrition knowledge or exposure.

DISCUSSION

The dietetic students participating in this course were undergraduates and many had no prior experience in conducting nutrition counseling with athletes in the university setting. The SNWC offers an opportunity for the dietetic students to challenge their nutrition-related counseling techniques and offers an opportunity for athletes to improve their sports performance. The counseling techniques the dietetic students learned were rooted in motivational interviewing. This framework allows the nutrition counselor to elicit behavior change by building client self-efficacy through incorporating counseling skills such as reflection, rolling with the resistance, and client goal setting. During the experiential-learning, the dietetic students' counseling confidence significantly increased after delivering the nutrition counseling sessions with the athletes. These findings are consistent with previous studies that correlated experiential-learning with enhanced nutrition related knowledge and skills.[9,10]

The experiential-learning framework developed by Kolb (1984) includes for constructs: concrete experience, reflection observation, abstract conceptualization, and active experimentation.[12] In the sports nutrition learning experience outlined in this study, students engaged in the first three constructs as they had a meaningful experience, reflected on the experience and were able to conceptualize lessons learned. The fourth construct, trying out what was learned, occurs as students continue to engage in this activity with other athletes and become leaders and mentors as other dietetic students join the SNWC. Experiential-learning allowed the dietetic students to have real-world exposure to counseling clients and applying the nutrition care process appropriately to the athletes' necessary dietary needs. This experience also provided an opportunity for the dietetic students to apply basic knowledge and understanding of sports nutrition with the athlete. Additional experiential-learning opportunities, such as continued participation in the SNWC, can allow for further understanding of sports nutrition counseling and improved counseling confidence.[10]

The dietetic student evaluation scoring revealed a wide variety of skill levels amongst the fifteen dietetic students that participated in the nutrition counseling sessions. The different skill levels could be due to year of education as well as years in the SNWC. Education level can directly impact the skill level of a dietetic student due to exposure of coursework. Duration of SNWC involvement can also directly impact the skill levels of a dietetic student. The SNWC supplies sports nutrition training prior to conducting these sessions. If a freshman is in their first year of joining the club, they have only had this training once compared to a senior who may have had this training three times. The dietetic students were provided feedback from the RDN in order to increase their performance levels for further sessions. This method is consistent with previous findings that feedback, and constructive criticism produces enhanced performance and increased confidence levels.[1,9] Previous findings have reported that evaluation methods to monitor outcomes is a key component when implementing a nutrition-related program.[1]

The reflections supported previous findings that an experiential-learning opportunity can produce enhanced nutrition counseling skills compared to the traditional classroom settings.[1,9,10] Brown found that 87.5% of the undergraduate dietetic students that participated in their experiential-learning experience reported increased knowledge and skills in the sports nutrition area.[1] Further, a key component to a successful experiential-learning environment includes the opportunity for students to reflect on their experiences in order to tie this to their course content learning.[9]

The goal adherence and attendance from the athletes were positive takeaways from this experience. All nine of the athletes met their goal or were in the process of meeting their goal after working with the dietetic students. Brown found that providing outcome evaluations allowed for continuous quality improvement and assurance that the program goals were being met.[1] A semi-structured interview with the athlete after session three allowed for insight into if the program was meeting their goals. Horacek found that individualized nutrition counseling can effectively help clients make changes to their dietary habits and provide them with the appropriate tools necessary to carry out their goals post-program.[13] These nutrition counseling sessions allowed the athletes to meet or progress to their goal through individuals' nutrition counseling sessions. Limitations in this study included only having fifteen dietetic students and nine athletes who were able to participate in the nutrition counseling sessions. This created a small representative sample from the University reducing the generalizability of results to other dietetic programs and athletes. Moreover, the study was only conducted over a four-week period, therefore long-term behavior changes and athletic performance was not assessed.

CONCLUSION

This information provided in the present study can be used to design future sports nutrition programs for university athletes and dietetic students seeking an experiential-learning opportunity. Experiences at the undergraduate level are limited in the sports nutrition area and this program allows for additional exposure to working with clients specifically in the sports nutrition area. By providing program structure and insight into outcomes for both the dietetic students and athletes, this will allow other universities to tailor the approach to their university. For future research, a larger sample size would be recommended in order to represent the general population. Additionally, long-term outcome measures such as dietetic learning, the athlete's diet, and the athlete's athletic performance would be beneficial to study.

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