An Evaluation of Sports Nutrition Knowledge and Influencing Factors in NCAA Division III Athletes

Direct Original Research

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Abstract

Introduction: This study evaluated the sports nutrition knowledge of NCAA Division III (DIII) athletes, examining the influence of demographic and sport-specific factors. Nutrition is a critical component of athletic performance, recovery, and overall health, yet prior research indicates collegiate athletes often lack adequate nutrition knowledge.

Methods: A total of 412 athletes, representing 17 different sports across endurance, power, and skill categories, completed the validated Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ). The sample included freshmen through fifth-year senior athletes, predominantly Caucasian (85%).

Results: The average A-NSKQ score was 17.1 out of 35 (48.9%), indicating suboptimal knowledge. Significant differences were found across multiple variables including sex ($p=0.0018$), class rank ($p=0.0023$), sport played ($p<0.0001$), and previous nutrition education ($p=0.0011$). A multiple regression analysis identified sport played (54%), class rank (16%), sex (13%), and prior nutrition education (11%) as significant predictors of A-NSKQ scores ($R^2 = 0.26$, $p < 0.01$).

Conclusions: These results highlight the need for targeted, evidence-based nutrition education in DIII programs. Future research should explore how improved knowledge influences dietary practices, athletic performance, and effective delivery of nutritional education.

Key Words: nutrition, athletes, college

Introduction

Adequate nutrition is essential for optimizing athletic performance, recovery, and overall health. Research has shown that dietary intake significantly impacts endurance, strength, and cognitive function, and reduces the risk of injury and illness.[1,2] Additionally, college athletes face unique challenges, including high training standards, academic pressures, and limited access to healthy food and nutrition education.[3,4] These issues are particularly pronounced for NCAA Division III (DIII) athletes due to fewer institutional resources compared to Division I (DI) and Division II (DII) programs.[5,6]

Sports nutrition knowledge is a key factor influencing dietary habits, directly affecting performance and recovery. However, collegiate athletes across all NCAA divisions commonly exhibit gaps in knowledge, including macronutrient needs, hydration methods, and the role of dietary supplements.[7,8] Nutrition misconceptions, often driven by social media and peer influence, further contribute to suboptimal dietary practices.[9] For college athletes, food insecurity is a barrier due to time commitments, limited financial and location of resources, and housing arrangements.[10] Inadequate access to registered dietitians exacerbate these challenges.

Despite existing research on sports nutrition knowledge, limited understanding exists of the factors influencing knowledge levels among DIII athletes. Therefore, to addresses these gaps, this study's purpose was to assess sports nutrition for NCAA DIII athletes and to identify the potential need for sports nutrition education with the following aims:

Aim 1. To assess the current level of sports nutrition knowledge in a sample of NCAA DIII student-athletes using the Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ).

Aim 2. To identify any significant differences in A-NSKQ scores within the NCAA DIII athletic program for class-rank, sex, sport, and previous nutrition experience.

Findings from this study aim to inform the development of tailored interventions to improve dietary habits and performance outcomes for college athletes.

Methods

Participants

A total of 412 NCAA DIII athletes from one institution participated in the study. The athletes represented 17 sports across endurance (e.g., cross country, track and field), power (e.g., football, basketball), and skill-based (e.g., golf, tennis) disciplines. The participants included 162 freshmen, 104 sophomores, 78 juniors, 55 seniors, and 13 fifth-year athletes. The sample was predominantly composed of Caucasian athletes (85%), with the remainder representing mixed race (6%), Black (4%), Asian (3%), and Hispanic (2%) athletes. Both male (n = 269) and female (n = 143) athletes were represented; all, except two, varsity teams at the institution were included. The sample size was strong regarding diversity in sports and class rank within the institution. Institutional Review Board approval was granted before the collection of data, and informed consent was conducted for all participants. It was emphasized to the athletes that they were free to obstain or withdraw from the study without penalty or prejudice at any time.

Protocol

The Nutrition for Sport Knowledge (NSKQ) and Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ) are validated tools previously used to assess nutrition knowledge among athletes.[11,12] The A-NSKQ was used in this study to reduce the survey time with respect to the athletes' schedules. The valid and reliable questionnaire consists of 35 items including multiple-choice and true/false questions including knowledge of macronutrients and micronutrients, hydration strategies, the use of supplements, and timing of nutrient intake. In addition to the formal A-NSKQ, the study included questions to inform researchers about athletes' demographics, any previous, formal nutrition education, and food preparation habits.

Data was collected in person before, during, or after scheduled team practices or lifting sessions. Participants gained access to the A-NSKQ using a QR code on their electronic devices. Researchers monitored the process to ensure there would be minimal distractions and to prevent participants from seeking answers elsewhere.

Statistical Analysis

Data from the study was analyzed using both SPSS and Qualtrics Stats IQ software. Descriptive statistics were employed to summarize the overall scores of the Athlete's Nutrition and Sports Knowledge Questionnaire (A-NSKQ), providing a clear distribution by variables such as class rank, sex, sport, and previous nutrition education. A range of statistical tests were utilized to identify differences between the groups: ANOVA with Tukey's Honestly Significant Difference (HSD) test was used to examine if A-NSKQ scores varied by class rank. T-tests were conducted to compare scores based on sex, sport participation, and prior nutrition education. Furthermore, multiple regression analysis was employed to ascertain predictors of A-NSKQ scores with independent variables including sport, class rank, sex, and prior nutrition education. Statistical significance was established at a $p < 0.05$.

Results

Overall Sports Nutrition Knowledge

The mean A-NSKQ score among participants was 17.1 out of 35 (48.9%), indicating suboptimal sports nutrition knowledge (Fig. 1). Scores ranged from 2 to 26, with a standard deviation of 4.1. This result aligns with findings from a previous study,[5] which reported similar nutrition knowledge deficits in collegiate athletes.

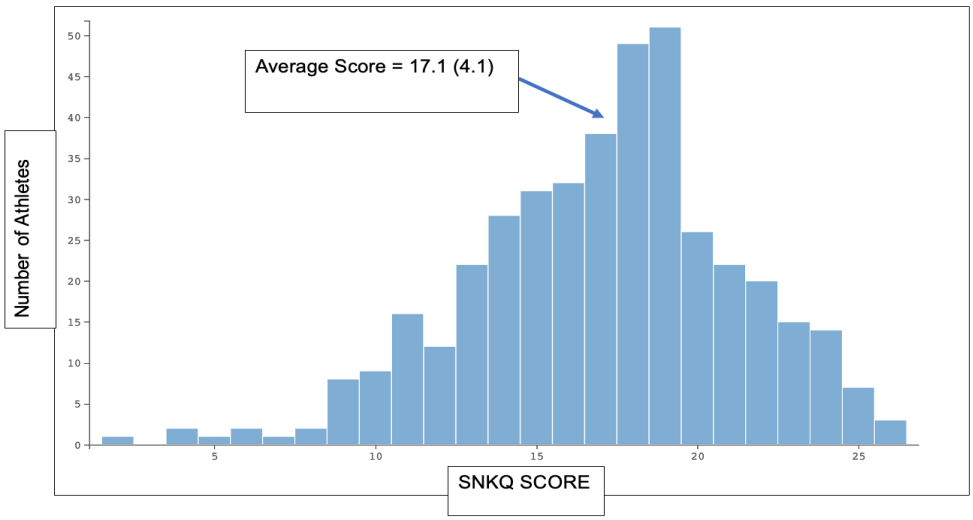

Figure 1. Average A-NSKQ scores across all teams.

Differences by Class Rank

ANOVA revealed statistically significant differences in A-NSKQ scores by class rank ($p < 0.01$). Freshmen scored the lowest, with an average of 16.3 (46%), while seniors scored the highest at 19.1 (55%). Post hoc analysis using Tukey's HSD showed significant differences (See Table 1.)

Table 1. Breakdown of A-NSKQ scores by class rank.

Class Rank	Average Score	Percentage Score	Significance Differences
Freshman	16.3	46%	**Lower than:** Juniors (p=0.07), Seniors (p=0.001)*
Sophomore	16.5	47%	**Lower than:** Seniors (p=0.002)*
Junior	17.8	51%	**-**
Senior	19.1	55%	**Higher than:** Freshmen: (p=0.001)*, Sophomores: (p=0.002)*
Fifth Year	18.9	54%	**Higher than:** Freshman (p=0.002)*, Sophomores (p=0.003)*

*Significant ($p<0.05$)

These findings suggest that knowledge increases with class rank, potentially due to cumulative exposure to nutrition information over time.

Sex Differences

Female athletes (n = 143) scored an average of 17.5 (50%), significantly higher than male athletes (n = 269), who averaged 16.5 (47%) ($p = 0.04$). The difference may reflect broader trends in health literacy, as well as greater interest in nutrition among females.

Differences by Sport

Athletes in endurance sports achieved higher scores than those in power- or skill-based sports. For example, cross country and track and field athletes averaged 20.8 (59%) and 20.4 (58%) respectively. In contrast, basketball and golf athletes scored lower, with averages of 14.6 (40%) and 11.8 (34%) respectively. T-tests revealed significant differences between endurance athletes and those in other categories ($p < 0.01$). Effect sizes were found to be large when comparing the top two teams to the overall group average. Effect sizes (Cohens d) for men's and women's cross

country and women's track and field were $d = 0.9$ and $d = 0.8$, respectively. Effect sizes for the bottom two teams were similar, with a medium effect size for men's basketball ($d = -0.61$) and a large effect size for women's golf ($d = -1.29$). Table 2 summarizes scores by sport.

Table 2. A-NSKQ Scores: top five teams vs bottom five teams.

RANK	SPORT	AVERAGE SCORE
Top 5		
1	Men's and Women's Cross Country	20.8 (59%), σ = 3.7*
2	Women's Track and Field	20.4 (58%), σ = 3.9*
3	Men's Diving	19.3 (55%), σ = 4.3
4	Men's Tennis	19.3 (55%), σ = 4.1
5	Men's Volleyball	18.2 (52%). σ = 4.3
Bottom 5		
25	Men's DI Hockey	15.1 (43%), σ = 4.4
26	Softball	15.0 (43%), σ = 4.3
27	Women's Triathlon	14.8 (42%), σ = 4.7
28	Men's Basketball	14.6 (40%), σ = 4.4**
29	Women's Golf	11.8 (34%), σ = 4.5**

*Significantly higher than overall average score ($p < 0.01$)
**Significantly lower than overall average score ($p < 0.01$)

Impact of Nutrition Education

Only 56 of the 412 athletes (13.6%) reported having any formal nutrition education, such as previous coursework or professional certification programs. Participants who had prior nutrition education scored significantly higher on the A-NSKQ, averaging 19.8 (57%) compared to 16.7 (48%) for those without any nutrition education ($p = 0.002$). Additionally, six teams reported receiving a nutrition seminar from a registered dietitian two months before the completion of the survey. These teams, including cross country and track and field, demonstrated higher average scores than teams without such exposure.

Predictors of Sports Nutrition Knowledge

Multiple regression analysis identified sport played, class rank, sex, and prior nutrition education as significant predictors of A-NSKQ scores ($R^2 = 0.26$, $p < 0.01$). The relative contribution of each predictor was as follows: Sport played: 54%, Class rank: 16%, Sex: 13%, Prior nutrition education: 11%. These findings highlight the importance of sport-specific demands and nutrition-based educational experiences in shaping student-athletes' nutrition knowledge.

Discussion

Explanation of Results

The study confirms suboptimal sports nutrition knowledge among DIII athletes, with an average score of 48.9%. These findings align with prior studies reporting similar deficits in collegiate athletes across divisions.[7,8] Higher scores among seniors and athletes with prior nutrition education suggest that cumulative exposure and formal training positively influence knowledge. Endurance athletes scored higher, likely reflecting the greater emphasis on nutrition in sports requiring sustained energy and recovery strategies.[13]

This disparity between endurance athletes and those in power- or skill-based sports highlights the need for sport-specific education. Lower scores among basketball and golf athletes may reflect less focus on nutrition within these training regimens.[4] Similarly, female athletes scored higher than their male counterparts, consistent with broader trends in health literacy and interest in nutrition.[14,15]

Strengths and Limitations

Strengths of this study include a large sample size, diverse sports representation, and use of a validated assessment tool.[12] Limitations include the predominance of Caucasian participants, restricting generalizability, and the inability to assess long-term effects or causality due to the study's cross-sectional design. Additionally, factors such as dietary habits and socio-economic status were not examined.

Future Research

Future research should explore the impact of tailored nutrition education on dietary practices and performance, with longitudinal studies assessing knowledge retention and health outcomes. Inclusion of more diverse populations and leveraging digital platforms for education delivery could enhance findings.[14,16]

One practical strategy that could be used to address the identified knowledge gaps in the current study could be to implement mandatory nutrition workshops for athletes, tailored to their specific sport. Partnerships with certified dieticians and sports nutritionists would strengthen an athletic program's ability to distribute evidence-based, sport-specific guidance for athletes. Additionally, nutrition education could be integrated into existing training schedules or use more convenient online platforms to provide easily accessible resources, which could improve learning and long-term application.[16]

Future research should aim to examine the role of socioeconomic status (SES) and food insecurity (FI) in influencing access to healthy food, nutrition education, and dietary practice resources. Understanding how SES and FI impacts athletes' nutrition knowledge and practices could provide valuable insights into existing nutrition disparities and help design more equitable and effective interventions.

The predominantly Caucasian sample (85%) limits the generalizability of the current study's findings, as it may not accurately represent the overall diversity of NCAA DIII athletics. Future studies should aim to include a more balanced racial and ethnic representation by targeting or including a broader range of higher education institutions and athletic programs in different areas of the United States. Recruitment from a wider geographic area could help ensure a more generalizable sample with more athletes from different minority groups. Finally, investigating the cost-effectiveness of employing nutrition professionals in DIII programs could strengthen the case for increased investment in athletes' well-being.

Conclusions

This study revealed significant disparities in sports nutrition knowledge among NCAA DIII athletes, with variations by class rank, sex, sport, and prior education. These findings highlight the need for targeted nutrition education tailored to athletes' specific needs. Future research must examine the relationship between nutrition knowledge, behavior, and performance to address gaps and promote healthier habits among collegiate athletes.

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References

1. American Dietetic Association; Dietitians of Canada; American College of Sports Medicine, Rodriguez NR, Di Marco NM, Langley S. American College of Sports Medicine position stand. Nutrition and athletic performance. *Med Sci Sports Exerc.* 2009;41(3):709-731. doi:10.1249/MSS.0b013e31890eb86
2. Thomas DT, Erdman KA, Burke LM. Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance [published correction appears in *J Acad Nutr Diet.* 2017 Jan;117(1):146. doi: 10.1016/j.jand.2016.11.008]. *J Acad Nutr Diet.* 2016;116(3):501-528. doi:10.1016/j.jand.2015.12.006.
3. Pacenta J, Starkoff BE, Lenz EK, Shearer A. Prevalence of and Contributors to Food Insecurity among College Athletes: A Scoping Review. *Nutrients.* 2024;16(9):1346. Published 2024 Apr 29. doi:10.3390/nu16091346
4. Zinn C, Schofield G, Wall C. Evaluation of sports nutrition knowledge of New Zealand premier club rugby coaches. *Int J Sport Nutr Exerc Metab.* 2006;16(2):214-225. doi:10.1123/ijsnem.16.2.214
5. L HS, E FB, L SA, M KC, N WH. Nutritional knowledge of collegiate athletes. *Applied Research in Coaching and Athletics Annual.* 2018;33:65-77
6. Singleton KM, Jagim AR, McAllister-Deitrick J, Daou M, Kerksick CM. Differences in perceived energy and macronutrient requirements across divisions in NCAA athletes. *J Int Soc Sports Nutr.* 2024;21(1):2365307. doi:10.1080/15502783.2024.2365307
7. Heaney S, O'Connor H, Michael S, Gifford J, Naughton G. Nutrition knowledge in athletes: a systematic review. *Int J Sport Nutr Exerc Metab.* 2011;21(3):248-261. doi:10.1123/ijsnem.21.3.248

8. Torres-McGehee TM, Pritchett KL, Zippel D, Minton DM, Cellamare A, Sibilia M. Sports nutrition knowledge among collegiate athletes, coaches, athletic trainers, and strength and conditioning specialists. *J Athl Train*. 2012;47(2):205-211. doi:10.4085/1062-6050-47.2.205
9. Klein DJ, Eck KM, Walker AJ, Pellegrino JK, Freidenreich DJ. Assessment of Sport Nutrition Knowledge, Dietary Practices, and Sources of Nutrition Information in NCAA Division III Collegiate Athletes. *Nutrients*. 2021;13(9):2962. Published 2021 Aug 26. doi:10.3390/nu13092962
10. Pacenta J, Starkoff BE, Lenz EK, Shearer A. Prevalence of and Contributors to Food Insecurity among College Athletes: A Scoping Review. *Nutrients*. 2024;16(9):1346. Published 2024 Apr 29. doi:10.3390/nu16091346
11. Trakman GL, Forsyth A, Devlin BL, Belski R. A Systematic Review of Athletes' and Coaches' Nutrition Knowledge and Reflections on the Quality of Current Nutrition Knowledge Measures. *Nutrients*. 2016;8(9):570. Published 2016 Sep 16. doi:10.3390/nu8090570
12. Trakman GL, Forsyth A, Hoye R, Belski R. Development and validation of a brief general and sports nutrition knowledge questionnaire and assessment of athletes' nutrition knowledge. *J Int Soc Sports Nutr* 2018;15(17):1-8. doi.org/10.1186/s12970-018-0223-1
13. Havermale LA. *Nutrition Knowledge of Collegiate Athletes in Endurance and NonEndurance Sports*. thesis. 2017.
14. Dietitians & Nutritionists. Data USA. Accessed November 20, 2024. https://datausa.io/profile/soc/dietitians-nutritionists#demographics.
15. Janbu T. Er flere kvinner i legeyrket en berikelse? [More women in the medical profession—a benefit?] *Tidsskr Nor Laegeforen*. 2000;120(1):85-87.
16. Daher J, Mountjoy M, El Khoury D. The Effectiveness of an Online Nutrition Education Program on Varsity Athletes' Nutritional & Dietary Supplement Knowledge. *Nutrients*. 2025; 17(1):44. doi.org/10.3390/nu17010044