# Analysis of Nutrition Knowledge and Healthy Habits within ROTC Cadets

*Original Research*

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## Abstract

**Introduction**: In pursuit of achieving and maintaining military readiness, Reserve Officers' Training Corps (ROTC) cadets must adhere to the standards of body composition and physical fitness respective to their service. Healthy habits such as adequate nutrition, sleep, and physical activity are essential for supporting these outcomes in service members, but evidence suggests that ROTC cadets may face challenges achieving optimal dietary intake and quality, in addition to having lower scores of nutrition knowledge, and are at increased risk of disordered eating.

**Methods:** Sixty-eight cadets (85 percent male; mean age 19.1±1.1 years) from a southeastern university completed the Military Eating Behaviors Survey (MEB-S). This study reported descriptive statistics of the survey responses related to nutrition, physical activity, and sleep. Further correlations among nutrition knowledge, diet quality, frequency of meal consumption, physical activity and sleep were analyzed.

**Results**: The mean HES-7 score was 16.9±6.6, indicating suboptimal diet quality. More than half of the sample reported supplement use within the past 30 days. Average sleep duration was 6.9±2.1 hours per night, and vigorous physical activity reported 41.8 days out of the week for 1.5±0.9 hours while moderate activity reported an average 3.5±2.1 days a week for 1.3±1.0 hours. Nutrition knowledge scores (14.5±3.0) were not significantly correlated with diet quality, meal frequency, frequency of meal consumption, physical activity or sleep. Data reports a moderate statistically significant negative association between diet quality and hours of sleep (HES-5, Pearson's $r = -0.414$, $p < .001$; HES-7, Pearson's $r = -0.389$, $p = .002$; HES-9, Pearson's $r = -0.449$, $p < .001$).

**Conclusions**: These findings suggest that ROTC cadets exhibit generally poor diet quality and high supplement use. This sample reported an average nutrition knowledge, although they had formal nutrition education provided. However, analysis suggests nutrition knowledge alone may not predict healthier eating patterns. Multifaceted interventions addressing environmental and behavioral factors may better support cadet readiness and performance.

***Key Words***: tactical, intake, diet quality

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**Introduction**

Reserve Officers' Training Corps (ROTC) cadets are able-bodied men and women completing a bachelor's degree while simultaneously participating in military training at a university, with the goal of becoming a commissioned military officer upon graduation. They are required to meet body composition and physical fitness standards that are unique amongst Army, Marines, Navy, and Air Force and Space Force. Nutrition is a primary influence on both body composition and performance, and understanding the status of nutrition knowledge, dietary intake and diet quality amongst ROTC cadets may facilitate further assistance by health care professionals or leaders of ROTC programs.

To prepare and continue to meet the requirements of the Army Fitness Test (AFT), Navy and Marine Corps Physical Fitness Tests (PRT/PFT), or Air Force Fitness Assessment (PFA), cadets typically participate in structured physical training sessions three times per week, though this varies by program.[1–3] While physical performance is an important component of military readiness, adequate energy intake and nutritional status are fundamental to supporting training adaptations and optimizing performance.[4]

Despite these expectations, ROTC cadets face several challenges that may compromise physical readiness and optimal health status. A high prevalence of low energy availability and frequent sleep disturbances, both factors that may hinder compliance with body composition and fitness standards, have recently been reported in this population.[5] Inadequate sleep, which is commonly reported among military personnel, is not only associated with impaired physical performance (including reduced vigilance and reaction time) but also with increased risk of developing metabolic and psychological disorders.[6,7]

Caffeine consumption is significantly higher in military personnel when compared to civilians. Research shows that moderate caffeine intake can enhance alertness and reaction time, but excessive consumption may contribute to anxiety and sleep disturbances.[8] Furthermore, existing research reports that dietary supplement use is higher among service members, and that service members are more likely to use products associated with adverse effects.[9] Among these are prohormones and multiple ingredient supplements marketed for pre/post workout, muscle building, and weight control. Adverse effects may include heart palpitations, gastrointestinal discomfort, nausea, vomiting, tremors, muscle cramps, weakness, and sleep disturbances, all of which can impair physical readiness.[9] Caffeine intake and supplement use amongst ROTC cadets is not well reported.

The Healthy Eating Score has been used to assess diet quality in military populations, with healthier dietary patterns linked to better overall health and physical fitness outcomes.[10] Overall dietary quality and intake among ROTC cadets are often suboptimal, with previous research reporting inadequate intake of energy, whole grains, fruits, and vegetables.[5,11] Nutrition knowledge is one of many factors influencing dietary choices, which in turn affect health, physical performance, and body composition.[12,13] Research has shown that nutrition education interventions have been linked to improved nutrition knowledge among ROTC cadets.[14] However, factors beyond nutrition knowledge, such as living environment and academic demands, also influence dietary habits in college populations. For example, students living in dormitories report limited access to kitchen facilities and healthy food options, leading to greater reliance on convenience foods and dining hall meals that are typically higher in saturated fat and lower in fruits and vegetables.[15] Additionally, academic stress and time constraints are associated with irregular eating patterns and reduced meal quality.[16] These contextual factors may contribute to the suboptimal dietary patterns observed among ROTC cadets, who balance academic coursework with rigorous physical and military training schedules. Prevalence of eating disorders among this population and pressure to meet body composition standards are additional stressors that may influence eating behaviors.[17]

The Military Eating Behaviors Survey (MEB-S) was developed and validated to assess diet quality in military populations.[18] The instrument includes multiple subscales, such as the Healthy Eating Score, which has been applied in previous research involving ROTC cadets.[1,19] The Healthy Eating Score-9 (HES-9) assesses food frequency over the past 30 days (question 43; Q43) and includes items on fruits, vegetables, whole grains, dairy, fish, energy drinks/shots, sugary beverages, dining out, and alcohol. The MEB-S scoring rubric recommends excluding alcohol and dining out to calculate the HES-7 composite score, since research demonstrates that the HES-7 aligns more closely with the Dietary Guidelines for Americans (2015–2020) and the Healthy Eating Index-2015 (HEI-2015) than the HES-9.[20] However, because the HES-9 is moderately correlated with the HEI-2015, alcohol and dining out items were retained in this study, as these factors are particularly relevant to understanding dietary behaviors and barriers within the college ROTC population. Additional items within the MEB-S assess nutrition knowledge, meal frequency, physical activity, sleep, and dietary supplement use.

This study supplements the relatively small body of evidence for lifestyle and nutrition-related measures in ROTC cadets. The primary aim is to investigate and report the baseline measures of self-reported answers related to nutrition, sleep, and physical activity. Further, relationships between diet quality, frequency of meals consumed, nutrition knowledge, sleep, and physical activity are analyzed due to their potential impact on health and performance. Understanding the relationship between nutrition knowledge and dietary habits in this population could inform more targeted and effective nutrition education strategies; therefore, researchers also aim to analyze whether greater nutrition knowledge is associated with better diet quality.

**Methods**

*Participants*

The data used in this study were collected at two separate time-points in August 2023 and March 2025. On both occasions, ROTC cadets from the same southeastern university completed the 133-item Military Eating Behavior Survey (MEB-S) in paper format. The university Institutional Review Board (IRB) approved the use of all data for research purposes (#25-020FB).

Data from fifty-eight cadets was collected in 2023, and data from sixteen cadets was collected in 2025. Three cadets were identified as repeats, in which their 2023 responses were removed, and their most recent survey responses were used in the analysis. Of the 71 total surveys, researchers analyzed those that had completed at least one of the following sections: diet quality, meal frequency, supplement use, physical activity, sleep, and nutrition knowledge. Survey results from 68 ROTC cadets are reported in this study. The sample mean age was 19.1$\pm$1.1 years old, although 4.2% did not fill out their age. Most of the sample were Army cadets (51.4%), and the remaining were Navy (24.3%) and Marine Corps cadets (20%).

*Protocol*

For scoring and analysis, the HES-7 scoring guidelines were followed by assigning missing answers as blank, recoding fish consumption scores (0=0; 1=3; 2=5; 3=5; 4=5; 5=5), and reverse coding energy drink and sugary beverage scores (0=5; 1=3; 2=2; 3=1; 4=0; 5=0). Alcohol and dining out items were reverse coded and used for the HES-9 composite score out of 45 total points. HES-5 and HES-7 composite scores were computed for analysis, out of 25 and 35 possible points, respectively. Low scores suggest poor diet quality, and higher scores suggest diet quality reflecting adherence to dietary guidelines.

The options given for the meal frequency question (Q35) included breakfast, lunch, dinner, and snacks throughout the last seven days. Statistics report the ranges of minimum (0) to maximum (7) number of days cadets report consuming at least three meals and a snack, along with frequencies relative to the sample. Lower scores indicated more meals were skipped. Cadets were also asked about the use of specific dietary supplements one or more times per week in the past 30 days. Options to answer "yes" or "no" to 12 different types of supplements were listed.

Options for food frequency were as listed:

- Rarely or never = 0
- One or two times per week = 1
- Three to six times per week = 2
- Once per day = 3
- Twice per day = 4
- Three or more times per day = 5

Cadets reported the number of days and hours engaged in both vigorous and moderate physical activity within the last seven days, with explanations and examples of both types of physical activity listed beneath the question for clarification (i.e. vigorous exercises "makes you breathe much harder than usual with heavy sweating, e.g., heavy lifting, running, aerobics, or fast bicycling"). Sleep was recorded in average hours within a 24-hour period throughout the last seven days.

The nutrition knowledge section totaled 23 true/false questions with four sub-categories: macronutrients, vitamins and minerals, energy, and hydration. This study adopted the scoring system Moorhead-Hill used with this scale and awarded one point for correct answers and zero points for incorrect or missing answers. This is consistent with scoring

systems used in previous research measuring nutrition knowledge in ROTC cadets[11,14] and athletes.[21] Individual question breakdown is listed by frequency of correct answers.

*Statistical Analysis*

All data were entered into Excel and subsequently imported into JASP software for analysis. Descriptive statistics summarize data regarding participant characteristics, eating habits (dietary quality, meal frequency, supplement use), physical activity, sleep, and nutrition knowledge. Correlation analyses were conducted using Pearson's *r* to determine associations between diet quality (HES-5, HES-7, and HES-9), frequency of meals, physical activity, sleep and nutrition knowledge.

**Results**

This sample consisted of 68 ROTC cadets. The majority were male (85.3%), 18-19 years old (70.6%), Army-affiliated (52.9%), and white (88.2%). More than half (57.3%) were not contracted, meaning they had not yet formally committed to completing the four-year ROTC program. See Table 1 for full demographic characteristics.

**Table 1**: Descriptive statistics.

| **Participant Characteristics** | | ***N (%)*** |
|---|---|---|
| Gender | Male | 58 (85.3%) |
| | Female | 10 (14.7%) |
| Age | 18 | 23 (33.8%) |
| | 19 | 25 (36.8%) |
| | 20 | 9 (13.2%) |
| | 21 | 8 (11.8%) |
| | 22 | 0 |
| | 23 | 1 (1.5%) |
| | Unanswered | 2 (2.9%) |
| Service | Army | 36 (52.9%) |
| | Marines | 14 (20.6%) |
| | Navy | 17 (25.0%) |
| | Unanswered | 1 (1.5%) |
| Racial Background | American Indian of Alaska Native | 0 |
| | Asian | 0 |
| | Black or African American | 4 (5.9%) |
| | Native Hawaiian or Other Pacific Islander | 1 (1.5%) |
| | White | 60 (88.2%) |
| | Unanswered | 3 (4.4%) |
| Year in ROTC | 1st | 38 (55.9%) |
| | 2nd | 16 (23.5%) |
| | 3rd | 4 (5.9%) |
| | 4th | 4 (5.9%) |
| | Unanswered | 6 (8.8%) |
| Contracted | Yes | 25 (36.8%) |
| | No | 39 (57.3%) |
| | Unanswered | 4 (5.9%) |

Values are presented as n(%). Percentages are calculated based on total sample size. "Unanswered" indicates missing responses. Age is reported in years. ROTC= Reserve Officers' Training Corps.

*Diet Quality*

The minimum HES-7 score reported was zero points and the maximum was 29 points, with an average score of 16.9±6.6 out of a total of 35 points.

Table 2 displays the average score for each food item, with the maximum of 5 points per item. A total of 32 percent of the sample selected a score of "2" for fruit, indicating consumption three to six times per week during the last 30

days. The most common response was "2" for fruits (32%), vegetables (31%), and whole grains (28%). Dairy was most scored as "3" (26%). Thirty-six cadets scored a three or higher, indicating consumption at least once per week. In contrast, 27 cadets (39.7%) scored a zero for fish, indicating they rarely or never consume it.

Energy drinks and sugary beverages were reverse coded, so higher scores indicate healthier behaviors. Both items had a mean score of 3.2, suggesting that cadets, on average, consumed energy drinks/shots and sugary beverages one to two times per week. Alcohol and dining out were scored 4.5$\pm$1.1 and 2.5$\pm$1.0, respectively. Composite scores for all HES scales (5, 7, 9) are provided with the goal to make comparisons amongst studies that use one of the various versions of this tool.

**Table 2:** Adjusted scores of HES food items.

| Food Items | Mean (SD) |
|---|---|
| Fruit | 2.3 (1.3) |
| Vegetables | 2.4 (1.2) |
| Whole Grains | 2.5 (1.3) |
| Dairy | 2.5 (1.3) |
| Fish | 2.1 (1.9) |
| Energy Drink/Shot | 3.2 (1.7) |
| Sugary Beverage | 3.2 (1.5) |
| Alcohol | 4.5 (1.1) |
| Dining Out | 2.5 (1.0) |
| Composite HES-5 Score | 10.9 (5.0) |
| Composite HES-7 Score | 16.9 (6.6) |
| Composite HES-9 Score | 24.8 (5.8) |

Note: Health Eating Score (HES) 5 items: fruit, vegetables, whole grains, diary, fish; HES-7: addition of energy drink/shot and sugary beverage to HES-5; HES-9: addition of alcohol and dining out to HES-7

*Meal Frequency*

Cadets were asked to fill in the number of days each week they eat breakfast, lunch, dinner, and snacks. Sixty-four provided answers for breakfast and lunch, 62 provided answers for dinner, and 63 provided answers for snacks. Eight cadets (12.5%) did not consume breakfast at all within the week, with the majority of cadets (26.6%) consuming breakfast all seven days, followed by the second most common answer of five days per week (18.8%). Cadets more commonly reported consuming lunch (67.2%) and dinner (87.1%) over the past seven days. Forty-four percent of respondents had a snack seven days of the week, followed by six days a week (12.7%), two days a week (12.7%), and zero days (9.5%).

*Supplement Use*

A total of 63 cadets completed the question related to supplement use each week within the last 30 days, and 79% responded with "Yes." Nine of these cadets were female, which includes all but one female from this sample, and the additional 41 were males. An age analysis reveals this includes twelve 18-year-olds, twenty 19-year-olds, eight 20-year-olds, seven 21-year-olds, and one 23-year-old. Twenty-three cadets were taking three or more supplements, with a maximum of eight supplements per cadet. Many cadets who take supplements are taking protein supplements, individual vitamins or minerals, or muscle building supplements (Table 3). A small number were taking "other" supplements that were further detailed to be collagen, berberine, or ashwagandha.

*Physical Activity & Sleep*

A total of 62 cadets successfully reported the number of days and minutes of physical activity they engaged in during the past seven days. On average, cadets were vigorously active 4$\pm$1.8 days out of the week for 1.5$\pm$0.9 hours. Average reported moderate physical activity was 3.5$\pm$2.1 days a week for 1.3$\pm$1.0 hours. Average reported sleep within a typical 24-hour period was 6.9$\pm$2.1 hours.

**Table 3:** Supplements.

| **Use Within the Last 30 days** | *N* |
|---|---|
| Yes | 50 |
| No | 13 |
| Unanswered | 5 |
| **Specific Types** | |
| Multi-Vitamin/Mineral Supplement | 11 |
| Individual Supplement Vitamin/Mineral Supplement | 20 |
| Protein Supplements | 33 |
| Herbal Supplements | 6 |
| Muscle Building Supplements | 18 |
| Weight/Fat Loss Products | 1 |
| Pre-Workout Supplements | 11 |
| Post-Workout Supplements | 4 |
| Joint Health Supplements | 4 |
| Omega 3 Supplements | 8 |
| Probiotics | 4 |
| Other | 4 |

Values are presented as n. "Unanswered" indicates missing responses. Participants could select more than one specific supplement type, so counts may exceed number of respondents reporting "yes" for supplement use.

*Physical Activity & Sleep*

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*Nutrition Knowledge*

Fifty-five cadets completed the nutrition knowledge assessment. The mean nutrition knowledge score was 14.5±3.0 points, with a range of 6-20. The percentage of cadets that scored each individual question correctly is displayed in Table 4.

**Table 4:** Nutrition Knowledge Assessment (n = 55)[a].

| **True/False Question**[b] | **Correct Answer** | **Category**[c] | **% Correct** |
|---|---|---|---|
| Dietary supplements are regulated by the government for purity (cleanliness) and safety before sale. | False | V | 47.3 |
| Replacing lost body weight from an exercise session with fluid is important. | True | H | 81.8 |
| Fruits and vegetables are good sources of zinc. | False | V | 21.8 |
| As long as I am physically active or not overweight, I can eat whatever I want and be healthy. | False | E | 76.4 |
| Good sources of calcium include bread, steak, and corn. | False | V | 72.7 |
| Most plants, fish, nuts and seeds are sources of healthy unsaturated fats. | True | M | 74.5 |
| Whole milk is a better source of protein than 2% or skim milk. | False | M | 29.1 |
| A recovery beverage (other than water) or snack should always be consumed after exercise. | False | H | 21.8 |

| | | | |
|---|---|---|---|
| A post-workout supplement is better for recovery than a snack or meal. | False | E | 14.5 |
| Vitamins and minerals are sources of calories. | False | V | 76.4 |
| Dietary fat is not considered an important part of a balanced diet. | False | M | 72.7 |
| Protein is the most important source of energy (calories) for physical activity. | False | E | 58.2 |
| At least half of the food on your plate should be fruits and vegetables. | True | M | 52.7 |
| Most military personnel require about four times more protein than civilians. | False | M | 43.6 |
| Meat is a good source of fiber. | False | M | 56.4 |
| Leafy green vegetables, root vegetables, and dairy products are good sources of potassium. | True | V | 56.4 |
| Carbohydrates are the main fuel for mental performance. | True | E | 80.0 |
| As long as enough calories are consumed, vitamin and mineral needs of military personnel are met. | False | V | 72.7 |
| Sports drinks are always the preferred beverage when exercising at moderate intensity. | False | H | 70.9 |
| Complex carbohydrate-rich foods include fruit, vegetables, and beans. | True | M | 58.2 |
| Iron is found in dark green vegetables, eggs, and fortified cereal. | True | V | 61.8 |
| Body fat is an important source of energy at rest and during long-duration exercise. | True | E | 76.4 |
| Regardless of how much protein I eat, my body will use it to build muscle. | False | M | 54.5 |

a. Table structure adapted from Moorhead-Hill, 2019.[19]
b. Kuder Richardson-20 value=0.57
c. V=vitamins and minerals, H=hydration, E=energy, M=macronutrients

*Relationships Between Variables*

Correlation analyses were conducted to determine associations between diet quality, nutrition knowledge, frequency of meals each week, physical activity and sleep (Table 5). A moderate statistically significant negative relationship was observed between sleep duration and diet quality across all three HES scales (HES-5, Pearson's $r$ = -0.414, $p$ < .001; HES-7, Pearson's $r$ = -0.389, $p$ = .002; HES-9, Pearson's $r$ = -0.449, $p$ < .001). Additionally, there was a positive statistically significant relationship between the consumption of breakfast each week and the consumption of dinner each week, Pearson's $r$ = 0.454, $p$ < .001. Breakfast consumption and snack consumption were also related (Pearson's $r$ = 0.312, $p$ = 0.013). Lunch consumption was significantly related to both dinner consumption (Pearson's $r$ = 0.454, $p$ < .001) and snack consumption (Pearson's $r$ = .312, $p$ = 0.013). Lunch consumption was also correlated with HES-5 (Pearson's $r$ = 0.277, $p$ = 0.026).

Hours of moderate activity per week was significantly associated with number of days per week dinner is consumed (Pearson's $r$ = -0.453, $p$ < .001). The number of days engaged in vigorous activity was correlated with HES-5 (Pearson's $r$ = 0.352, $p$ = .005) and HES-7 (Pearson's $r$ = 0.270, $p$ = 0.034). HES-5 and number of hours of vigorous activity were positively correlated (Pearson's $r$ = 0.271, $p$ = 0.037). The number of days of vigorous activity was also correlated with the number of hours of vigorous activity (Pearson's $r$ = 0.314, $p$ = 0.014). A positive association was measured between the number of days of moderate activity and hours of moderate activity engaged (Pearson's $r$ = 0.307, $p$ = 0.027).

There was neither a significant correlation measured between nutrition knowledge and diet quality, nor nutrition knowledge with other items (meal frequency, supplement use, physical activity, and sleep).

**Table 5:** Correlation analyses.

| | Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | HES-5 | | | | | | | | | | | | |
| 2 | HES-7 | .916** | | | | | | | | | | | |
| 3 | HES-9 | .799** | 0.957** | | | | | | | | | | |
| 4 | Nutrition Knowledge | -0.006 | 0.009 | 0.045 | | | | | | | | | |
| 5 | Sleep | -0.414** | -0.389* | -0.449** | -0.198 | | | | | | | | |
| 6 | Weekly Breakfast Consumption | 0.147 | 0.149 | 0.122 | 0.122 | .116 | | | | | | | |
| 7 | Weekly Lunch Consumption | 0.277* | 0.237 | 0.155 | 0.124 | -.147 | .200 | | | | | | |
| 8 | Weekly Dinner Consumption | 0.019 | -0.006 | 0.012 | -.080 | .136 | .454** | .454** | | | | | |
| 9 | Weekly Snack Consumption | 0.142 | 0.180 | 0.164 | -.007 | .099 | .312 | .312* | .142 | | | | |
| 10 | Days of Vigorous Activity | 0.352* | 0.270* | 0.141 | .137 | -.132 | .131 | .131 | -.126 | .235 | | | |
| 11 | Weekly Hours of Vigorous Activity | 0.271* | 0.147 | 0.169 | .059 | -.202 | -.1.54 | .115 | .010 | -.082 | .314* | | |
| 12 | Days of Moderate Activity | 0.011 | -0.029 | -0.037 | .188 | -.036 | -.090 | .098 | -1.83 | .24 | .053 | -.066 | |
| 13 | Weekly Hours of Moderate Activity | 0.061 | 0.145 | 0.203 | .035 | -.086 | -.121 | -.067 | -.453** | -.145 | .083 | .176 | .307* |

*$p < .05$; **$p < .001$

Values represent correlation coefficients(r) between pairs of variables. Numbers across the top correspond to the variables listed in the first column. Only the lower triangle of the matrix is shown to avoid redundancy.

## Discussion

*Eating Habits & Supplement Use*

The eating patterns reported among ROTC cadets in this study highlight both strengths and areas of concern. The average HES-7 score (16.9±6.6 out of 35) reflects suboptimal diet quality, consistent with prior findings in cadet and military populations, where inadequate fruit, vegetable, and whole grain intake is frequently observed.[1,5] Limited fish consumption was particularly notable, as fish provides omega-3 fatty acids critical for cardiovascular function and cognitive performance.[22] Meal frequency patterns further illustrate dietary gaps; nearly 13 percent of cadets reported skipping breakfast every day of the week. Previous research has demonstrated that regular breakfast consumption is associated with improved diet quality, enhanced cognitive and physical performance, and more effective weight management in military trainees.[23] Although this study did not measure a significant association between breakfast consumption and diet quality, significant positive correlations were measured for lunch consumption, including its positive relationships with diet quality, dinner consumption, and snack consumption. Increased breakfast consumption was also positively correlated with breakfast and snack consumption, indicating individuals who more frequently eat breakfast may also more frequently eat dinner or have a snack throughout the day. These correlations provide insight to the practice of habitual eating tendencies throughout the day, which are important to educate cadets about to achieve their increased energy needs throughout the program. Irregular meal frequency may contribute to energy imbalance or

low energy availability, hinder performance or the ability to maintain optimal body composition and increase reliance on dietary supplements to compensate for inadequate nutrient intake.

Reported supplement use ($n$ = 50) was also highly prevalent in this sample, with 79 percent of cadets reporting use within the past 30 days, many of whom consumed multiple products concurrently. This rate is substantially higher than in civilian populations and is consistent with evidence indicating elevated supplement use among service members.[8] Protein powders, multivitamins, and muscle-building supplements were most frequently reported, reflecting trends documented in both athletic and military cohorts.[24] Although protein supplementation may support lean mass development and recovery when timed appropriately in relation to meals and training, excessive or indiscriminate use may displace nutrient-dense food sources that more effectively contribute to long-term weight management and health outcomes. Additionally, concurrent use of supplements with energy drinks or caffeine-containing products raises safety concerns, as such combinations have been associated with increased risk of anxiety, cardiovascular strain, impaired sleep, and potential interference with recovery processes.[25,26] These effects may indirectly compromise body composition and hinder cadets' ability to meet height–weight and performance standards.

Overall, the coexistence of suboptimal dietary quality and high supplement use suggests that cadets may be attempting to address performance, recovery, or weight-management goals primarily through supplementation rather than through consistent and structured dietary practices. Emphasizing meal frequency, particularly the inclusion of breakfast, and encouraging reliance on whole-food protein sources may represent more effective strategies for maintaining healthy body weight, supporting muscle mass, and meeting military height–weight requirements. When combined with evidence-based and safety-conscious supplement use, these approaches may provide a more sustainable framework for optimizing performance, readiness, and long-term health in cadet populations.

*Physical Activity & Sleep*

ROTC cadets reported engaging in vigorous physical activity 4.0$\pm$1.8 days out of the week for 1.5$\pm$0.9 hours per day, and slightly fewer days (3.5$\pm$2.1) per week for approximately the same time (1.3$\pm$1.0 hours per day) for moderate activity. Mantanona and colleagues[1] also analyzed self-reported weekly physical activity by ROTC cadets using the MEB-S and reported 2.4$\pm$3.3 total physical activity hours, which is a slightly lower combined average than the findings in this study. Other studies report scores for physical fitness assessments, rather than approximate training hours outside of fitness testing.[27–29] Results from this study align with and exceed the recommendations suggested by the Center for Disease Control (CDC) and American College of Sports Medicine (ACSM): "All healthy adults aged 18–65 years should participate in moderate intensity aerobic physical activity for a minimum of 30 minutes on five days per week, or vigorous intensity aerobic activity for a minimum of 20 minutes on three days per week."[30] Cadets in this sample exceeded the recommendations for both days per week and minutes per day for vigorous activity, which may counterbalance the slightly lower report of number of days exercising at moderate activity; although the recommendation of daily minutes of moderate activity are met.

The significant positive correlations amongst the number of days and hours of vigorous activity with diet quality was interesting, considering the mixed results of literature between diet quality and physical performance in both ROTC and military service members.[1,31] The significant moderate negative association between hours of moderate activity per day and frequency of dinner consumption may be from the fact that intense physical activity can decrease appetite. Additional nutrition education about proper fueling techniques could be beneficial for cadets to encourage consumption of adequate nutrition pre- and post-training, along with practical food recommendations to utilize when training is more frequent.

This study contributes to the limited literature of reported sleep in ROTC cadets, with an average report of 6.9$\pm$2.1 hours per day within the last seven days, which is slightly more than the average 6.2$\pm$1.7 hours reported in a recent 2025 study which consisted of only 20% of the sample meeting the Army recommendation of 7 to 8 hours each night[32] and 60% experiencing sleep disturbances as measured by the global Pittsburg Sleep Quality Index (PSQI).[33] Garron and Klein[4] reported average sleep amongst a sample of 13 male ROTC cadets of 6.0$\pm$1.0 hour per night, and 85% had varying levels of sleep disturbances and poor sleep quality as measured by PSQI. Both studies by Eberhardt[33] and Garron[5] are limited to small sample sizes and are specific to female or male, respectively, which makes it difficult to compare or establish an accurate average of sleep each night for ROTC cadets. The negative association measured between sleep duration and diet quality was surprising, because it contradicts previous research that reports a u-shaped association between sleep and diet quality summarized in a 2020 systematic review.[34] To the researcher's knowledge, this is the first study to report average hours of sleep with a large ROTC sample.

*Nutrition Knowledge*

The mean nutrition knowledge score was 14.5±3.0 points (range: 6–20), which averages 63 percent correct, and corresponds to an average level of knowledge based on research conducted in Trakman and colleagues.[21] This percentage is similar to previous research among active-duty soldiers[35] and ROTC cadets[19] using the same survey instrument. Other studies used different tools to measure nutrition knowledge and found lower mean scores of nutrition knowledge that were reported 18.9 percent[36] and 39 percent.[11] A 2024 study conducted in cadets of the same demographic with the same principal investigator measured average baseline percentages of general nutrition knowledge at 57, sports nutrition knowledge at 45, and total nutrition knowledge at 48 prior to receiving an education intervention.[14] Another recent study sampled 530 ROTC cadets and measured average nutrition knowledge percentages amongst three programs: 56, 62, and 71.[37]

Notably, over half of the sample also received an incoming nutrition education briefing provided by a registered dietitian nutritionist (RDN) prior to the survey, which may have positively influenced knowledge scores. All cadets engaged in this study have access to a registered dietitian integrated into the ROTC program at the university, which may reflect reasoning behind higher nutrition knowledge scores compared to other studies.

The finding that nutrition knowledge was not significantly associated with diet quality contrasts prior research reporting significant associations between these factors in military and college populations, where greater nutrition knowledge has been linked to higher diet quality.[38–40] Other barriers to healthy eating identified among college students, such as perceived ease of consuming healthy foods, cost of healthy eating, food insecurity, and lack of encouragement, may have played a role in the present findings.[40,41] These results suggest that support beyond nutrition education may be necessary to promote healthier eating patterns.

Results of this survey may help inform targeted nutrition education strategies for ROTC populations. For example, fewer than half of participants correctly answered the question regarding dietary supplement regulation, incorrectly indicating that supplements are tested for purity and quality. In addition, most participants incorrectly responded that supplements are better than a meal or snack for post-workout recovery. These misconceptions are concerning given that most participants also reported using at least one dietary supplement. This pattern is consistent with previous literature reporting high supplement use among military personnel and college students.[9,42] Given the prevalence of supplement use, education regarding supplement safety and efficacy may be an important consideration for this population.

*Nutrition Education and Resources*

Despite the foundational impact of nutrition on military readiness, this study found no statistically significant association between nutrition knowledge and diet quality, meal frequency, or supplement use among ROTC cadets. This echoes findings in other military and athletic populations where nutrition knowledge alone has not reliably predicted dietary behaviors.[21] Nutrition knowledge may be necessary but insufficient; environmental, cultural, and logistical factors, including demanding schedules, campus food environments, and peer influences, likely play strong roles in influencing cadet eating behaviors.

Targeted nutrition interventions, however, have demonstrated success in improving cadet nutrition knowledge and eating habits. Boyum and colleagues[14] found that structured education sessions increased cadets' nutrition knowledge scores, and other military-based interventions have improved dietary quality and performance-related outcomes.[10,11] The lack of correlation in the present study may therefore point toward a need for multifaceted approaches that combine education with practical resources, such as improved access to healthy foods, structured meal planning, and guidance on safe supplement use. ROTC cadets represent a unique group balancing the demands of college life with military training. As such, interventions may need to extend beyond didactic knowledge delivery to include behavioral strategies (e.g., goal setting, feedback, accountability), peer-led education, and environmental supports. For instance, integrating registered dietitians into ROTC programs could provide cadets with individualized guidance on fueling, recovery, and supplement safety. Interventions tailored to holistic healthy habits, such as educating how to improve sleep hygiene through appropriate caffeine management and timing of physical exercise before sleep, may be an area of implementation to consider in this population.

*Limitations*

This sample is young, with over half consisting of first year ROTC cadets (56%). This means they may not have had exposure to ROTC standards and training unless they were enrolled in a JROTC program in high school. Further,

most of the sample (84%) were not legal drinking age (21 years old in United States), which contributes to the fact 74 percent stated they rarely or never consumed alcohol. The original validation of the MEB-S was designed for active-duty military, and did not detail the inclusion of ROTC cadets in the sample. Future research is recommended to analyze validity and reliability to the sample to ensure it is appropriately used. Two researchers recorded the survey responses and question perceived misinterpretations as well; for example, in the meal frequency question, there was not a consistent number of respondents throughout breakfast, lunch, dinner, and snacks although the questions are grouped into one question about meal frequency. This may indicate cadets misunderstood the question or possibly thought to skip the question if their answer was zero or "no." Further, the HES assesses frequency of consumption rather than quantity of the food choices and although it provides food examples, it does not specify serving sizes. Overall, the limitations of self-reported data extend to possible misinterpretation of the questions and/or biases in responses, and future research may consider the inclusion of an objective tool.

In summary, these results align with previous research reporting high supplement use and inadequate sleep duration and diet quality among military populations. These results also provide evidence that nutrition knowledge alone may not improve diet quality. While cadets demonstrate moderate nutrition knowledge, translating that knowledge into action requires comprehensive interventions that address environmental barriers, cultural factors, and other barriers influencing food accessibility and choices.

**Conclusion**

Findings from the present study indicate that overall diet quality among this ROTC population was suboptimal, despite participants demonstrating moderate nutrition knowledge. Cadets met and exceeded majority of physical activity recommendations established by the CDC and ACSM and reported a high prevalence of dietary supplement use. Nutrition knowledge was not significantly associated with diet quality, meal frequency, physical activity or sleep. However, greater diet quality was positively associated with greater engagement in days and hours of vigorous physical activity, but hours of moderate activity were negatively associated with weekly dinner consumption. Some daily meals were also significantly associated amongst each other, with daily lunch consumption further positively associated with diet quality. This study is also among the few to examine sleep duration in ROTC populations and measured a negative association between sleep duration and diet quality. These findings highlight the need for targeted nutrition and lifestyle interventions within ROTC programs. Initiatives that combine education with accessible resources and sustained support may be most effective in promoting long-term health behaviors and enhancing military readiness for future military officers.

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