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ROLE OF SPORTS NUTRITION KNOWLEDGE IN SHAPING EATING BEHAVIOR AND FITNESS PERCEPTION OF ATHLETES

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KEYWORDS	ABSTRACT
sports nutrition knowledge; eating behavior; fitness perception; club-level athletes; dietary practices; Dera Ismail Khan	<i>Sports nutrition knowledge is an important component of athletic preparation because appropriate dietary decisions support training demands, recovery, health, and sustained participation in sport. This study examined the relationship of sports nutrition knowledge with eating behavior and fitness perception among male club-level athletes in District Dera Ismail Khan. A quantitative cross-sectional survey design was used with 221 male athletes participating in cricket, football, and badminton. Data were analyzed in SPSS Version 29 using descriptive statistics, Pearson correlation, and regression analysis. Participants reported mean scores of 3.48 ± 0.60 for sports nutrition knowledge, 3.40 ± 0.57 for eating behavior, and 3.55 ± 0.59 for fitness perception, all within the moderate range. Sports nutrition knowledge was positively correlated with eating behavior ($r = .47, p < .01$) and fitness perception ($r = .54, p < .01$), and eating behavior was positively correlated with fitness perception ($r = .50, p < .01$). Regression analysis showed that sports nutrition knowledge significantly predicted eating behavior ($\beta = .44, t = 5.80, p < .001$) and fitness perception ($\beta = .52, t = 6.45, p < .001$). The findings indicate that greater nutrition knowledge is associated with healthier reported eating behavior and more positive perceptions of physical fitness, and these findings highlight the value of structured nutrition education and professional nutrition support for club-level athletes.</i>
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Background

Nutrition is an essential component of sports preparation because athletes must meet the nutritional demands created by training, competition, recovery, and general health. Appropriate energy and nutrient intake supports exercise performance and recovery, while nutritional requirements vary according to the athlete, the sport, the training load (Basit et al., 2026), and the competitive situation. Professional guidance therefore emphasizes integrating appropriate nutrition into athletic preparation rather than treating diet as separate from training (Thomas, Erdman, & Burke, 2016).

Nutrition knowledge may influence athletes' ability to make appropriate food-related decisions. Athletes who understand the roles of carbohydrates, proteins, fats, fluids, micronutrients, meal timing, and recovery nutrition may be better equipped to select foods that support their training demands. Knowledge alone, however, does not guarantee appropriate dietary behavior, because food choices are also shaped by availability, cost, habits, culture, coaching practices, social influences, and access to qualified nutrition professionals. Systematic reviews therefore describe the relationship between nutrition knowledge and dietary intake as meaningful but complex rather than purely causal (Janiczak et al., 2022).

Recent research indicates that gaps in athletes' nutrition knowledge remain common. Hopper, Mooney, and Mc Cloat (2025) reported continuing deficiencies in athletes' knowledge and awareness of recommended dietary practices across the available literature. Similarly, Alahmadi and Albassam (2023) found inadequate nutrition knowledge and dietary intake in several important areas among athletes and physically active individuals.

The issue is also relevant in Pakistan. Zulfiqar, Arooj, and Khalid (2025) examined recreational university athletes in Pakistan and reported substantial deficiencies in total nutrition knowledge. Another Pakistani study identified a knowledge–practice gap: participants demonstrated comparatively good knowledge of healthy dietary choices, while their actual practices remained weaker (Shakeel et al., 2022). These observations emphasize that both knowledge and behavioral outcomes need to be examined together.

A further relevant component is athletes' perception of their own fitness. Fitness perception represents an athlete's subjective evaluation of physical condition, preparedness, energy, and capacity to perform. Although perceived fitness is not a substitute for objective measures such as aerobic capacity, strength, body composition, or sport-specific performance testing, it provides useful information about how athletes evaluate their own physical condition.

The present study therefore focuses on three interrelated variables: sports nutrition knowledge, eating behavior, and fitness perception among 221 male club-level athletes from District Dera Ismail Khan, and examines them through descriptive, correlational, and regression analyses.

Statement of the problem

Club-level athletes are expected to maintain dietary practices that support training, competition, and recovery; however, they rarely have regular access to qualified sports dietitians or structured nutrition education. Consequently, they often depend on coaches, teammates, family members, social media, personal experience, or other informal sources for nutrition-related information. Evidence from Pakistan shows that deficiencies in nutrition knowledge occur among recreational athletes, and that good knowledge does not always translate into healthy dietary practice. The problem is particularly relevant at the club level in District Dera Ismail Khan, where context-specific evidence on the relationships among these three variables is limited. Without such evidence, sports clubs, coaches, physical educators, and health professionals lack the information needed to design targeted nutrition-awareness programs. The present study therefore investigates whether sports nutrition knowledge is positively related to, and statistically predicts, eating behavior and fitness perception among male club-level athletes.

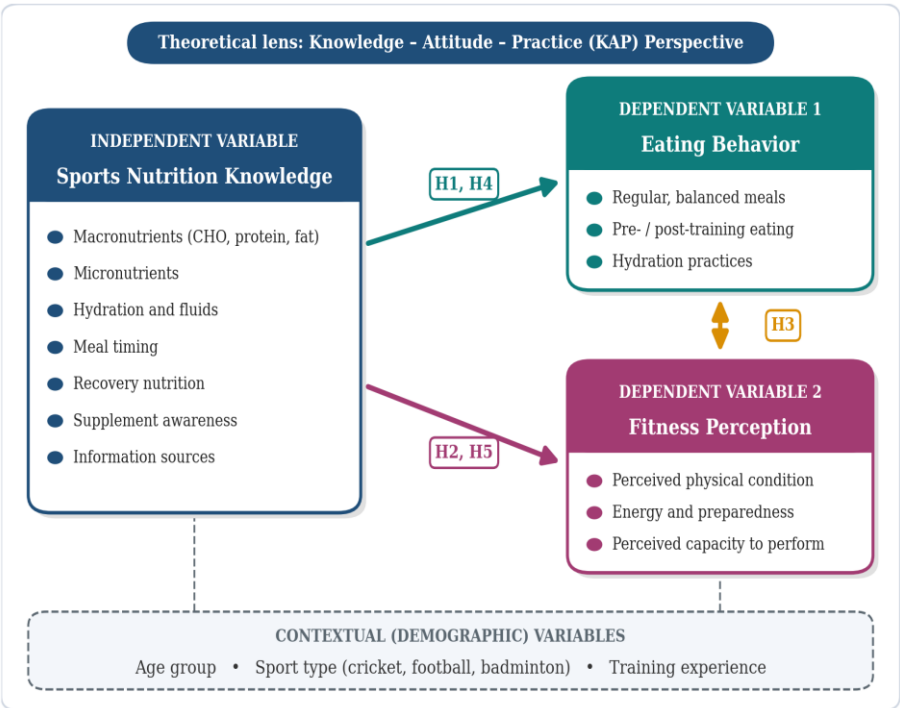


Figure 1: Conceptual framework of the study variables and hypothesized relationships

Table 1: Variables of the Study and Operational Definitions

Variable	Type	Operational Definition	Key Indicators
Sports Nutrition Knowledge (SNK)	Independent	The athlete’s understanding of nutrition principles relevant to training, competition, and	Macronutrients, micronutrients, hydration, meal timing, recovery

		recovery, measured by the SNK scale score.	nutrition, supplements
Eating Behavior (EB)	Dependent	The athlete's self-reported dietary practices in daily life and around training, measured by the EB scale score.	Meal regularity and balance, pre-/post-training eating, hydration practice
Fitness Perception (FP)	Dependent	The athlete's subjective evaluation of physical condition and readiness to perform, measured by the FP scale score.	Perceived condition, energy, preparedness, capacity to perform
Demographic variables	Contextual	Background characteristics used to describe the sample.	Age group, sport type, training experience

Research Methodology

Research Design

The study employed a quantitative cross-sectional survey design to investigate the relationships among sports nutrition knowledge, eating behavior, and fitness perception. This design was appropriate because it allowed the researcher to measure participant characteristics and statistically examine associations among the study variables. Because the study was observational rather than experimental, the relationships and predictive associations identified should not be interpreted as evidence of cause and effect. Figure 2 summarizes the research process.

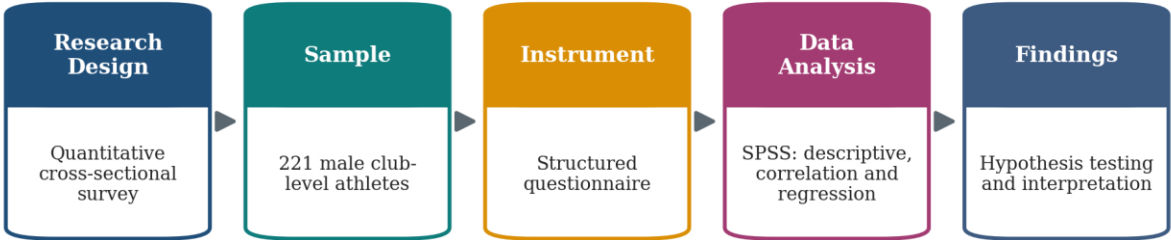


Figure 2: Flow of the research process

Population and Sample

The population comprised male club-level athletes in District Dera Ismail Khan. The sample consisted of 221 male athletes from three sports: cricket, football, and badminton. Participants were aged 18–30 years (grouped as 18–20, 21–25, and 26–30 years) and had training experience ranging from 1–2 years to six years or more, providing representation of athletes with different levels of sporting experience. The researcher was used simple random sampling.

Research Instrument

Data were collected through a structured, self-administered questionnaire with two parts. Part A recorded demographic information (age group, sport type, and training experience). Part B contained three scales measuring sports nutrition knowledge, eating behavior, and fitness perception. Responses were recorded on a five-point Likert-type scale, and a mean score from 1 to 5 was computed for each variable, with higher scores indicating greater knowledge, healthier eating behavior, and more positive fitness perception. The use of valid and reliable measures is essential when assessing athletes' nutrition knowledge (Trakman et al., 2016); the structure and reliability of the instrument are summarized in Table 2.

Table 2: Structure and Reliability of the Research Instrument

Scale	Number of Items	Response Format	Cronbach's α
Sports Nutrition Knowledge	13	5-point Likert	0.89
Eating Behavior	11	5-point Likert	0.87
Fitness Perception	12	5-point Likert	0.86

Note. Highlighted cells should be completed from the original questionnaire and SPSS reliability output. An α of .70 or above is generally regarded as acceptable.

Table 3: Criteria for Interpreting Mean Scores

Mean Score Range	Level	Interpretation
1.00 – 2.33	Low	Limited knowledge / unhealthy behavior / negative perception
2.34 – 3.66	Moderate	Adequate but improvable knowledge, behavior, or perception
3.67 – 5.00	High	Strong knowledge / healthy behavior / positive perception

Data Collection Procedure

The questionnaire was administered to athletes at their respective clubs. Participants were informed about the purpose of the study, participation was voluntary, and responses were kept confidential and used for research purposes only. The researcher was survey and distribute the questionnaire personally data collected each responded.

Data Analysis

Data were analyzed with the Statistical Package for the Social Sciences (SPSS). Frequencies and percentages described the demographic profile; means and standard deviations summarized the study variables; Pearson correlation examined the relationships among variables; and regression analysis tested whether sports nutrition knowledge predicted each outcome. Table 4 links each hypothesis to its statistical test.

Table 4: Statistical Techniques Used to Address the Objectives and Hypotheses

Objective / Hypothesis	Variables	Statistical Technique
Objective 1	SNK, EB, FP; demographics	Frequency, percentage, mean, SD
H1	SNK ↔ EB	Pearson product-moment correlation
H2	SNK ↔ FP	Pearson product-moment correlation
H3	EB ↔ FP	Pearson product-moment correlation
H4	SNK → EB	Linear regression
H5	SNK → FP	Linear regression

Presentation of Results

Table 5: Demographic Characteristics of Male Club-Level Athletes (N = 221)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age Group	18–20 years	68	30.8
	21–25 years	102	46.2
	26–30 years	51	23.1
Sport Type	Cricket	85	38.5
	Football	76	34.4
	Badminton	60	27.1
Training Experience	1–2 years	74	33.5
	3–5 years	98	44.3
	6+ years	49	22.2
Total		221	100.0

Note. Percentages within each variable may not sum exactly to 100 because of rounding.

Table 5 shows that the largest age group was 21–25 years (46.2%), followed by 18–20 years (30.8%) and 26–30 years (23.1%). Cricket players formed the largest sports group (38.5%), followed by football (34.4%) and badminton (27.1%) players. Regarding experience, 44.3% of athletes reported 3–5 years of training, 33.5% reported 1–2 years, and 22.2% reported six years or more. The sample was therefore composed mainly of young adult athletes with varying levels of training experience. These figures describe the sample and should not be taken to represent all athletes in Dera Ismail Khan unless the sampling strategy supports such a generalization.

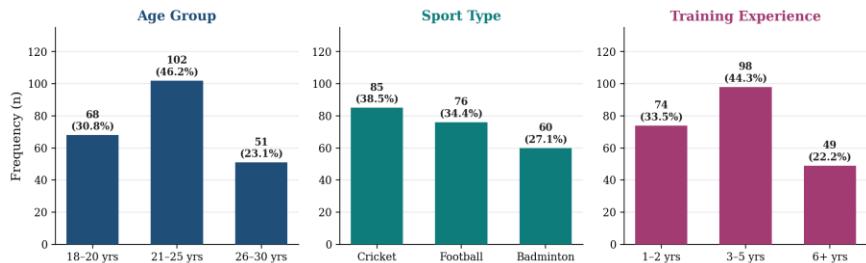


Figure 3: Demographic profile of participants (N = 221)

Table 6: Descriptive Statistics of the Main Study Variables (N = 221)

Variable	Mean (M)	Standard Deviation (SD)	Level
Sports Nutrition Knowledge	3.48	0.60	Moderate
Eating Behavior	3.40	0.57	Moderate
Fitness Perception	3.55	0.59	Moderate

Note. Levels are based on the criteria in Table 3 (Moderate = 2.34–3.66).

As shown in Table 6 and Figure 3, the mean score for sports nutrition knowledge was 3.48 ($SD = 0.60$) and for eating behavior 3.40 ($SD = 0.57$). Fitness perception recorded the highest mean at 3.55 ($SD = 0.59$). All three variables fell within the moderate range, indicating adequate but improvable levels of knowledge, dietary behavior, and perceived fitness. The similar standard deviations show that responses were not widely dispersed around their means. Notably, eating behavior had the lowest mean, suggesting that athletes' practice lagged slightly behind their knowledge.

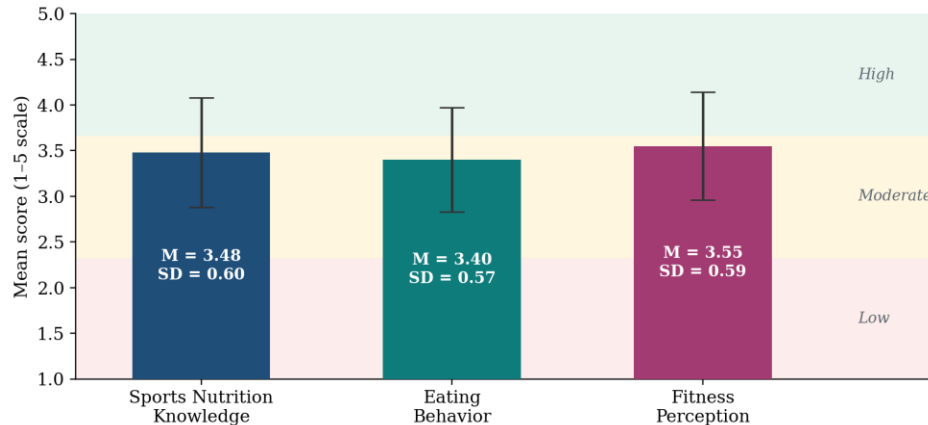


Figure 4: Mean scores of the study variables with standard deviation bars

Table 7: Pearson Correlations Among Sports Nutrition Knowledge, Eating Behavior, and Fitness Perception

Variable	1	2	3
1. Sports Nutrition Knowledge	1.00		
2. Eating Behavior	.47**	1.00	
3. Fitness Perception	.54**	.50**	1.00

Note. N = 221. ** $p < .01$ (two-tailed).

Sports nutrition knowledge showed a statistically significant positive correlation with eating behavior ($r = .47, p < .01$) and with fitness perception ($r = .54, p < .01$). Eating behavior was also significantly and positively correlated with fitness perception ($r = .50, p < .01$). All three coefficients indicate moderate-to-strong positive relationships. Athletes with higher sports

nutrition knowledge scores therefore tended to report healthier eating behavior and more positive fitness perception. These correlations indicate association but do not establish that nutrition knowledge directly caused either outcome. Figure 5 displays the correlation matrix.

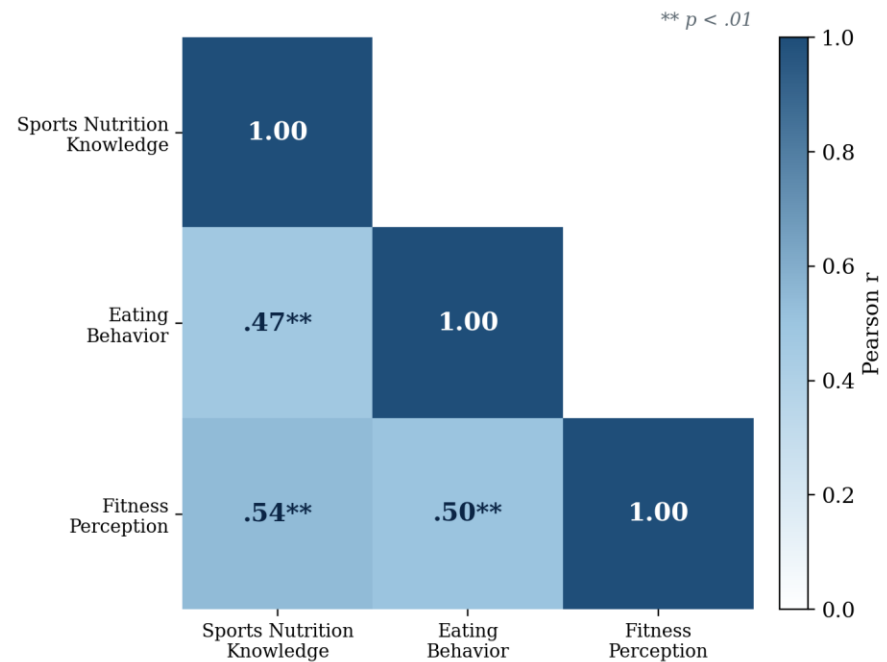


Figure 5: Correlation matrix of the study variables

To evaluate the practical importance of these relationships, Table 8 reports the shared variance (r^2), the 95% confidence interval of each coefficient, and its strength according to Cohen's (1988) guidelines (.10 = small, .30 = medium, .50 = large).

Table 8: Strength and Practical Significance of the Correlations

Relationship	<i>r</i>	95% CI	<i>r</i> ² (Shared Variance)	Strength
SNK – Eating Behavior	.47	[.36, .57]	.22 (22%)	Medium
SNK – Fitness Perception	.54	[.44, .63]	.29 (29%)	Large
Eating Behavior – Fitness Perception	.50	[.39, .59]	.25 (25%)	Large

Note. Confidence intervals were computed using Fisher's z transformation ($N = 221$). SNK = sports nutrition knowledge.

Sports nutrition knowledge shared 22% of its variance with eating behavior and 29% with fitness perception. Thus, while knowledge is clearly an important correlate, the larger share of variation in both outcomes is attributable to other factors — such as food availability, cost, habits, and training environment which supports the KAP view that knowledge is necessary but not sufficient for behavior change.

Table 9: Regression Analysis of Sports Nutrition Knowledge as a Predictor of Study Outcomes

Predictor → Outcome	Standardized β	t-value	p-value	Decision
SNK → Eating Behavior	.44	5.80	< .001	Significant
SNK → Fitness Perception	.52	6.45	< .001	Significant

Note. N = 221. SNK = sports nutrition knowledge

Sports nutrition knowledge significantly predicted eating behavior ($\beta = .44$, $t = 5.80$, $p < .001$) and fitness perception ($\beta = .52$, $t = 6.45$, $p < .001$). The larger standardized coefficient for fitness perception indicates that sports nutrition knowledge had a stronger statistical relationship with how athletes perceived their fitness than with their reported eating behavior. Figure 6 presents the empirical model with all coefficients.

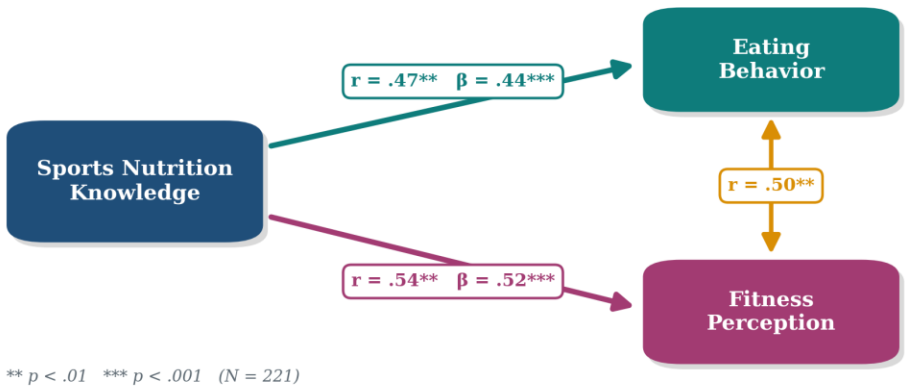


Figure 6: Empirical model showing correlation (r) and regression (β) coefficients

Table 10: Summary of Hypothesis Testing

Hypothesis	Relationship	Statistical Evidence	Interpretation	Decision
H1	SNK ↔ EB	$r = .47$, $p < .01$	Medium positive association	Supported
H2	SNK ↔ FP	$r = .54$, $p < .01$	Large positive association	Supported
H3	EB ↔ FP	$r = .50$, $p < .01$	Large positive association	Supported
H4	SNK → EB	$\beta = .44$, $p < .001$	Significant predictor	Supported
H5	SNK → FP	$\beta = .52$, $p < .001$	Significant predictor	Supported

Note. SNK = sports nutrition knowledge; EB = eating behavior; FP = fitness perception.

All five hypotheses were supported by the data. Sports nutrition knowledge was positively related to, and significantly predicted, both eating behavior and fitness perception, and the two outcomes were positively related to each other.

Discussion

The primary finding of this study is that sports nutrition knowledge was positively associated with both eating behavior and fitness perception among male club-level athletes in District Dera Ismail Khan. Athletes who reported a greater understanding of sports nutrition also tended to report healthier dietary behavior and more favorable perceptions of their physical fitness.

The positive relationship between sports nutrition knowledge and eating behavior ($r = .47$) is particularly relevant. Nutrition knowledge provides athletes with the information needed to evaluate food choices; however, the moderate magnitude of the relationship with knowledge sharing only 22% of the variance in eating behavior shows that knowledge is not the sole determinant of eating behavior. This interpretation is consistent with systematic-review evidence that nutrition knowledge contributes to dietary intake but that the relationship varies considerably across athlete populations and measurement approaches (Janiczak et al., 2022). The slightly lower mean for eating behavior than for knowledge also echoes the knowledge–practice gap described in the KAP perspective.

The findings are also relevant to the Pakistani context. Shakeel et al. (2022) found that sports students demonstrated comparatively good knowledge and attitudes while their healthy dietary practices remained weaker, and Zulfiqar et al. (2025) reported substantial nutrition-knowledge deficiencies among recreational university athletes in Pakistan. The present findings complement this literature by showing that variation in knowledge within a club-level population is meaningfully associated with reported eating behavior. International evidence provides a similar picture: Alahmadi and Albassam (2023) identified poor nutrition knowledge and shortcomings in dietary intake among athletes and physically active individuals, and Hopper et al. (2025) concluded that important gaps remain in athletes' nutrition knowledge and awareness of dietary recommendations. Together, these studies support the continuing need to examine nutrition knowledge across competitive levels and cultural settings.

The second major finding was a positive association between sports nutrition knowledge and fitness perception ($r = .54$), the strongest correlation in the study. One possible explanation is that athletes who understand nutrition pay closer attention to fueling, hydration, and recovery, which may contribute to more favorable perceptions of preparedness and physical condition. This remains an interpretation rather than a demonstrated mechanism, because actual dietary intake, recovery markers, physiological fitness, and sport performance were not objectively measured.

Eating behavior also correlated positively with fitness perception ($r = .50$), indicating that nutritional practice and perceived fitness are interconnected within the sample. Perceived fitness, however, should not be treated as equivalent to objectively measured athletic performance. Future research would benefit from combining subjective fitness scores with objective measures such as strength, endurance, body composition, recovery indices, or sport-specific performance tests.

Regression analysis further showed that sports nutrition knowledge significantly predicted both eating behavior ($\beta = .44$) and fitness perception ($\beta = .52$), with both effects significant at $p < .001$.

These results strengthen the evidence of an association but do not establish causality, because the study was based on observational survey data.

The results have clear practical implications. Nutrition education may be a valuable component of club-level athlete development. Systematic reviews indicate that many nutrition-education interventions improve at least some dietary outcomes, although findings are heterogeneous and stronger research designs are needed (Boidin et al., 2021). Nutritional counseling has also been associated with positive changes in nutrition knowledge and dietary intake, underlining the role of appropriately qualified professionals (Fiorini et al., 2023). Rather than simply distributing information, sports organizations should therefore provide structured, practice-oriented education that teaches athletes how to apply nutrition knowledge to food selection, hydration, training, recovery, and competition.

Conclusion

On the basis of the data analysis, the study concludes that sports nutrition knowledge is significantly related to eating behavior and fitness perception among male club-level athletes in District Dera Ismail Khan. Sports nutrition knowledge showed a positive relationship with eating behavior and fitness perception and eating behavior was positively associated with fitness perception. Regression results further showed that sports nutrition knowledge significantly predicted eating behavior and fitness perception. All five hypotheses were therefore supported.

The findings support the view that sports nutrition knowledge is an important correlate of both dietary behavior and athletes' subjective assessment of their fitness. The results should not, however, be interpreted as proof of a direct causal effect, since dietary behavior and perceived fitness are shaped by multiple personal, social, environmental, economic, and sporting factors. The study highlights the importance of improving athletes' access to reliable nutrition information and professionally guided nutrition education, particularly in club-level sporting environments.

Recommendations

1. Introduce structured sports nutrition education at club level. Short sessions should address balanced meals, carbohydrates for training, protein and recovery, hydration, meal timing, and the safe use of supplements.
2. Involve qualified nutrition professionals. Sports clubs should establish links with registered dietitians or qualified nutritionists rather than relying solely on coaches, peers, or online information.
3. Train coaches in evidence-based nutrition. Because coaches interact with athletes regularly, improving their basic knowledge can reduce the spread of inaccurate dietary information.
4. Emphasize behavior as well as knowledge. Programs should include practical meal planning, food selection, hydration strategies, and ways of applying nutrition principles in everyday life.

5. Promote credible information sources. Athletes should learn to distinguish professional, evidence-based guidance from unverified social-media advice and commercial supplement claims.

Future Research

1. Include female athletes, since the present findings are limited to male athletes.
2. Extend the study to additional sports and districts to improve generalizability.
3. Incorporate objective dietary assessment such as food records or 24-hour recalls.
4. Add objective fitness and performance measures such as body composition, endurance, strength, and recovery indicators.
5. Conduct longitudinal or intervention studies with pre- and post-testing to establish whether improving knowledge leads to changes in dietary behavior and performance.

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