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ORIGINAL RESEARCH

Australian team sports athletes prefer dietitians, the internet and nutritionists for sports nutrition information

Running head: Athletes' information sources

Date accepted: June 2019

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Abstract

Aim: To evaluate the information sources that are used and preferred by Australian athletes and assess if preferences influence sports nutrition knowledge (NK).

Methods: Elite and non-elite Australian team sport athletes, playing Australian Football (AF), Cricket, Lawn Bowls, Soccer, or Hockey, were recruited via the sporting organisations' qualified sports dietitians or club presidents. Athletes completed one of two online, validated sports NK

questionnaires. Frequency analysis on previous sources of advice, preferred sources of information, and preferred type of support were assessed. Differences in NK scores (%) based on previous sources of dietary advice and preferences for obtaining information were assessed using T-test or Mann-Whitney U test.

Results: Four-hundred and ten athletes completed the demographic and information source questions and 331 also completed the NK questions. Athletes were mostly non-elite (76%) and AF players (79%). Forty-four per cent of athletes reported having previously received advice from a dietitian. Twenty per cent, 19%, and 16% of athletes chose 'dietitian', 'internet' and 'nutritionist' as their preferred source of nutrition information, respectively. Athletes preferred information on sports nutrition (35%), individual consultations (33%), and information on general healthy eating (33%) over cooking classes (4%) and group presentations (3%). There were no significant associations between preferred and previous information sources and NK scores.

Conclusions: Australian athletes prefer dietitians, the internet and nutritionists for sports nutrition information. There is an interest in and need for access to a qualified sports dietitian and reputable internet-based nutrition information. Education programs and advice given to athletes needs to be evaluated.

Key words: Counselling, Education, Sports nutrition, Information source, Athlete, Dietitian

Introduction

Dietary intake has a significant effect on athletic performance[1] and is influenced by several factors, one of which is nutrition knowledge (NK).[2,3] Therefore, it is not surprising that the assessment and evaluation of athletes' NK is a popular topic. Since 2015 at least twenty papers on the NK of athletes have been published. Literature reviews published in 2011[4] and 2016[5] concluded that there were significant gaps in athletes' NK. It has been postulated that the low NK scores could be explained by the use of questionnaires that have not undergone adequate validation.[5] However, results from the newly developed and extensively validated Nutrition for Sport Knowledge Questionnaire (NSKQ)[6] and Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ)[7] found that mean NK scores of elite and non-elite athletes were just 46% to 51%.[7,8] Thus, it is unlikely that low NK scores are explained by the use of NK questionnaires that are not validated.

There has been minimal research undertaken to explain why athletes have poor NK. It is plausible that athletes do not have access to reputable nutrition information. Studies that have evaluated American collegiate athletes' preferred nutrition information sources have reported mixed findings; including that athletes are most likely to seek information from a strength and conditioning coach,[9] a physician,[10] the media and the internet,[10] their parents and family,[11] an athletic trainer,[12] and their coach.[13] Indian college athletes preferred obtaining nutrition information from their parents,[14] while Iranian[14] and Nigerian[15] athletes were most likely to obtain nutrition information from their coaches. To our knowledge, only three studies in Australian athletes have assessed preferred sources of information.[16-18] Devlin and Belski[16] found that 97.8% of elite AFL players chose 'club dietitian' as their primary source of

information, but the questionnaire was completed under dietitian supervision, which may have biased results. Andrews and Itsiopoulos[17] also reported that elite and sub-elite Australian soccer players chose their club dietitian as their primary source of information most often, but this was selected by only 32% of respondents. Australian triathletes most commonly relied on 'their own previous knowledge', followed by sports dietitians for post-exercise nutrition information.[18] The reasons why certain sources of information are preferred do not appear to have been explored.

In addition to the limited information on Australian athletes' preferred sources of information, there is a dearth of knowledge about whether athletes' preferred source of information influences NK scores. The aims of this paper were to (1) evaluate the sources of information that have previously been used and are preferred by Australian athletes and (2) assess whether athlete's nutrition information sources influences their NK.

Methods

Study reporting complies with STROBE. This cross-sectional study reports on ancillary data from two cross-sectional studies that evaluated the NK of Australian athletes. For study one, Australian athletes competing in metropolitan and state leagues, and playing for national sporting teams were invited to participate via direct recruitment from their clubs qualified sports dietitian (Australian football, soccer) or via email from their club president (Australian football, cricket, lawn bowls, and hockey). Recruitment took place between February and May 2017. For study two, members of one metropolitan Australian football and netball league in Melbourne, Australia, were invited to participate via email (from the league president); recruitment took place from April to May 2017. To be eligible, participants needed to be residing in Australia, aged 17 years and older, and play competitive sport (at any level). Athletes playing in

metropolitan and state leagues are referred to as non-elite and athletes playing in national leagues are referred to as elite.

For study one, a power analysis for an independent sample *t*-test was conducted in G-POWER to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, a large effect size ($d = 0.8$), and two tails. Based on these assumptions, the desired sample size for each group (elite versus non-elite athletes) was 51. A power calculation was not undertaken for study two.

For study one, data were collected using the Nutrition for Sport Questionnaire (NSKQ).[6] A sub-set of the NK data from study one is reported elsewhere.[8] For study two, data were collected using the abridged NSKQ (A-NSKQ); all the NK data from study two are reported elsewhere.[7] The questionnaires were self-administered online, making supervision impossible. However, participants were instructed to answer questions honestly and not to look up answers to questions.

The NSKQ comprises 89 NK items and the A-NSKQ comprises 37 NK items. Both questionnaires asked the same demographic questions, including items on previous sources of advice and preferred sources of nutrition information. The only difference was that for one item on preferred means of nutrition education, the NSKQ provided closed-ended responses and the A-NSKQ allowed open-ended responses to capture unexpected replies. Copies of the questionnaires are available from the corresponding author.

The research was approved (S16/267) by the La Trobe University's SHE College Human Ethics Sub-Committee (SHE CHESC). All participants were provided with the participant information statement and consent form (online) and 'agreed' to participate (electronically).

Data analyses were conducted in IBM SPSS Version 23 software (IBM Corp., Armonk, NY). In the previous studies reporting on NK, responses with more than 10% missing data were excluded. In the present study, all responses of individuals who completed the demographic and information sources questionnaires were included. There were no missing data for demographic variables. Assessment of the association between NK and information sources was only conducted on the sub-set of participants who had completed at least 90% of the NK questions. As per previous studies, under the assumption that non-response to NK questions was most likely due to not knowing the correct option, missing data for NK questions were coded as incorrect.

Frequency analyses of participant characteristics (age, gender, level of education, sport played and sporting level) were conducted. Frequency analyses were also conducted for athletes' previous sources of advice on diet preferred (most preferred, top 3 choices) sources of nutrition, support received at sporting organisations, attitudes towards receiving support at sporting organisations and preferred types of support

Data for previous sources of advice, preferred sources of nutrition information and preferred types of nutrition-education support were assessed for the whole cohort and stratified based on age (17 – 25, 26 – 35, ≥36 years), gender (male, female), level of education (high school, diploma, and university), and level of sport played (elite, non-elite). Differences in these responses based on participant characteristics were assessed using Chi-square analysis. For age and level of education, where differences in groups were statistically significant, adjusted residuals were evaluated to assess which groups differed from one another. Values between -2 and 2 indicate no significant deviations from expected values.

Differences in NK scores (%) based on previous sources of advice on diet (yes/no for each option) and differences in NK scores (%) based on preferred sources of information (yes/no for ranked as 'number 1' source of information) were assessed using T-test or Mann-Whitney-U-tests, for normal and skewed data, respectively.

Results

In total, there were 410 complete responses to the demographic and information sources questions. Response rates could not be calculated because the questionnaires were, in part, distributed via club managers and total exposure was not known. Participants were predominately aged 17 – 25 (61%), male (60%), university educated (54%), involved in AF (79%) and playing their chosen sport at the non-elite level (76%) (Table 1). Two-hundred-and-six of the responses were from the NSKQ; NK score (%) was available for 154 respondents (completion rate: 54%). Two-hundred-and-four of the responses were from the A-NSKQ; NK score (%) was available for 177 participants (completion rate: 85%) (Table 1)

Forty-four per cent of all athletes reported having previously been given advice on their diet from a dietitian. The question did not specify whether the dietitian was a generalist or sports dietitian. A higher proportion of participants reported that they had been given diet-advice from their family (58%), friends (51%), coach or trainer (48%), and team mates (47%). Males were significantly more likely to have received advice from a dietitian (males: 50%; females: 35%, $P = 0.002$). Likewise, elite athletes were more likely to have received advice from a dietitian (elite: 83%; non-elite: 32%, $P < 0.001$) (Table 2). More males were classified as elite athletes.

Dietitian was selected as the most preferred ('number 1') source of nutrition information by 20% of participants; however, a similar proportion of respondents chose the internet (19%) and nutritionist (16%) as their 'number 1' source of information. Males chose 'dietitian' as their most preferred source of information more frequently than females (males: 26%, female: 10%, P = 0.003) (Table 3). In contrast, males chose nutritionist less frequently than females (13% versus 22%, P = 0.022). Non-elite athletes demonstrated a greater preference for the internet than elite athletes (22% versus 10%, P= 0.011). For the cohort as a whole, athletic trainer (14%) was also a popular choice for preferred source of nutrition information. A smaller proportion of participants chose family or friend (10%), academic journal (6%), doctor (6%), mass media (3%), coach (2%), and social media (2%) as their most preferred source of nutrition information (Figure 1).

Fifty-nine per cent of participants (72% non-elite, 18% elite) reported receiving neither nutrition information nor access to a dietitian at their sporting organisation. However, 87% (68% both, 19% nutrition information only) believed that these services should be available.

There were no significant differences in NK score (%) based on choosing a dietitian (yes: 45%, no: 45%, P = 0.983), the internet (yes: 47%, no: 44%, P = 0.106), or a nutritionist (yes: 44%, no: 45%, P = 0.476) as the most preferred source of information.

There were no significant differences in NK based on previously receiving advice from a dietitian (yes: 45%, no: 44%, P = 0.164). There were no significant differences in NK between individuals whose club provided 'no nutrition support' (44%), 'nutrition information only' (46%), or 'access to a dietitian and nutrition advice' (45%) (P = 0.723)

There were no significant differences between elite and non-elite athletes' NK (elite: 46%; non-elite: 44%, P=0.215). (See appendices for additional comparisons).

There were 206 ranked responses for preferred means of education. The preferred means of education for the whole cohort were 'Access to nutrition information relevant to sport' (35%) and 'Individual consultations' (33%), followed by 'Access to nutrition information relevant to healthy eating' (25%). Only 3% and 4% chose 'Access to group presentations' and 'Cooking classes', respectively (Figure 2).

There were significant differences in preference for individual consultations based on age (P= 0.009), with a trend towards younger participants preferring individual consultations; however, post-hoc analyses (based on adjusted residuals) indicated no differences from expected values when individual groups were compared. Likewise, there were significant preferences for cooking classes based on level of education (P=0.003), with a trend towards individuals with a diploma preferring this option, but no significant differences in individual groups were evident. (Table 4).

The A-NSKQ open-ended responses indicated that athletes would find the following useful: provision of general information; provision of information on foods to consume before, during and after competition/training; meal plans; access to a nutritionist or dietitian; recipe ideas, food provision and support with practical aspects of choosing foods; and general support. Novel and unexpected responses included 'I think it's the individual's responsibility', 'How nutrition affects the workings of the gut' and 'How/why fat is stored'.

Discussion

Previous research has shown that Australian athletes have low NK scores[8,16-18] and fail to comply with best-practice sports nutrition guidelines.[19,20] Since NK is one factor that can influence nutrition behaviour,[2,3] it is pertinent to explore the preferred information sources that athletes use, and how preferences influence NK. This is one of the first papers to investigate these topics in Australian team sports athletes.

Previous sources of advice: Over 50% of athletes reported to have been given advice from their family, friends, coach or team-mates. Family and friends are known to be key information sources for both athletes[14,22,23] and non-athletes, especially amongst adolescents.[21] Over 80% of New Zealand rugby coaches[22] and around 50% of UK sports coaches report that they provide their athletes with advice.[23] Coach was also reported as a common nutrition information source by American,[24] Iranian[25] and Nigerian[15] college athletes and New Zealand runners.[26] It is likely that athletes spend more time with their family, friends and coaches, who are not nutrition professionals, than with a dietitian. Studies have shown there is room for improvement in coaches NK.[5] Likewise, previous research has demonstrated that there are gaps in the Australian populations' understanding of detailed nutrition messages.[27] Therefore, advice (and misinformation) from family, friends and coaches has the potential to have a great impact on athletes. Nutrition is a popular topic, so even when athletes are consulting with a dietitian it is possible they are simultaneously discussing their diet with others. This is likely to lead to confusion and may help explain why athletes with access to a dietitian did not have better NK scores.

There were fewer elite than non-elite athletes surveyed in our studies (Table 1), which reflects the smaller proportion of athletes playing sports at highly competitive levels. About 72% of non-elite and 18% of elite athletes reported that their [current] sporting organisation provided 'neither nutrition information nor access to a dietitian'. Only one-third of non-elite athletes but over 80% of elite athletes had previously received advice from a dietitian. Although a large proportion of elite athletes had access to professional nutrition advice, it is unclear when the athletes last saw the dietitian or how often they received advice. This may, in part, explain the lack of difference between elite and non-elite athletes NK. Available literature indicates that the majority of athletes have not consulted a dietitian; for example, previous studies reported just 40% of Nigerian college athletes,[15] 30% of NCAA athletes,[28] and 12.5% of elite Australian triathletes[18] had accessed such services. While the recognition of the value of a sports dietitian has increased over time,[28,29] even in the professional environment, dietetic services are usually only available on a part-time basis.[16,29] Barriers to provision of dietetic services in both non-elite and elite environments are not known, but may include economic and time constraints.[30]

Preferred source of information: Dietitians, the internet' and nutritionists' were chosen as the preferred nutrition information sources. Australian athletes' preference for dietitians was akin to previous findings in other Australian studies.[16-18] While many respondents (48%) reported that they had been previously given diet advice from their coach or trainer, only 2% of athletes actually selected 'coach' their most preferred source of nutrition information. This is in contrast to existing international reports, which found that American college athletes were more likely to seek advice from a trainer or coach than a dietitian,[12] and felt more comfortable discussing their nutritional needs with their trainer, coach,[13] parent or friend[24] than with a

dietitian. These differences may be reflective of varying roles of a sporting coach in an Australian and international context.

The popularity of the internet is in line with several other studies[23,24,31] and mirrors findings from earlier research, which reported magazines to be a very popular information source.[32-34] Given the strong preference for using the internet to obtain nutrition information and the lack of access to dietitians amongst some athletes, it seems prudent that dietitians (or club officials) provide advice on obtaining evidence-based information and education on assessing source credibility.

Factors that influence preference for information sources: Previous sources of advice and preferences for obtaining nutrition information were influenced by age, gender, level of education and sporting level. In the literature, there is limited information on factors that impact the use of and preference for certain advice sources. However, it is known that females, older, and more educated individuals tend to have higher general NK.[35] Many of the findings of the present study are axiomatic – for example, individuals with higher levels of education were more likely to use academic journals as their top source of information. Elite athletes were more likely to prefer dietitians, while non-elite athletes were more likely to prefer the internet, which may reflect the types of nutrition information which they have access to.

Lack of association between NK and access to dietitian: Our results indicated that there were no significant differences between NK scores (%) of participants who had previously received advice from a dietitian or selected nutritionist or dietitians as their preferred source of information. This is akin to previous findings in elite Australian athletes.[17] A study in American

collegiate athletes reported that individuals who indicated that a sports dietitian was their prime source of information had a better understanding of dietary periodisation.[37] However, this study was assessing procedural knowledge (reported behaviours) rather than declarative knowledge (correct/incorrect answers to a factual statement). Additional published research on the association between information source and NK is lacking. However, several before-and-after studies evaluating education programs designed and run by dietitians have reported improvements in NK and eating behaviours.[36-39] The NSKQ and A-NSKQ are designed to measure changes in NK, not nutrition behaviour**.**

In the present study, about 50 of the participants were recruited from elite teams known to have access to a qualified sports dietitian. However, these dietitians work on a part-time basis. Much of their role involves the provision of meals (and supplements), which reduces the need for specific education on guidelines that are intended to assist with planning an appropriate diet. They work towards counselling and motivating athletes to make food choices that will enhance performance and recovery. They provide practical tips and focus their education on simple concepts related to choosing appropriate food before, during and after training and competition. For instance, rather than explaining that athletes should aim to have 0.3g protein/kg body weight after a resistance training session, they would provide a 100 kg athlete with examples of recovery meals or snacks that contain 30 grams of protein. The lack of association between dietetic advice and NK in the present study may have occurred because the NSKQ and A-NSKQ test several specific sports nutrition guidelines, which are not necessarily the focus of dietetic interventions. It is also possible that some of the other athletes who answered 'yes' to receiving advice from a dietitian saw a dietitian who was not qualified to work in sport, or was not current

with evolving research. Sports nutrition is a specialised and rapidly evolving field. Obtaining qualifications as a sports dietitian involves post-graduate study. Achieving accredited sports dietitian status involves ongoing professional development to keep abreast of new literature. Ideally, all dietitians should work within their scope of practice and refer on to a more appropriate colleague if required.[29]

Preferred type of nutrition support: Access to nutrition information relevant to sport was the most preferred type of nutrition support. This was followed closely by 'individual consultations' and 'access to general healthy eating information'. The open-ended responses indicated a preference for provision of general advice and sports-specific advice (especially in relation to the pre-competition meal and recovery nutrition) and provision of meal plans. These findings, combined with athletes' poor awareness of (and failure to follow) specific sports nutrition guidelines, suggest that more focused education may be beneficial. Indeed, our results demonstrate that athletes have an interest in theoretical concepts, such as those covered in the NSKQ and A-NSKQ.

Limitations: A limitation of this study is that the questionnaires were self-administered online and thus it is possible that athletes looked up the answers to questions; however, given the low scores and average times taken to complete the tools, the authors believe this is unlikely to have occurred. A further limitation was that the low completion rates meant that NK scores were not available for all respondents. In addition, while respondents were asked whether they had received advice from a dietitian, the researchers were not able to determine the extent of the advice, how recently the advice had been given. The specific qualifications and area of expertise of the dietitian was also not known. In relation, the soccer (n =5) and elite Australian Football

players (n =46) were recruited by their dietitian, which may have biased responses regarded preferred sources of information. This study was undertaken in an Australian context and most athletes were young, university educated, and involved in Australian football – therefore the results may not be applicable to all athletes.

Finally, this was a quantitative study and was unable to explore several relevant concepts in adequate depth. Athletes' reasons for choosing one nutrition source over another are unclear. The quality and method of delivery of nutrition interventions provided to athletes is not known. The internet was a preferred source of information, but we did not query the search terms and websites used by athletes. Moreover, we did not investigate athletes' barriers to obtaining adequate NK. These issues are well suited to qualitative research studies, such as focus groups.

Conclusions: In conclusion, Australian team sport athletes appear to prefer dietitians, the internet and nutritionists for sports nutrition information. These results support athletes' interest in and need for access to a qualified sports dietitian and reputable internet-based nutrition information. Future research could focus on evaluating novel education methods, including provision of information via online (website) modules, or web-based mobile applications[11] designed by qualified dietitians. Future research could also assess whether athletes' preferences for educational support affects their improvement in NK after undertaking education programs. Additional studies exploring why athletes prefer information sources is required. Exploration of the reasons for athletes' poor NK also warrants further study.

Authorship

GT planned and undertook data analysis, wrote the manuscript, and oversaw manuscript preparation. AF, RH and RB assisted with study designed and contributed to revising the paper for intellectual content. All author's read and approved the final manuscript approved the final manuscript. The content of the manuscript has not been published elsewhere.

Conflicts of interest

The authors have no conflicts of interest to declare.

Funding source

This work was supported by an Australian Government Research Training Program Scholarship (GT).

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Table 1 Combined participant characteristics (n = 410) and total nutrition knowledge score of individuals who completed the demographic questions in study one and study two

Characteristic	N (%) or Mean ± SD
Age (years)	
17 – 25	250 (61%)
26 – 35	126 (31%)
≥ 36	34 (8%)
Gender	
Male	247 (60%)
Female	163 (40%)
Highest level of education	
Primary School/High School	125 (30%)
Diploma	64 (16%)
University	221 (54%)
Sport played	
Australian football	323 (79%)
Other	87 (21%)
Highest level of sport played	
Non-elite	311 (76%)
Elite	99 (24%)
Completed the questionnaire	24.6 ± 3.9
Yes	331 (72%)
No	79 (18%)
Mean NK score (%)	
NSKQ (n = 154)	48.2±12.1
A-NSKQ (n = 177)	47.0±13.2

Table 2 Per cent participants who reported they had previously been given advice by various professionals; stratified for gender, age, education and sporting level

Professional	**Total cohort**	**Gender**	**Age**	**Level of education**	**Highest playing level**
Doctor	23	M: 21 F: 27	17-25: 23 26-35: 21 36+: 28	HS: 26 Dip: 14 Uni: 25	*Elite: 26 Non-elite: 15
Dietitian /Nutritionist	44	*M: 50 F: 35	17-25: 46 26-35: 44 36+: 31	*HS: 57† Dip: 42 Uni: 37†	*Elite: 32 Non-elite: 83
Team mates	47	*M: 52 F: 40	17-25: 45 26-35: 52 36+: 50	HS: 52 Dip: 44 Uni: 46	*Elite: 43 Non-elite: 62
Family	58	M: 58 F: 58	17-25: 62 26-35: 50 36+: 68	HS: 50 Dip: 56 Uni: 63	*Elite: 66 Non-elite:35
Friends	51	M: 50 F: 54	*17-25: 46 † 26-35: 62 † 36+: 50	*HS: 42† Dip: 58† Uni: 47	Elite:: 54 Non-elite: 42

Coach/Trainer	48	M: 53 F: 42	*17-25: 53† 26-35: 42 36+: 33	HS: 50 Dip: 50 Uni: 48	Elite: 50 Non-elite: 45

Table 3 Participants top sources of information, stratified for gender, age, education and sporting level

*Statistically significantly different P <0.05; † statistically significantly different form expected value based on adjusted residual value

	Total Cohort		Gender	Age	Level of education	Sporting level
	First choice (%)	In top 3(%)	First Choice (%)	First Choice (%)	First Choice (%)	First Choice (%)
Academic Journal	6	15	M: 5 F: 8	17-25: 7 26-35: 6 36+: 3	*PS/HS: 1† Dip: 3 Uni: 10†	Non-Elite: 7 Elite: 3
Athletic trainer	14	42	M: 13 F: 14	17-25: 14 26-35: 15 36+: 9	PS/HS: 13 Dip: 14 Uni: 14	*Non-elite: 16 Elite: 7
Coach	2	14	M: 4 F: 1	17-25: 2 26-35: 2 36+: 3	PS/HS: 3 Dip: 3 Uni: 2	Non-elite: 3 Elite: 0
Dietitian	20	41	*M: 26 F: 10	*17-25: 24† 26-35: 14 36+: 6†	*PS/HS: 30† Dip: 11 Uni: 16	*Non-elite: 12 Elite: 46
Doctor	6	19	M: 5 F: 9	17-25: 5 26-35: 8 36+: 9	PS/HS: 6 Dip: 3 Uni: 7	*Non-elite: 8 Elite: 0
Family/Friend	10	37	M: 8 F: 13	17-25: 10 26-35: 10 36+: 12	PS/HS: 8 Dip: 14 Uni: 10	*Non-elite: 12 Elite: 3
Internet Search	19	47	M: 20 F: 17	17-25: 17 26-35: 20 36+: 30	PS/HS: 15 Dip: 17 Unit: 21	*Non-elite: 22 Elite: 10
Mass Media	3	13	M: 2 F: 3	*17-25: 1 26-35: 3 36+: 12	PS/HS: 1 Dip: 5 Uni: 3	Non-elite:3 Elite: 1
Team mates	2	21	M: 2 F: 3	17-25: 2 26-35: 3 36+: 3	PS/HS: 2 Dip: 2 Unit: 2	Non-elite: 2 Elite: 4
Nutritionist	16	37	M: 13* F: 22	17-25: 16 26-35: 18 36+:15	*PS/HS: 22 Dip: 23 Uni: 12†	*Non-elite:14 Elite: 24
Social Media	2	13	M: 2 F: 2	17-25: 2 26-35: 2 36+:0	PS/HS: 1 Dip: 3 Unit: 2	Non-elite: 2 Elite: 2

*Statistically significant P <0.05. † Post-hoc analyses shows different from expected values

Table 4 Participants most preferred means of education for available responses (204/410); stratified for gender, age, education and sporting level

	Total cohort	Gender	Age	Level of education	Sporting Level
Access to nutrition information relevant to healthy eating	25	M: 25 F: 26	17-25: 20 26-35: 34 36+: 31	PS/HS: 25 Dip: 30 Uni: 23	Non-elite: 26 Elite: 23
Access to nutrition information relevant to sport	35	M: 34 F: 37	17-25: 35 26-35: 29 36+: 54	PS/HS: 38 Dip: 25 Uni: 36	Non-elite: 34 Elite: 35
Access to group presentations	3	M: 3 F: 7	17-25: 2 26-35: 5 36+: 15	PS/HS: 21 Dip: 14 Unit: 15	Non-elite: 4 Elite: 2
Individual consultations	33	M: 34 F: 28	*17-25: 38 26-35: 29 36+: 0	PS/HS: 34 Dip: 23 Uni: 37	Non-elite: 33 Elite: 33
Cooking classes	4	M: 5 F: 2	17-25: 5 26-35: 3 36+: 0	*PS/HS: 4 Dip: 15 Uni: 0	Non-elite:3 Elite: 7

*Statistically significant $P < 0.05$; for age and education; individual results not statistically significant different from expected values

Figure legends

Figure 1 Australian Athletes' preferred ('number 1') nutrition information sources

Figure one is a pie chart depicting elite and non-elite Australian football, soccer, hockey, cricket, netball and lawn bowls players (n =410) most preferred information sources. Athletes were asked to *Rank the top 3 sources of information [relied on] on regarding nutrition.* The proportion of participants which selected each option as '1' are presented.

Figure 2 Australian Athletes' preferred ('number 1') type of nutrition-education support

Figure one is a pie chart depicting elite and non-elite Australian football, soccer, hockey, cricket, netball and lawn bowls players (n =206) most preferred type of nutrition education. Athletes were asked to 'what type of support do/would you find useful, please rank from 1 (most useful) to 5 (least useful)?' The proportion of participants that selected each option was selected as '1' are presented.

Figures

Figure 1

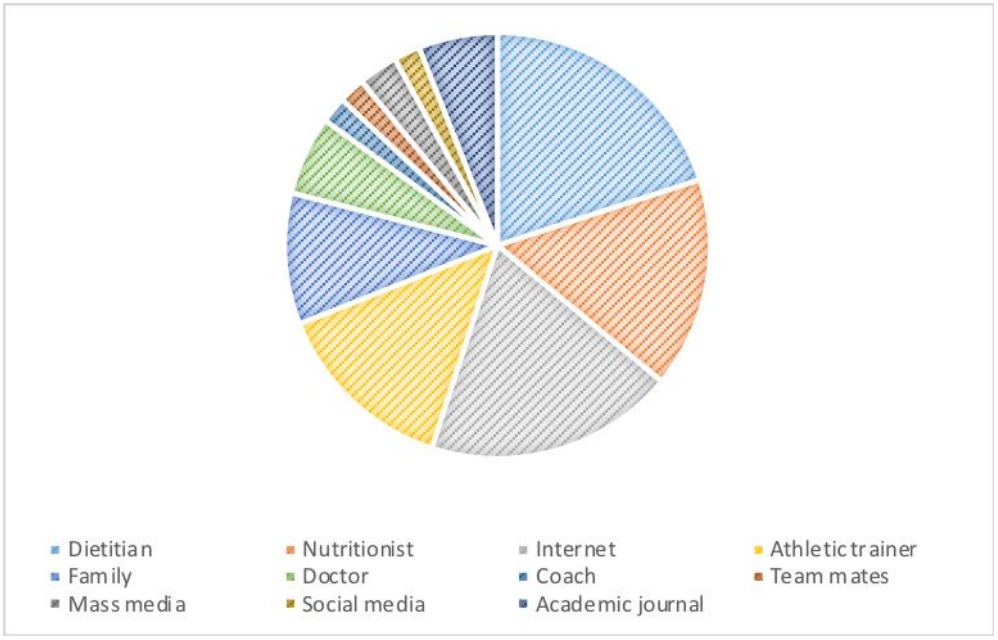
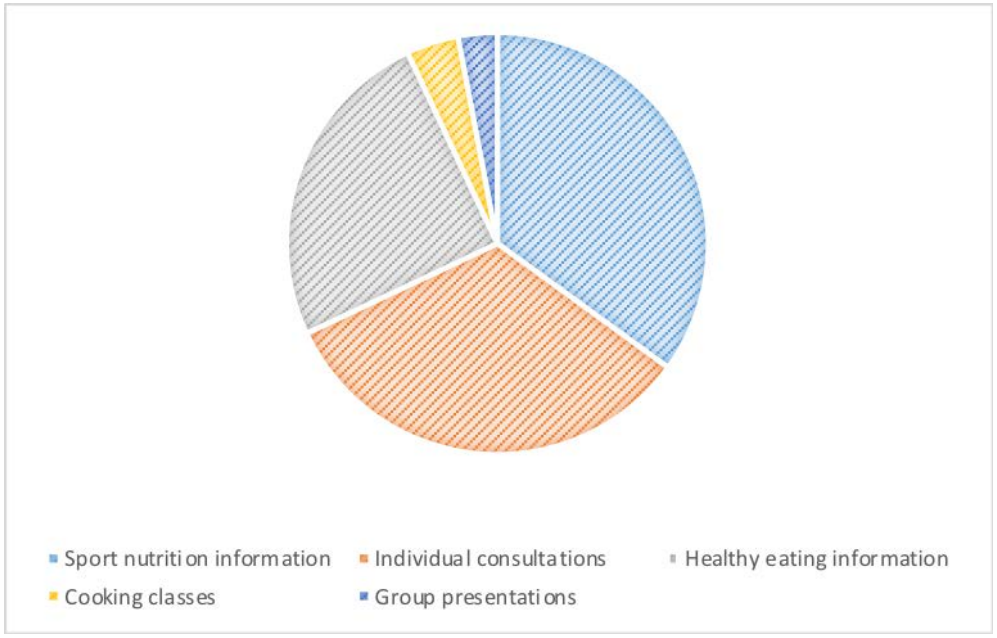


Figure 2



Appendices

Additional information on significance testing

Significance testing for NK score and sources of advice, preferred source of information and support at sporting club

There were no significant differences in score (%) based on having previously been given advice from team-mates (yes: 45%, no: 44%; P = 0.392), coach/trainer (yes: 44%, no 45%, P = 0.783), dietitian/nutritionist (yes: 45%, no: 44%, P = 0.164), doctor (yes: 44%, no: 45%; P = 0.664) and family (yes: 44%, no: 45%; P = 0.640).

There were no statistically significant differences in score (%) based on preference for receiving advice from an athletic trainer (yes: 44%, no: 45%: P = 0.277), coach (yes: 32%, no: 45%; P = 0.83), dietitian (yes: 45%, no: 45%; P = 0.983), family (yes: 43%, no: 45%; P = 0.646), internet (yes: 47%, no: 44%, P = 0.106), mass media (yes: 40%, no: 47%, P = 0.244), social media (yes: 50%, no: 44%; P = 0.572), team mates (yes = 36%, no = 45%, p=0.510), and nutritionist (yes: 44%, no: 45%; P =0.476). There was a significant difference for doctor; those who chose doctor in their top sources of information scored 41% and those who did not scored 47% (P =0.024).

There were no significant differences in nutrition knowledge between individuals whose club provided no nutrition support (44%), nutrition information only (46%), or access to a dietitian and nutrition advice (45%) (P = 0.723