

## ORIGINAL ARTICLE

## Nutritional supplement practices in UK junior national track and field athletes

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**Methods:** The nutritional supplementation practices of 32 national track and field athletes competing at the 2004 World Junior Championships were studied using an anonymous questionnaire. Information was sought on the prevalence and type of supplement used, the reasons for use, knowledge of supplements, and sources of information.

**Results:** Use of supplements was widespread with 62% of respondents declaring supplement use. Prevalence in female athletes (75%) was higher than in males (55%) but was not statistically significant. No differences were found for age, training volume, or type of event. Seventeen different supplements were taken, with each athlete using an average of 2.4 products, multivitamins and minerals being the most popular. Reasons for using supplements were for health (45%), to enhance the immune system (40%), and to improve performance (25%). Of all respondents 48% believed they had an average knowledge of supplements, but three quarters felt that they required further information. Those not using supplements were more likely to think supplements were associated with health risks than those taking them ( $p=0.03$ ). Most athletes (72%) have access to a sports dietician but underutilise this resource. Coaches (65%) had the greatest influence on supplementation practices, with doctors (25%) and sports dieticians (30%) being less important.

**Conclusions:** Supplementation practices were widespread among the population studied. The findings of this investigation could be used to enable the sports dietician and physician to identify common misconceptions held by adolescent athletes regarding nutritional supplements and to implement educational programs, which should include members of the non-medical support team.

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Athletes have used various substances for their ergogenic benefits since ancient times and many use nutritional supplements without consideration of possible negative consequences. The International Olympic Committee (IOC) prohibits many chemical and hormonal substances that offer an unfair advantage to the user.<sup>1</sup> Nutritional supplementation, however, is a grey area and as more drugs are placed on the banned list for athletes, supplements and herbal preparations have gained popularity as a way to achieve performance enhancement “legally”.

Despite lack of scientific evidence to support their alleged benefits,<sup>2–4</sup> the retail sale of dietary supplements in the USA generated \$3.3 billion in 1990 and \$13.9 billion in 1998, and is predicted to triple by the end of 2005.<sup>5,6</sup> Unlike medicines, there is no governing body to control and regulate the supplement industry. In the USA, the Food and Drug Administration formerly protected the public from mislabelled and unsafe dietary supplements and herbal preparations but lost its regulatory powers with the Dietary Supplement and Health Education Act of 1994, and can now only take action after adverse health effects have occurred.<sup>7,8</sup> In Europe, regulations have been drafted at national and European level<sup>9,10</sup> and will be enforced from the end of 2005 in the UK. Unless scientific evidence is strong, displays of health claims are unlikely to be allowed on the product label.

Regulations in other nations are not as stringent and athletes, therefore, remain vulnerable. There is also a small but real risk of an athlete committing an unintentional doping offence as the result of ingesting a dietary supplement or herbal preparation since the IOC list of doping substances includes several which occur naturally in nutritional supplements.<sup>11–13</sup> The IOC acknowledge the situation and have

softened their rules to state that “unintentional anti-doping rule violations...may result in reduced sanctions”.<sup>1</sup>

Athletes are also at risk of significant adverse effects as some dietary supplements and herbal preparations have been associated with cardiovascular, neurological, metabolic, and haematological problems.<sup>14–16</sup> Governing bodies, such as UK Sport<sup>17</sup> and the British Olympic Association,<sup>18</sup> warn athletes about these risks on their web pages.

In the UK, the supplementation practices of athletes remain relatively unknown and it is, therefore, difficult to decide if findings from overseas studies are applicable here. Because of the risks associated with supplement use outlined above, it was considered important to gather basic data on the prevalence and type of supplement used and also the reasons, knowledge levels, and influences which aid the athletes in their decision. Elite athletes are more likely to be under pressure to take supplements and it was, therefore, decided to study this population.

The objectives of this study were to determine: (a) the prevalence and type of supplements used by the current national junior track and field squad; (b) the frequency and reasons for the use of supplements; (c) knowledge and sources of supplement information; and (d) if gender, age, sporting event, or training load influence supplement use.

## METHODS

## Study population

All 34 male and female track and field athletes selected for the Great Britain junior team and participating at the IAAF 2004 World Junior Championships were targeted for this study. The objectives and requirements of the study were explained and written consent was obtained from all athletes. No ethical approval was necessary, but the medical

**Table 1** Characteristics of the athletes

	Number	Age, years (mean)	Training per week, hours (mean $\pm$ SD)
All athletes	32	18	9.7 $\pm$ 4
Females	12	18	10.2 $\pm$ 5
Males	20	18	9.4 $\pm$ 3.5

SD, standard deviation.

commission of the national governing body, UK Athletics, was informed about the procedure and aims of the study. The contact details of the researcher were provided allowing any queries to be addressed immediately. A questionnaire about nutritional supplementation practices was sent, with other registration material, by post to the athletes by the World Junior Championships UK administrators. Approximately 2 weeks were allowed for completion and return of the anonymous questionnaires. No attempt was made to follow up the non-responders.

### Questionnaire

The questionnaire was designed to provide data on supplementation patterns, knowledge, and resources in the study population. A draft of the questionnaire was first given to six independent athletes who attended the Crystal Palace sports centre for medical treatment. Feedback was specifically sought on language and content. Two independent sports physicians and a sport nutritionist then critiqued the final draft. The term "nutritional supplement" was not defined for the athletes. In the data analyses, however, supplements were defined as "ergogenic aids" (creatine, caffeine) or "recovery nutrients" (vitamins/minerals, glucosamine, glutamine). A Likert scale (range 1–5) was used to estimate knowledge (1, poor; 3, average; 5, excellent) and frequency (1, occasional; 3, weekly; 5, daily) of supplement use, as well as access to sport dieticians (1, not at all; 3, monthly; 5, weekly).

### Statistical methods

Statistical analysis was performed using the Stata 6.0 software package. A  $p$  value  $<0.05$  was considered statistically significant. Statistical analyses were also performed to compare subjects taking and not taking supplements. Variables measured on a continuous scale were compared between groups using a  $t$  test. Categorical variables were compared using Fisher's exact test. This test was used in preference to the  $\chi^2$  test, which does not work well with small numbers of subjects as in this study. Descriptive data were calculated as frequencies (%) and are represented as the mean  $\pm$  standard deviation. Analyses were calculated for all subjects combined and also separately by gender.

**Table 2** Supplement use

	Supplement use (%)		Frequency of use, Likert scale (%)*					Supplements, number $\pm$ SD
	Yes	No	1	2	3	4	5	
All athletes (%)	20 (62)	12 (38)	4 (22)	2 (11)	0	3 (17)	9 (50)	2.4 $\pm$ 1.5
Females (%)	9 (75)	3 (25)	1 (13)	0	0	1 (13)	6 (75)	2.3 $\pm$ 1.5
Males (%)	11 (55)	9 (45)	3 (30)	2 (20)	0	2 (20)	3 (30)	2.4 $\pm$ 1.5

\*Scale: 1, occasional use; 5, daily use.  
SD, standard deviation.

## RESULTS

### Demographic characteristics

A total of 32 questionnaires were received and analysed, a response rate of 94%. The characteristics of the athletes are given in table 1.

### Reported prevalence and frequency of supplement use

Frequency of supplement use and number of products taken are given in table 2. Overall, 62% of athletes supplemented their diet (75% of females and 55% of males,  $p = 0.45$ ).

Age ( $p = 0.52$ ), training volume ( $p = 0.81$ ), and type of event ( $p = 0.46$ ) did not have an influence on supplement usage.

Respondents took a total of 17 different supplements with each athlete using an average of  $2.4 \pm 1.5$  different products. Supplements were taken on a daily basis by 50% of respondents. Multivitamins were the most frequently used supplement (45%), followed by individual vitamin C (35%) and iron (30%).

### Reason for supplement use

Figures 1 and 2 show the reasons given by the athletes regarding their decision to use or not use supplements.

### Knowledge and resources

Most athletes had been recommended to use supplements by their coach (67% female and 64% male), while parents were also very influential (44% and 36%, respectively). Most of the athletes (58%) checked with the medical team before taking supplements and the majority obtained their supplements from health food shops (53%) or supermarkets (29%).

Self reported supplement knowledge scores were broken down into those who did and did not take supplements (fig 3). Forty eight per cent of all respondents believed they had an average knowledge of supplements, but most (75%)

**Table 3** Opinions on supplements

	No supplement	Supplement	p value
	n (%)	n (%)	
Supplements enhance performance	7 (63)	11 (58)	1.00
Exercise increases the need for supplements	2 (18)	15 (83)	0.001
Supplements are associated with health risks	10 (83)	8 (42)	0.03
Supplements can cause a positive doping test result	11 (92)	12 (71)	0.35
Not needed if have a balanced diet	11 (91)	17 (85)	1.00
Would like to get more advice on supplements	5 (50)	16 (89)	0.06

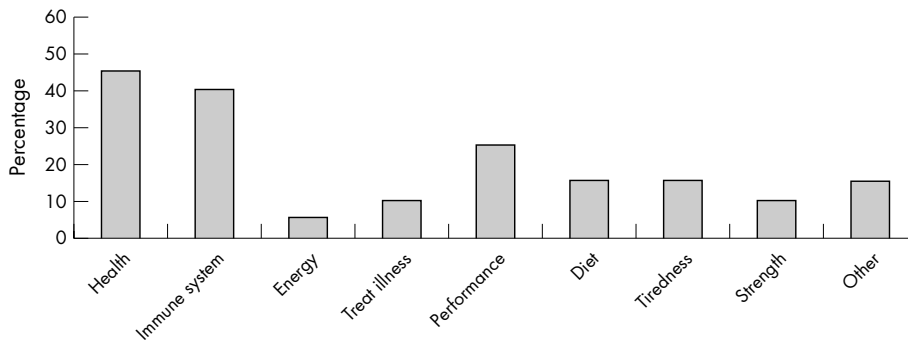


Figure 1 Why do you take supplements?

felt that they required further advice and/or information on nutritional supplements. Some evidence of difference was found between those taking supplements (89%) and those not taking supplements (50%) as to whether more advice on supplements was required, although this result was only of borderline statistical significance ( $p = 0.06$ ). No respondent felt they had an excellent knowledge level.

**Doping and health risks**

Athletes were asked their opinion on a range of dietary, performance, and health related issues. Those who answered affirmatively to the questions were then separated into those who took supplements and those who did not (table 3).

Of the subjects not taking supplements, 83% believed they could be harmful compared to only 42% of those who took supplements. Athletes who took supplements were also more likely to believe that exercise increases the need for supplements (83% compared to 18%). Those not taking supplements were more likely to think that supplements could lead to a positive doping test result than those who were taking supplements, although this difference was not found to be statistically significant.

There was no difference between the groups in their access to a dietician (supplements 75%, no supplements 67%,  $p = 0.70$ ) or their consultation rate (70% v 67%,  $p = 1.00$ ).

**DISCUSSION**

**Prevalence of supplement use**

Nutritional supplementation was widespread amongst this group of elite junior track and field athletes. The overall figure of 62% was similar to that calculated by the author in a recent literature review looking at supplementation studies from the past 10 years.<sup>19</sup>

The prevalence was slightly higher for female (75%) than male athletes (55%), although this did not reach statistical significance ( $p = 0.45$ ). The trend was similar to that

observed in previous studies<sup>20 21</sup> and possible explanations include females being more susceptible to advertising, more aware of nutritional needs, and having more real need for supplements (for example, ferrous sulphate due to menstrual loss) compared to male athletes.

Prevalence was not influenced by age, sporting event, or training volume in this study, but this should be viewed critically due to the small range of ages and events participated in by this population.

**Type, frequency, and reason for supplement use**

Respondents supplemented their diet with an average of 2.4 different products, usually on a daily basis. These findings are similar to those of Slater and Tan.<sup>22</sup> It is of note, however, that the study was conducted during peak activity and results might be different during the off season. Athletes were also asked to consider only the past 3 months when estimating their supplement use. The majority (95%) of those using supplements denied taking them more frequently when training intensity increased even though 83% thought that exercise increased the need for supplements. This contradiction between belief and practice needs to be further explored.

The most popular supplements taken by female athletes were the “recovery nutrients” (44%). This might be explained by the finding that many female athletes are restrictive eaters and do not want to add extra energy to their diet. This is supported by the primary motivations cited for taking supplements: health issues (33%) and strengthening the immune system (44%). Performance and strength (both 11%) were perceived as less important.

Male athletes used “ergogenic aids” more often than the female athletes (45% v 11%), but no statistical significance was reached. This is in accordance with the studies of Sundgot-Borgen *et al*<sup>19</sup> and Slater and Tan<sup>22</sup> and is supported by the fact one of the main reasons reported by males for

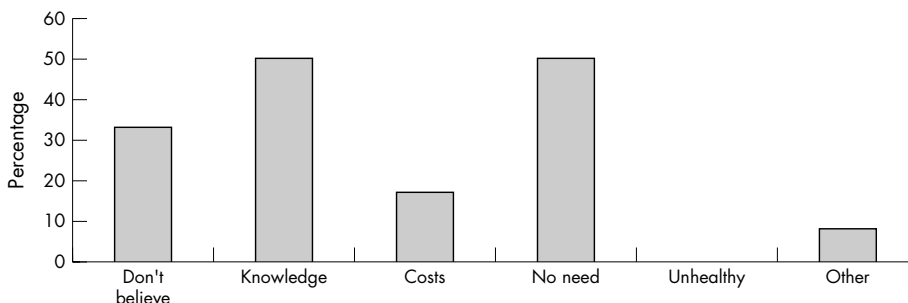
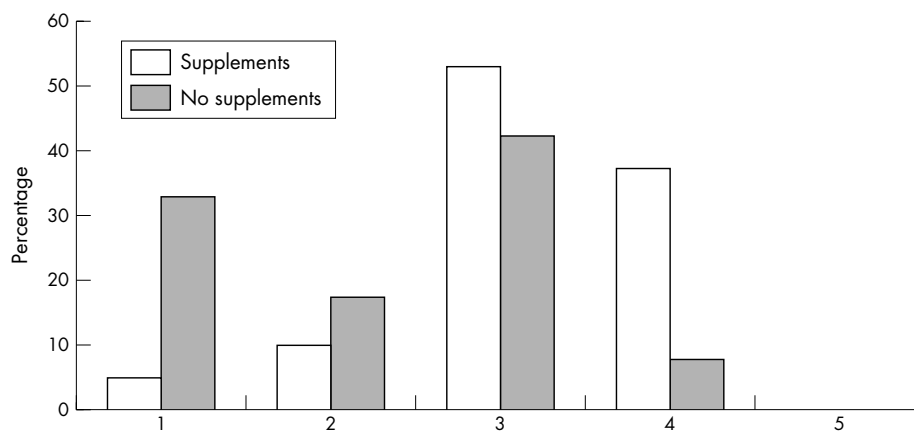


Figure 2 Why do you not take supplements?



**Figure 3** Knowledge scores. Scale: 1, poor knowledge; 5, excellent knowledge.

taking supplements is to improve performance (36%). Although some studies suggest that some supplements, such as caffeine, creatine, and sodium bicarbonate, have ergogenic potential, these supplements may have side effects and their applicability is limited to certain types of exercises and individuals.<sup>4</sup> The low prevalence of creatine use reported in this study (18%) is therefore understandable as creatine causes instance weight gain, which can impair performance. Interestingly, two male athletes reported the use of iron supplements to treat symptoms of fatigue and tiredness. Iron supplementation is unlikely to be required by men and if taken excessively can have negative health consequences.<sup>3</sup>

It is important to note that no dietary evaluation of the athletes was undertaken and therefore it is not known whether some of these athletes were nutritionally deficient, although 85% of athletes supplementing considered their diet to be well balanced. To date there is no conclusive scientific evidence supporting the use of nutritional supplements in a healthy athlete eating a well balanced diet, but adverse effects are likely if supplements are taken in large amounts.<sup>3, 4</sup>

The most frequent reasons for *not* taking supplements were lack of knowledge and no need for supplements (both 50%). Costs were less important (17%), reflecting the trend that people are increasingly willing to pay for products with alleged benefits.<sup>23</sup>

It is of great concern to the author that only one athlete in this study was worried about supplement purity and safety and only 71% of those supplementing believed that this could lead to a positive doping test as opposed to 94% not supplementing. The risk of committing a doping offence is small but real and needs to be a core topic when planning educational programs for athletes.<sup>11-13</sup>

### Knowledge of supplements

Knowledge may be an important factor in reducing nutritional supplement use. Massad *et al*<sup>24</sup> reported an inverse relationship between the knowledge and use, but this was not supported by the findings of the present study. Athletes who supplemented their diet reported greater knowledge levels (mean Likert score 3.2) than those who did not (2.6). This is most likely explained by the fact that athletes were asked about their own perception of supplement knowledge, while other investigations have assessed nutritional knowledge.<sup>24, 25</sup> The validity of the knowledge scores must, therefore, be questioned, but the scores do provide an interesting insight into the perceived awareness of these teenage athletes and possible over-confidence in their own decision making abilities.

### Influence on supplement use and sources of information

More than 75% of the athletes had access to a sports dietician, but the majority used this service infrequently. This supports the findings of Rockwell *et al* who also reported an underutilisation of nutritional professionals.<sup>26</sup> Dietary assessment is currently not compulsory for national junior athletes in the UK but does provide an opportunity for counselling and nutrition education. Dieticians working in high performance centres need to promote their availability to ensure that coaches and athletes are informed about their services. Routine entry physical examinations may also allow sports physicians to open discussions about nutrition and supplements.

Coaches had the greatest influence on athletes' supplementation practices, with doctors (25%) and sports dieticians (30%) seen as less influential. This supports previous findings that athletes rely on information sources where accuracy cannot be guaranteed.<sup>22</sup> Coaches have no compulsory nutritional education and it has been shown that they lack appropriate knowledge.<sup>26</sup> It is suggested that any nutritional education programs should include coaches, as athletes may be reluctant to change their habits unless supported by their coach.

It is of concern is that only two athletes received their supplements from the medical support team, whereas the others bought from sources where purity and safety cannot be guaranteed, such as health shops and the Internet.

### Limitations of the study

The main limitation was the small size of the study population and, as a result, there was a relatively low power to detect differences between the groups. The subjects were competing in a major event and may have been using supplements more than usual. The questionnaire was also included with other registration documents for the World Junior Championships and, although this probably improved return rates, participants may have been concerned about confidentiality.

Future research in this area needs to consider supplement use over a longer period in order to provide more information on patterns and trends. A larger population including a wider range of ages and sporting events would also address some of the limitations of this study.

### CONCLUSION

Supplementation practices were widespread among the population studied. The findings of this study could be used to enable the sports dietician and physician (a) identify

### What is already known on this topic

Many athletes use nutritional supplements without consideration of possible negative consequences. In the UK, the supplementation practices of athletes remain relatively unknown.

### What this study adds

Over half the members of a national track and field adolescent squad took nutritional supplements. More female than male athletes took supplements.

common misconceptions held by adolescent athletes regarding nutritional supplements and (b) implement educational programmes, which need to include members of the non-medical support team. An honest discussion of the limitations of most supplements, and acknowledgement that some supplements may work in certain athletes, may lead the sports physician and dietician to be more credible and useful to the athlete in providing medical care and guidance that supports the desire to improve performance.

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