

NUTRITIONAL SUPPLEMENT USE IN HIGH PERFORMANCE UK ATHLETES: INVESTIGATING THE RELATIONSHIP BETWEEN ACTION AND RATIONALE

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INTRODUCTION

‘Supplement’ is a generic name for vitamins, minerals, herbal remedies, traditional Asian remedies, amino acids and other substances that are taken orally. For decades, competitive sports have operated under strict regulation in terms of the substances that athletes are, and are not, permitted to take and adherence to the anti-doping regulations (WADA, 2006) is expected from all high performing athletes at all times. Gaining competitive advantage, however, is more important than ever: increasingly, athletes’ livelihood and the financial well-being of the sports organisations they represent depend on success. Sportsmen and women frequently turn to supplements hoping to find the desired competitive edge.

Worldwide supplement use among athletes, on average, ranges between 40 to 60 percent (Erdman et al., 2006; Huang et al., 2006; Maughan, 2005; Nieper, 2005; Silver, 2001; Slater et al., 2003; Sundgot-Borgen et al., 2003). Nutritional supplements are typically used for their actual or perceived physiological and health benefits (Aoi et al., 2006; Armsey & Green, 1997; Erdman et al., 2006; Huang et al., 2006; Kreider et al., 2004; Lawrence & Kirby, 2002; Maughan, 2005; Nieper, 2005; Silver, 2001; Slater et al., 2003; Sundgot-Borgen et al., 2003), and the range and quantity of ergogenic drugs and supplements used by athletes shows a growing trend (Telkin & Kravitz, 2004). Literature suggests that athletes take advice regarding supplement use from not only doctors and dietitians, but also from coaches, parents, peers, trade publication and websites (O’Dea, 2003; Nieper, 2005; Sundgot-Borgen, 2003). Thus there is a potential divergence between the type of supplements chosen by athletes and the medical rationale dictating the use of supplements for particular purposes – for example, performance enhancement and health maintenance. Not only can contaminated products lead to adverse results in doping tests, it is also possible that vitamin products with accurately listed compounds and substances can be harmful. At a time when anti-doping organisations are increasingly turning their attention to issues of detection and prevention, it is vital that sports managers are aware of the problem and ensure that countermeasures (i.e., education, expert advice and help or coaching education) are in place.

METHODS

In supplement surveys, athletes are often asked about the substances they have used and some of these surveys also contain explicit questions regarding the reasons behind supplement taking (O’Dea, 2003; Massad et al., 1995; Nieper, 2005;). For the purpose of this study, data from the ‘Drug-free sport survey’ (UK Sport, 2005) were used (n = 874) and we focused on supplements which are considered to improve performance. The relationship between supplements used and rationale for use was shown by calculating chi-square statistics, phi coefficients and relative proportion of informed choices. A pair of answers was considered congruent if there was an agreement between an athlete’s self-reported supplement use and rationale. The connection was not explicitly made by the athlete but calculated afterwards from answers given on two separate and seemingly independent questions (Petroczi & Naughton, 2007). By creating a series of two by two contingency tables from cross-tabling each supplement type and the reasons given by athletes for using supplements, we: i) tested relationship between answers (i.e., testing for independence of the two variables); ii) estimated the strength of this relationship from the proportion of congruent pairs of answers (reasons given for supplement

use matches with the reported supplement use); iii) calculated the relative proportion of answers indicating informed choices (ie. the supplement used is appropriate in terms of the reasons given by the respondent for using supplements) and incongruent answers (ie, the supplement used is inappropriate in terms of the reasons given by the respondent for using supplements).

RESULTS

The sample predominantly consists of non-professional 'Athletes' primarily from Olympic and Paralympic sports (69%): the other 31% are professional 'Players' in football, cricket, rugby union, basketball, ice hockey and tennis. Over half of respondents (52.3%) are between age 19 and 29 whilst <18 and 35-39 age groups forms considerable segments (22% and 17%, respectively). Two-thirds of the sample (66%) are male. Of the 874 respondents, 528 (60%) reported reported supplement use. Nine surveys had missing values resulting in n = 519 for statistical analysis. The use of selected supplements varied widely. Creatine use was reported by 36.1% of supplement users and 21.5% of all respondents, followed by whey protein (30.6% and 18.2%, respectively), iron (29.8% and 17.7%, respectively), caffeine (23.8% and 14.2%, respectively), ginseng (8.3% and 4.9%, respectively) and vitamin C (70.4% and 41.9%, respectively). Of the 519 supplement users, the following reasons were mentioned for supplement use: strength maintenance (38.1%), doctors' advice (24.2%), enhancing endurance (20.0%) ability to train longer (13.3%), and provided by the governing body (3.8%). Associations with motive were found in 8 of the 11 test pairs which were expected from literature precedents, however with only weak associations. Of these, four were associated with the ability to train longer [creatine ($\chi^2 = 49.14$, $p < .001$; $\phi = .307$, $p < .001$), ginseng ($\chi^2 = 4.06$, $p = .044$; $\phi = .099$, $p = .044$), whey protein ($\chi^2 = 31.18$, $p = .001$; $\phi = .25$, $p < .001$) and caffeine ($\chi^2 = 25.19$, $p = .001$; $\phi = .220$, $p < .001$)]. The remaining four associations were: maintaining strength with creatine ($\chi^2 = 97.08$, $p < .001$; $\phi = .432$, $p < .001$) and whey protein ($\chi^2 = 97.82$, $p < .001$; $\phi = .434$, $p < .001$); enhancing endurance with caffeine ($\chi^2 = 38.761$, $p = .001$; $\phi = .273$, $p < .001$); and doctors' advice and iron ($\chi^2 = 35.00$, $p < .001$; $\phi = .25$, $p = .001$). No associations were found for vitamin C and able to train longer or doctors' advice; nor for iron and enhancing endurance.

DISCUSSION

These results suggest lack of informed choices regarding supplements (e.g., even with relatively strong association of $\phi = .434$ present, only 56.1% of those who take supplements to maintain strength reported using whey protein, whereas 14.9% use protein but for no logical reasons, such as strength maintenance or ability to train longer). Moreover, with the exception of iron, the indications are that athletes who take supplements do so without having been advised to do so by doctors or dieticians. This may lead to the unnecessary and inappropriate use of potentially dangerous supplements and therefore should be addressed.

To underscore potential health hazards, athletes' nutritional supplement-taking practices require further investigation, including their use of supplements other than those referred to in the UK Sport survey, combinations, dosage and duration, and sources of advice. Given the influential role of coaches in relation to doping matters – especially where younger athletes are concerned (UK Sport, 2005) – the data also support the argument for supplement use to become a mandatory part of coach education and accreditation. It has been shown that nutritional supplement use increases the chances for using prohibited substances, thus researching supplement use and highlighting the lack of understanding is important. Sports managers must have an awareness of the issue of supplement use (and potential misuse) if they are to provide the best support and advice to the athletes in their charge.

REFERENCES

Aoi, W., Naito, Y., & Yoshikawa, T. (2006). Exercise and functional foods. *Nutrition Journal*, 5, 15. doi:10.1186/1475-2891-5-15.

- Armsey, T.D., Green, G.A. (1997). Nutrition supplements: Science vs hype. *Physician and Sportmedicine*, 25, 76.
- Erdman, K.A., Fung, T.S., & Reamer, R.A. (2006). Influence of performance level on dietary supplementation in elite Canadian athletes. *Medicine & Science in Sport & Exercise*, 38, 349-356.
- Huang, S., Johnson, K., Pipe, A. (2006). The use of dietary supplements and medication by Canadian athletes in the Atlanta and Sydney Olympic Games. *Clinical Journal of Sport Medicine*, 16, 27-33.
- Kreider, R.B., Almada, A.L., Antonio, J., Broeder, C., Earnest, C., Greenwood, M., et al. (2004). ISSN exercise & sport nutrition review: research & recommendation. *Sports Nutrition Review Journal*, 1, 1-44.
- Lawrence, M.E. & Kirby, D.F. (2002). Nutrition and Sports Supplements: Fact or Fiction. *Journal of Clinical Gastroenterology*, 35, 299-306.
- Massad, S.J., Shier, N.W., Koceja, D.M., Ellis, N.T. (1995). High school athletes and supplements: A study of knowledge and use. *International Journal of Sport Nutrition*, 5, 232-245.
- Maugham, R.J. (2005). Contamination of dietary supplements and positive drug tests in sport. *Journal of Sport Science*, 23, 883-889.
- Nieper, A. (2005). Nutritional supplement practices in UK junior national track and field athletes. *British Journal of Sport Medicine*, 39, 645-649.
- O'Dea, J. (2003). Consumption of nutritional supplements among adolescents: usage and perceived benefits. *Health Education Research*, 18, 98-107.
- Petroczi, A. & Naughton, D.P. (2007). Supplement use in sport: is there a potentially dangerous incongruence between rationale and practice? *Journal of Occupational Medicine and Toxicology* 2,4, doi:10.1186/1745-6673-2-4.
- Silver, M.D. (2001). Use of ergogenic aids by athletes. *Journal of the American Academy of Orthopaedic Surgeons*, 9, 61-70.
- Slater, G., Tan, B., The, K.C. (2003). Dietary supplementation practices of Singaporean athletes. *International Journal of Exercise Metabolism*, 13, 20-32.
- Sundgot-Borgen, J., Berglund, B., Torsveit, M.K. (2003). Nutritional supplements in Norwegian elite athletes – impact of international ranking and advisors. *Scandinavian Journal of Medicine and Science in Sport*, 13, 138-144.
- Telkin, K.A. & Kravitz, L. (2004). The growing trend of ergogenic drugs and supplements. *ACSM Health Fitness Journal*, 8, 15-18.
- UK Sport. Drug-free sport survey. London: UK Sport. 2005.
- WADA 2006. The World Anti-Doping Code. The 2007 Prohibited List. International standard. 2006. September 16. http://www.wada-ama.org/rtecontent/document/2007_List_En.pdf, accessed on 26/03/2007.