Can we afford to exercise, given current injury rates?

R J Shephard

**GUEST EDITORIAL**

**Exercise**

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**Fatalities could be reduced through application of our current knowledge**

A lack of adequate and regular physical activity is now recognised as a major factor contributing to many forms of chronic disease, and public health agencies around the world are eager to encourage the general public to get more active. However, papers such as those of Conn and associates, and repeated surveys from various countries, including Britain, Denmark, Germany, South Africa, and the US note an important social and economic toll from injuries among current exercisers. Some authors have suggested that the incidence of such adverse consequences could be sufficient to counter both health and economic arguments for the advocacy of exercise, whereas others have considered these injuries an inevitable consequence of participation in health giving exercise.

A journal such as *Injury Prevention* can hardly accept the position that such events are unavoidable “accidents”. Nevertheless, it seems appropriate to question both the magnitude of the problem and the ability to generalise the findings, while suggesting appropriate preventive measures.

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through a simple application of our current knowledge.

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GUEST EDITORIAL

Exercise

Sports and recreational injury: the hidden cost of a healthy lifestyle

S W Marshall, K M Guskiewicz

More exercise will mean less obesity related disease, but exercise related injuries may negate the gain

S port and recreational physical activity is an integral part of our society and participation in recreational physical activity is widely promoted as part of a healthy lifestyle. However, recent studies, such as the paper by Conn et al in this issue of Injury Prevention, point to the significant, and largely under-researched, injury problem associated with sports and recreational injury.1 In this guest editorial, we review the evidence for and against increasing the level of physical activity in the general population in developed countries. We also suggest specific collaborations important for controlling sports and recreational injury and for developing future recommendations on physical activity.

Physical inactivity and obesity are a growing problem throughout the developed world.1 Increasing affluence has facilitated the consumption of a high energy, high fat diet.2,3 But as food portion sizes have grown,4 so too have our waistlines.1 Levels of work related physical activity have dropped with the advent of service-oriented economies in developed countries; concurrently, the time available for recreational physical activity has diminished.3,4 Nearly 75% of US adults report they are not regularly active or are inactive during leisure time.5 In addition, the transportation infrastructure in developed countries increasingly discourages walking or cycling in favor of using a motor vehicle.6 As a result of reduced physical activity, diabetes and other obesity related diseases have increased.2,7 Of great concern is the fact that participation in physical education programs by US children and adolescents is low (only 21% of US adolescents participate in daily school based physical activity programs) and declining, while the prevalence of overweight in this age group is increasing.7–11 In part, this is because the leisure time activities pursued in developed countries are increasingly sedentary. Enormous growth in the market for home video/DVD, electronic games, and computers has widened its appeal to manufacturers and retailers but may mean massive future costs for public health in terms of obesity related disease.

In response, the US Surgeon General issued a call to action in 1996.12 A expert panel reviewed the evidence on the protective effects of physical activity in terms of prevention of obesity, cardiovascular disease, colon cancer, diabetes, poor mental health, and musculoskeletal degeneration. It was concluded that, while long duration and/or high intensity exercise conferred the greatest benefits, significant health gains could be achieved through a sequence of short episodes of moderate activity (brisk walking or climbing stairs) spread throughout the day. The recommendation was for each adult to participate in at least 30 minutes of moderate activity per day; this activity could be accumulated in a series of short episodes (say, three sets of 10 minute walks).13 The subsequent implementation of this recommendation has been the focus of numerous public health campaigns and much research effort.

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But a hidden danger lurks beneath the surface of the Surgeon General's recommendation, and that danger is sports and recreational injury. An increased risk of injury was identified in the Surgeon General's report as the major negative consequence of increasing the level of physical activity in the population. The authors of the report suggested that these injuries could be prevented in sedentary individuals by "gradually working up to a desired level of activity." However, this suggestion is not supported by the epidemiology of sports and recreational injury. Sports and recreational injuries arise in a wide diversity of activities and occur to persons at all levels of fitness and conditioning. In fact, the evidence linking physical fitness and prevention of sports injury is slight, but the same is true of warm-up and stretching programs. By far the biggest determinant of injury risk in sports and recreational injury is the nature of the activity itself, with contact sports carrying the greatest risk of injury. Personal history of injury also has an important role, especially in the young athlete. Given the above, it would have been useful if the authors of the Surgeon General's report could have made specific recommendations about those physical activities which provide maximal cardioprotective benefits while minimizing the risk of injury.

In fairness to the Surgeon General's office, the descriptive epidemiology of sports injury in the US remained an undeveloped area throughout much of the 1990s. Fortunately, three recent reports from the Centers for Disease Control and Prevention have changed that. The most recent of these reports appears in this issue of Injury Prevention. As a result of this work, the scope of sports and recreational injury in the US has been documented in much greater detail than was possible in previous reports. Figures from this paper underscore the enormous magnitude of the problem of sports and recreational injury. Using data from the National Health Interview Survey, an annual face-to-face survey of over 37 000 households in the US, the authors estimate that there are 26 sports and recreational injury episodes per 1000 persons per year; this rate exceeds the rate for transportation related injury. Obviously there are marked differences in severity between sports and recreational injuries and transportation injuries, however, 20% of schoolchildren are absent from school at least one day a year due to sports injuries, and 28% of working adults lose at least one day a year from work due to sports injuries. Perhaps the most staggering statistic is that for those persons ages 5 to 24 years, sports injuries account for one out of every five injury episodes.

Data such as these call into question the wisdom, in public health terms, of attempting to increase in a broad based manner the level of physical activity in the population. There is a urgent need for specific guidance as to which physical activities confer the greatest health benefits in terms of preventing chronic disease, while minimizing the injury risks. Public health recommendations need to address the specific mix of mild, moderate, and vigorous physical activity not only in terms of chronic disease prevention and treatment, but also in terms of management of the risk of injury.

One of the first steps in identifying issues of public health concern is the gathering of incidence statistics. From an injury control perspective, the problem of sports and recreational injury has gone undocumented for far too long. This is in part due to the fact these injuries tend to be of lower severity. As a result, much of the burden of these injuries has fallen outside the scope of standard data collection systems for fatal and hospitalized injuries. It is also due in part to deficiencies in previous coding systems used to categorize injury, such as International Classification of Diseases, ninth revision, clinical modification (ICD-9-CM), which were unable to comprehensively classify sports injuries. Finally, it must be admitted that social dynamics have also played a role; physical health professionals have tended not to engage intellectually and socially with their colleagues in exercise and sports science, and vice versa.

What can be done to make sports and recreational activity safer? Protective equipment interventions are one option; in the sports of recreational baseball and softball, safety bases, softer balls, and protective faceguards have all been shown to be effective and are widely adopted. Rule changes also have great potential; the rule changes and player education programs introduced into North American football in recent years have reduced the incidence of catastrophic injury in that sport from 36 per annum to zero. More problematic are nebulous, ill defined injuries such as concussion, or those due to intrinsic forces, such as rupture of the anterior cruciate ligament.

An important new use of analytic epidemiologic studies in sports and recreational injury is the use of the prospective cohort design. This study design has great applicability to the study of sports and recreational injury because cohorts can be assembled and data on putative risk factors obtained at the start of the sports season. Athletes can then followed over the course of the season and injuries prospectively identified by their health care providers. The time between acquisition of risk factor data and ascertainment of injuries is typically short—weeks or months, as opposed to the years or decades common in occupational or environmental epidemiology. Cohort sizes can be quite modest (hundreds rather than thousands) because sufficient injuries typically present during only a few seasons of follow up. Acquisition of accurate data on participation in sports (so-called "exposure" data) is critical to success of these studies. Methodologic research on the most efficient techniques for obtaining participation or exposure data is required.

From the prevention standpoint, the sports injury community is notable for the presence of a group of medical professionals known as certified athletic trainers (ATCs). ATCs specialize in the prevention, assessment, treatment, and rehabilitation of injuries and transportation injuries. Sports and recreational injury episodes per 1000 persons per year; this rate exceeds the US has been documented in much greater detail than was possible in previous reports. Data collection in one of the largest and longest lived injury surveillance systems in the world, the National Collegiate Athletic Association's Injury Surveillance System, is largely supported through the volunteer work of ATCs.

Sport and recreational physical activity is an integral and vital component of our society. Increasing the level of physical activity in children and adults is a pressing public health concern; however, the injuries resulting from sports and recreational activities are also a grave public health concern. For the US, we now have a clearer picture of those injuries than ever before. The burden of responsibility now rests on the shoulders of the injury control professionals to partner with sports medicine professionals and exercise science researchers in order to develop physical activity guidelines that minimize the risk of injury in sports and recreational activities, while maximizing the public health gain from prevention of obesity and other inactivity related disease. Injury Prevention 2003; 9: 100–102