

Nonelite exercise-related injuries: Participant reported frequency, management and perceptions of their consequences

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This mixed methods study explored the frequency of sport/exercise-related injuries in nonelite sport, participant-reported management and perceptions of potential injury consequences. Focus group participants, who trained two to four times a week and had previously sustained musculoskeletal sports-related injuries, reported seeking medical advice secondary to advice from teammates or online research. General practitioners were viewed as gatekeepers to specialist secondary care and less able to effectively treat sport-related injuries. Participants displayed limited awareness of potential future implications of injury, and considered physical and psychological benefits of exercise more valuable than potential injury-associated risks. In the survey of physically

active people, over half reported sustaining an exercise-related injury (562/1002, 56%). Previously injured respondents were less likely to consider consulting a health professional for injury-related advice than those with no injury history (45% vs 64%; $P < 0.001$) and more likely to continue exercising despite injury (51% vs 37%; $P < 0.001$). Concerns about injuries largely related to short-term issues; only 32% were concerned about possible long-term joint problems including osteoarthritis. Exercise-related injury was common in nonelite exercise participants. There was some dissatisfaction with care pathways for sports-related injuries and a lack of awareness about appropriate injury management and potential consequences of injury, particularly in the long-term.

Physical activity is essential for overall health and longevity (Warburton et al., 2006), playing an important role in the management and prevention of common health problems such as cardiovascular disease and type II diabetes (Blair, 2009; Hellénus & Sundberg, 2011). A 2010 survey suggested that regular exercise participation in the UK may be as low as 16% (Sport England, 2010), with the annual cost of physical inactivity reaching at least £2 billion (The Health and Social Care Information Centre, Lifestyles Statistics, 2011). There is therefore a need to increase the uptake of regular physical activity. However, such activity is coupled to risk of injury, especially sports/exercise-induced musculoskeletal injury (Verhagen & van Mechelen, 2010).

In the short term, sports-related injuries can cause pain, absence from work, loss of time for training and competition, and associated financial costs. However musculoskeletal injury is also a major risk-factor for the development of osteoarthritis (OA; Muthuri et al., 2011), which is becoming increasingly more common in ageing

Western societies. A number of studies have examined the inter-relationship between sports injury and subsequent development of OA. In a study of male former top-level athletes, the risk of knee OA was increased almost five times in those with previous knee injuries compared with those without [odds ratio (OR) 4.73; Kujala et al., 1995]. Further studies have identified injuries such as meniscal injuries, knee ligament tears and fractures involving articular surfaces as strong risk factors for knee OA, increasing the OA risk as much as 10-fold compared with age-matched uninjured populations (Gillquist & Messner, 1999; Cooper et al., 2000; Gelber et al., 2000; Sutton et al., 2001; Takeda et al., 2011).

The majority of studies to date have examined elite sports populations and very few have investigated sports injury in people participating in sports/exercise at a recreational level, despite such participants representing the bulk of the exercise-active population. In 2010–2011 sports injuries accounted for 2.2% (352 899) of accident and emergency (A&E) attendances in England, with similar figures in 2008–2009 and 2009–2010. Similarly, sports-related injuries are estimated to account for approximately 2–3% of general practitioner (GP) consultations each year and musculoskeletal complaints for

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15–25% of consultations (Jordan et al., 2010; Baarveld et al., 2011).

Despite the reported high prevalence of injury in nonelite athletes, there has been relatively little research into where injured people go to seek help from healthcare professionals or participant understanding of the consequences of such injuries. The aims of this study were therefore to explore sports-related injuries in people who are currently exercise active (at a nonelite/nonprofessional level), their reported current management pathways and perceptions of the consequences of sports-related injuries.

Materials and methods

A mixed methods study, which included focus groups and a survey, was conducted in order to examine the frequency of sports-related injuries, responses to injury and injury management. The study was conducted under the market research ethics approval held by the independent market research companies, ICM Research and Brand Health International, who conducted the survey. Informed consent was obtained from participants.

Focus groups

Focus groups were planned according to guidelines for focus group methodology (Tang & Davis, 1995; Morgan, 1998). Three 90-min focus group discussions were held in Birmingham, London, and Manchester in August 2010. Each group included a mix of eight male and female participants selected based on the following criteria: (a) aged 25–50 years; (b) training two to four times a week for a specific event (e.g. triathlon), and (c) had suffered a sports-related injury (defined as an event which restricted participation) during the past 2 years. The aim of the focus groups was to understand sports participants' attitudes to injury, how injuries were managed and perceived implications of injury. The 2-year window for injury was selected to improve recall. The experienced focus group facilitators used a series of predefined questions related to five topics to further explore the impact of exercise and sports-related injuries: (a) range of sports/exercise activities in a typical week; (b) injuries experienced and attitudes toward them; (c) actions taken to address injuries (medical and nonmedical); (d) barriers and attitudes to seeking medical treatment; and (e) Perceived future implications of the injury. Each focus group was recorded and transcribed. A pragmatic approach was undertaken to review the transcripts: initially responses of all participants were extracted from the transcripts and grouped into themes by an experienced qualitative researcher. Within each of the themes, aggregated responses across the focus groups were analyzed and listed according to frequency.

Online survey

A systematic literature review (data not presented here) and qualitative interviews with sports participants, GPs and members of the public were conducted to inform the design of the online survey. For the purposes of this study, exercise was defined as planned bouts of physical activity that is structured and for health benefits and sport as a branch of physical activity which is in a competitive environment where rules are adhered to (Caspersen et al., 1985).

The survey questions offered a variety of relevant set responses (Appendix 1). Following development, survey questions were reviewed by a clinical and lay panel. The survey was conducted in September 2010. Participants were recruited by contact of previous telephone survey participants and using the ICM online panel

(<http://www.icm-direct.com>). The latter consists of over 135 000 adults across the UK who have registered an interest in participating in surveys. Invitations to complete the survey were emailed to all members of the online panel.

The survey targeted physically active people to assess the epidemiology of musculoskeletal sports injuries, utilization of health services to manage musculoskeletal sports injuries and perceptions of the consequences of sports injury. Only respondents who classed themselves as “physically active exercise participants” in the pre-survey filter question, defined as exercising three or more times a week either currently or previously before sustaining an injury, were able to complete the survey. Because of this recruitment strategy, response rates could not be determined.

Descriptive statistics were used to present the data according to the questionnaire categories. In some categories, respondents had the opportunity to include more than one response; therefore data could exceed 100%. Pearson's chi-squared or Fisher's exact tests were conducted for response to injury in relation to gender, age and experience of previous injury.

Results

Focus groups

The focus group participants were aged between 25 and 50 years old and had sustained musculoskeletal injuries in relation to sports activity in the past 2 years, including running and football. All participants defined themselves as “keen amateurs” and were actively training for an event (including triathlon, marathon) two-four times a week. Reported injuries included sprained ankle, fractured patella, torn hamstring, knee ligament tears and sprains, foot fracture and tennis elbow. Almost all (23/24) had sought medical advice for their injury and 9/24 had received medical treatment (for example, surgery, splinting).

All participants observed that regular exercise was a necessary part of their life; most reported being active since a young age and stated the need to maintain an active lifestyle with ageing to maintain good health. The physical and psychological benefits of exercise were considered more valuable than any potential injury-associated risks (Supporting Information Table S1). In the event of an injury, participants expressed feelings of frustration and most reported returning to training before full recovery; regaining a competitive edge was commonly regarded as a higher priority despite the potential dangers of an early return to training.

Post-injury, most participants sought medical advice, although most reported a delay because of a preference to first seek advice from teammates, friends, and family, and to conduct individual research, typically online. The primary drivers of seeking medical attention were intense pain and/or loss of function or worsening/unresolved symptoms over time. Medical advice was often not sought where the injury was bearable or history of previous injury where medical advice was deemed to have not been useful. The most commonly reported expectations of medical advice were to understand how the injury happened so as to avoid a recurrence and guidance on returning to training and regaining strength and function as quickly as possible.

Most participants viewed their GP as a gatekeeper to specialist secondary care and imaging investigations. Practitioners such as physiotherapists, chiropractors, osteopaths, and orthopedic surgeons were considered more able to effectively treat sports-related injuries. Satisfaction levels with treatment and with healthcare professionals varied according to the level of advice and rehabilitation provided. The ultimate goal for participants was to return to playing sport and training; those healthcare professionals that offered advice and guidance on this issue were most valued.

Potential reoccurrence of an injury outweighed any fears regarding long-term complications such as OA. Reoccurrence was considered preventable by many through switching activity (e.g. lessening impact on the joint), using specialized equipment (e.g. strapping, supports) or by taking supplements (e.g. glucosamine, calcium).

Participants displayed very limited awareness of the potential future implications of sports injuries except the possibility of the same injury reoccurring and little or no awareness of arthritis as a possible consequence of sporting injury. The majority of participants were unaware of information about the condition and its causes and many considered it to be a disease of the elderly, and less

important than diabetes and cardiovascular health. Consequently, most participants did not consider OA to be relevant to them at this time.

Survey of “physically active” exercise participants

The survey was completed by 1002 respondents. Fifty-six percent of respondents were women ($n = 563/1002$), the mean age was 44, and geographically, respondents were evenly spread across the UK. The majority ($n = 762/1002$; 76%) reported engaging in sport or exercise at least three times a week (Table 1). Sixteen percent ($n = 159/1002$) usually engaged in sport/exercise, but were currently recovering from an exercise-related injury while a similar number continued to exercise regularly despite currently having an injury ($n = 149/1002$; 15%). Thirteen percent ($n = 134/1002$) had sought advice or treatment for an exercise-related injury in the last 2 years. A minority had previously played sport or exercised regularly, but now reported to have been diagnosed with OA and stopped regular sports participation or exercise (2%). Overall, the majority of the survey population were either physically active at the time of participation in the survey or had sustained a fairly recent injury, which had caused a temporary halt to activity.

Training at the gym was the most frequent form of exercise regularly undertaken, followed by swimming, running, cycling, and football (Table 2). The majority had been actively participating in sport or exercise for more than 10 years.

Sports injuries

Over half of the “physically active” respondents reported ever sustaining injury/ies related to their sports participation (Table 1). The majority of reported injuries (most recent injury recorded if multiple had occurred) were sustained in either the previous year ($n = 229/562$; 41%) or 1–3 years previously ($n = 190/562$; 34%). Of the

Table 1. Characteristics of exercise participants completing the injury survey

Characteristic	Exercise or play sports at least three times a week n (%)	Sustained pain/injury through sport/exercise n (%)	
Gender			
Female ($n = 563$)	443 (79)	258 (46)	$P < 0.001$
Males ($n = 439$)	319 (73)	304 (69)	
Age			
18–24 ($n=118$)	92 (78)	64 (54)	$P < 0.001$
25–34 ($n=216$)	168 (78)	121 (56)	
35–44 ($n=149$)	117 (79)	95 (64)	
45–54 ($n=268$)	198 (74)	152 (57)	
55–64 ($n=151$)	108 (72)	86 (57)	
65+ ($n=100$)	79 (79)	44 (44)	

Table 2. Distribution of sports injuries according to sport and number of years playing

Sport	Participants $n = 1002$	Number of years playing sport (% of participants reporting injury)							Total
		<1	1–3	4–6	7–10	11–15	16–20	>20	
Gym	477	5%	14%	11%	10%	7%	3%	2%	55%
Swimming	405	2%	3%	6%	7%	4%	5%	29%	56%
Running	353	5%	11%	10%	10%	6%	3%	14%	58%
Cycling	305	5%	11%	7%	6%	5%	6%	27%	66%
Football	147	1%	4%	4%	5%	8%	13%	38%	73%
Tennis	125	2%	10%	10%	7%	9%	6%	28%	72%
Squash	41	2%	12%	15%	10%	10%	12%	27%	88%
Rowing	26	8%	19%	19%	12%	NR	4%	NR	62%
Netball	19	5%	NR	16%	NR	5%	11%	5%	42%
Skiing	33	NR	9%	9%	9%	12%	15%	21%	76%
Rugby	19	NR	5%	5%	26%	NR	5%	32%	74%
Hockey	14	7%	NR	14%	21%	29%	14%	7%	92%

NR, not reported as no participants within this category of number of years played this particular sport.

Table 3. Relationship between experience of previous injury and injury management

	Previous injury	No previous injury	<i>P</i>
Would seek advice from healthcare professional if injured	362 (64.4)	343 (78.0)	<i>P</i> < 0.001
Where did/would you go FIRST to seek information and advice about your injury?			
General practitioner	181 (32)	254 (57.7)	<i>P</i> < 0.001
Accident and emergency	72 (12.8)	28 (6.4)	
Would not seek any advice	99 (17.6)	10 (2.3)	
Which did you/would you do while recovering from injury?			
Would continue exercising	48 (8.6)	7 (1.6)	<i>P</i> < 0.0001
Would reduce exercise	117 (21)	68 (17)	
Would stop exercise and then gradually reintroduce	118 (21)	86 (20)	
Would stop exercising altogether	276 (49)	276 (63)	

Table 4. Relationship between age and injury management

Age	Would seek advice from healthcare professional if injured	Where did/would you go FIRST to seek information and advice about your injury?			
		General practitioner	Private healthcare	Internet	Teammates/peers
18–24 (n = 118)	69 (59)	38 (32)	6 (5)	18 (15)	5 (4.2)
25–34 (n = 216)	136 (62)	82 (38)	14 (6)	33 (15)	8 (3.7)
35–44 (n = 149)	107 (72)	66 (44)	14 (9.4)	15 (10)	7 (4.7)
45–54 (n = 268)	194 (72)	126 (47)	34 (12.7)	18 (7)	13 (4.9)
55–64 (n = 151)	118 (78)	69 (46)	20 (13.9)	9 (6)	2 (2)
65+ (n = 100)	81 (81)	54 (54)	14 (14)	3 (3)	0 (0)
<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001

remaining reported injuries, 9% (50/562) had been sustained in the previous 4–6 years; 7% (37/562) in the previous 7–10 years; 6% (36/562) in the previous 11–20 years and 4% (20/562) over 20 years ago. Sport-related injury was significantly more common in men than women (69% vs 46%; *P* < 0.001; Table 1 and Supporting Information Table S2), and was less common in the younger and older age groups (18–24 and 65+ ; *P* < 0.001; Table 1 and Supporting Information Table S2). Injury was generally associated with increased number of years playing sport (Table 2).

Sports injury management

The majority (80%, *n* = 798/1002) stated that they did, or would, consult a health professional for information and advice about their injury. The most commonly reported sources of information and advice were GPs, A&E, and the Internet. Respondents who had not previously sustained an injury and older people were significantly more likely to state that they would seek advice regarding injury, to consult a health professional and for their GP to be their first source of information (Tables 3 and 4, *P* < 0.001). Younger people were more likely to use alternative sources of information such as the Internet and teammates/peers. Of those that did consult with a healthcare professional about their injury, 94% (*n* = 374/400) received a diagnosis: sprained ligament (*n* = 95/374; 26%), muscle tear (*n* = 89/374; 22%), undiagnosed pain in joint area (16%; *n* = 59/

374), tendonitis, tendinopathy or repetitive strain injury (*n* = 46/374; 12%), fracture (*n* = 40/374; 10%), and dislocation (*n* = 18/374; 5%). Most (*n* = 342/400; 86%) felt that they had been provided with some advice on how to tailor their exercise based on their injury, approximately half receiving long-term advice and two-thirds receiving short-term advice. A small proportion (13%) reported receiving no advice from their healthcare professional.

While recovering from an injury, most reported that they would either stop (75%) or reduce (20%) their level of exercise until they were partially or fully recovered, although some would continue with their usual level of sport or exercise (5%). People who had previously sustained an injury were significantly more likely to continue exercising despite injury (Table 3, *P* < 0.001).

Concerns about sports injuries

When asked about any concerns that they might have about the long-term consequences of their injury, the majority (*n* = 437/562; 78%) stated they had a concern about the potential complications of their injury. Most respondents were concerned about short-term consequences, such as the injury reoccurring or becoming worse (*n* = 294/562; 53%) or that their fitness level would decrease (*n* = 184/562; 33%). A third reported concern about long-term joint problems such as OA or limited mobility (*n* = 178/562; 32%).

Discussion

This study aimed to examine the frequency of sports injury in nonelite sports participants, attitudes to injury management, and perceptions of the consequences of injury. Sports-related injury was common in this population, particularly in men and those aged 35–44. Dissatisfaction surrounding medical care pathways for sports-related injuries was evident from the focus groups. Although not directly examined within the survey, the finding that those with history of previous injury were more likely to report that they would not seek medical advice for future injury and were more likely to continue exercising despite injury, suggests that this population may have had similar feelings of dissatisfaction. In general, there was limited awareness about the potential future implications of sport-related injuries, particularly with respect to long-term consequences such as OA.

Although recreational sports participation represents the bulk of the exercise-active population, most studies of sports-related injuries have focused on elite sports. Notably, the few studies that have been conducted suggest that injury incidence is as high as 54.8% per year for recreational long-distance runners, and 17.6% per year for amateur golfers, while in a 5-year retrospective study of amateur footballers the mean number of injuries per player was 1.75 (McKean et al., 2006; McHardy et al., 2007; Tsiganos et al., 2007; Van Middelkoop et al., 2008). In keeping with these studies, the current study found a relatively high rate of injury in recreational sports participants, with approximately one-quarter of the survey respondents reporting to have sustained an injury related to their sports participation in the previous year. Highest injury frequency was related to increased number of years playing sports (greater than 20 years), as may be expected given the increased exposure to risk of injury. Injury was also most commonly reported by people participating in rugby and football, in line with previous reports indicating rugby to be the sport associated with the greatest overall injury incidence and football with the highest frequency of ankle injuries and anterior cruciate ligament (ACL) injuries (King et al., 2010; Ekstrand et al., 2011).

It is evident from both the focus groups and survey data that GPs are often perceived only as a means of accessing specialist facilities. In the UK, specialist/imaging services are not generally directly accessible to patients and often require lengthy waiting times following referral of patients to these services by their GP. There is therefore an increased risk of frustrated sports participants returning to activity before injury resolution, perhaps explaining why those with previous injury were more likely to state that they would continue exercising despite injury and were less likely to seek advice, particularly from healthcare professionals. A previous small survey of injured sports participants presenting to A&E

found that nine out of 10 would prefer their care to be managed in a specialist sports medicine clinic rather than by their GP, commonly citing GPs as having too little time, lack of interest, or inadequate knowledge to competently manage the injury, findings that are echoed in the focus groups from the current study (Boyce & Quigley, 2001).

There have been a number of reports suggesting that GPs in the UK lack experience in dealing with sports injuries and rely heavily on pharmacological therapies (Boyce & Quigley, 2001; Pike, 2005). GPs themselves have indicated feeling undertrained in sport and exercise medicine (Buckler, 1999; Pike, 2005; Al-Nammari et al., 2009; Woods & Moynihan, 2009), while a recent study suggested that the UK junior doctor training program provides inadequate musculoskeletal medicine training (Al-Nammari et al., 2009). Improved education of GPs and improved integration with sports and exercise medicine (SEM) services may facilitate better management of sports-related injuries and improved confidence in GPs. Although SEM was granted specialty status in 2005, there is still a lack of consensus as to the role of SEM physicians in the National Health Service (NHS) and how these services should be delivered and the number of substantive consultant posts within the NHS remains limited (Cullen, 2009). In a recent survey of GPs, orthopedic, and rheumatology consultants, 93% felt that there was a role for separate SEM in the UK, and that this should be placed both alongside GPs and in secondary care (Cullen, 2009; O'Halloran et al., 2009). It should be noted, that because of the very limited access to SEM physicians in the UK, the survey did not provide the option for participants to state that they sought advice from SEM physicians. Therefore, we cannot conclude from this study whether any participants were able to access this service.

The lack of awareness or concern regarding the long-term complications of sports injury was evident in this study. Although most participants reported concern about potential complications of injury, these were largely related to the injury reoccurring or worsening, or to a decrease in fitness. OA was consistently alluded to as a disease of the elderly during focus group discussions, less important than other diseases such as ischemic heart disease and diabetes, and not relevant. While the risk of long-term consequences most likely relate to the nature of a particular injury (e.g. knee joint trauma versus a calf muscle tear), there is limited published evidence that sports participants distinguish between these injuries.

Within elite sport there is considerable pressure on athletes, both from the athlete themselves and from coaches, to return to normal training and participation as quickly as possible (Turner, 2011). Although acute injury management and rehabilitation programs have substantially improved in recent years, there is increasing evidence of the negative long-term implications of

“quick-fix” strategies for important joint trauma such as ACL injuries, and of the need to ensure that athletes do not return to sport too early (Roos et al., 1998; Li et al., 2011). This study suggests that this philosophy of “*play now – pay later*” among elite athletes is also evident in nonelite sports participants.

This study does have limitations. The focus groups were of small sample sizes and only included previously injured participants, thereby potentially introducing bias. In addition, formal qualitative analysis was not conducted on the transcripts of these interviews, thereby potentially limiting the depth of data drawn from this component of the study. Because of the use of an online survey, the elderly population was underrepresented, while the retrospective nature of the survey may have introduced recall bias. Chronicity of injury was not defined in the survey; we therefore cannot differentiate individuals who suffered an acute injury a few days prior from those who may still view themselves as having a weakness in a particular area because of a sports injury that happened years ago. In addition, approximately half of those with history of an injury had reportedly experienced soft-tissue injury, which may not directly lead to long-term joint damage. Education level and social background were not recorded; therefore, we were unable to determine whether this influences injury management or the perception of the consequences of injury. While the population studied within our survey and focus group are likely representative of similar populations within other countries, further work is required to understand whether our findings are generalizable outside of the UK.

Perspectives

Sports participation is known to have a beneficial effect on overall health and longevity. However, these benefits are coupled to risk of injury, which in the short term can cause pain, loss of time for training and absence from work, and in the long term is a major risk factor for the development of OA. Our study identified a concerning lack of awareness surrounding injury management, with many participants reporting that they would continue exercising despite injury. Participants were more worried about being able to exercise now, and in general did not consider the potential negative long-term consequences of returning to sport too early to be important. Although injury prevention programs have been successfully developed among a number of specific sporting populations (Bahr et al., 1997; Olsen et al., 2005; Junge et al., 2011; Myklebust et al., 2013), these findings suggest that there is a considerable need to educate nonelite sports

participants about injury prevention and management. There is a paucity of published data to inform us whether this lack of understanding of injury consequences is widespread in other countries. Furthermore, the notable lack of confidence in the competence of GPs to manage sports injuries, a finding echoed by GPs themselves in previous studies (Buckler, 1999; Boyce & Quigley, 2001; Al-Nammari et al., 2009), suggests that education programs need to be directed not just toward sports participants but also to better equip the clinicians responsible for managing sports-related injuries. The issues concerning care pathways may of course not be generalizable to other health systems where access to sports physicians or specialists is more readily available.

Key words: Nonelite, exercise, sport, injury, general practice, osteoarthritis.

Abbreviations: A&E, accident and emergency; GP, general practitioner; OA, osteoarthritis; OR, odds ratio; NHS, National Health Service; SEM, sports and exercise medicine.

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Competing interests

AG and SRK: no conflicts; PGC: research funding from Centocor and Pfizer; speaker or advisory boards for AstraZeneca, Bioiberica, BMS, Merck, Novartis, Pfizer, Roche.

Authors contributions

PGC conceived the study. AG and SRK conducted the analysis. All authors were involved in drafting the manuscript, and read and approved the final manuscript.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher’s web-site:

Table S1. Quotes from comments made by focus group participants.

Table S2. Reporting of previous injury according to age and gender.

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