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Community Options for Outdoor Recreation as an Alternative to Maintain Population Health and Wellness

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1. Introduction

Among professional, elite amateur and recreational athletes, having a sports injury can cause physical, social and psychological concern. Individuals with a sports injury may experience a significant challenge due to the reduced ability to participate in regular training. The injury may result in changes to their daily routine, and require time to heal. Regardless of etiology or prognosis, the loss presents a serious challenge to the athlete's health. In order to promote recovery, it is important for the injured person to adopt alternative approaches to remaining active. The injured athlete can engage in a variety of challenging and satisfying activities which will provide assistance in overcoming physical psychological and social concerns associated with being inactive. Outdoor recreation allows injured athletes the opportunity to modify their training activity in order to rest the injured body part, and provide a variety of physical activity opportunities to maintain health and wellness.

2. Health and wellbeing

The health benefits of outdoor recreational physical activity can be attributed to many different dimensions beyond physiological. Researchers have studied the relationship between outdoor recreational physical activity and psychological health and have found improved ratings of quality of life, decreased stress reduction, improved feelings of self-competence, and positive changes in mood and emotions. Thus, the health benefits of outdoor recreational activity are extensive, and outdoor recreation is a viable community alternative for places to participate in sport, exercise and physical activities. The outdoor environment provides an opportunity for people to recover from daily stress and fatigue, and on any given day, $\frac{1}{4}$ or about 54 million U.S. adults participate in a sport, exercise, or recreational activity. The benefit of many community outdoor recreational locations is that they provide an easily accessible place to maintain an active lifestyle. Community options surround everyone and to name a few, may consist of forests, beaches, parks, and sports fields. There is growing recognition for the value of outdoor recreation in promoting activity options to recover from sports-related injuries.

3. Physical health

Prolonged inactivity is detrimental to recovering from a sports injury. Research has shown that regular physical activity reduces people's risk for heart attack, colon cancer, diabetes, and high blood pressure and may reduce risk of stroke (USDHHS, 2008). Evidence compiled from many decades of research investigating the frequency, intensity and duration of physical activity show that regular physical activity assists in increasing and maintaining muscle strength, balance, and neuromuscular control. Evidence also suggests that moderate physical activity may in part offer some protection against injuries and may mediate tissue repair, the formation of new blood vessels, tissue remodeling and scar tissue healing. Movement also helps to provide a continued supply of nutrients and ensures that the muscles do not atrophy. Current guidelines for physical activity suggest that to prevent repetitive strain on the initial injury site, early movement is important for tissue to repair. The U.S. Department of Human Health and Human Services recommends that all adults should set the goal to accumulate at least 150 minutes per week or more of moderate-intensity physical activity (e.g., brisk walking) to reduce the risk of disease (USDHHS, 2008; USDHHS, 1996). In addition, these guidelines suggest that benefits can also be obtained with 75 minutes per week of vigorous-intensity physical activity (e.g., biking). Those with acute injuries may consider beginning a new activity plan with small amount of moderate- to vigorous-intensity physical activity such as 10 minutes, and gradually build up to the 150 minutes per week goal overtime. To strengthen muscle and bones, this minimal standard may be derived by intermittent or short bouts of activity (such as brisk walking, cycling, swimming and yard work) of at least 10 minutes in duration. The impact of an inactive lifestyle has severe consequences, thus injured athletes are encouraged to engage in a variety of their preferred type of activity. People who perform more formal exercise (e.g., structured exercise program) can accumulate this daily total through a variety of recreational or sports activities. Community outdoor recreation environments provide numerous opportunities such as participation in low impact sports, walking or hiking groups and can accommodate most individual preferences.

Public park settings provide opportunities for a variety of physical activities such as walking, biking, playing sports and games, etc. and oftentimes offer places to engage in hobbies such as boating, gardening, and picnicking. Participation in hobbies of the recreational kind may assist in providing opportunities for more gentle movement of the injured area. Encouraging participation in low-impact sports and recreation activity in the community provides alternative activity options that can help prevent re-injury and recovery from the sports injury. Recreational fitness facilities are also sought out places.

4. Psychological health

Little is known about the mechanism by which physical activity plays in treating mental illness. The most common mental illness is depression. Evidence of reduced depression in populations defined as being clinically depressed, have been noted within 4 to 8 weeks and results have persisted for up to one year. Moreover, studies show that physical activity provides an equally beneficial anti-depressant effect to that of standard psychotherapeutic treatments. One possible explanation is that physical activity reduces anxiety and improves mood. Exercise helps to improve psychological health through the release of neurotransmitters and endorphins. The release of the 'feel-good' brain chemicals may help

ease the feelings of depression. Also, physical activity helps to improve the immune system and increase the body temperature, all which have calming effects on the body.

It is also plausible that the environment in which people are active in has an effect on their psychological health. Studies have examined the amount of green space in people's direct living environment and the amount of time they spend walking or bicycling. In the Netherlands, where bicycling for leisure or transportation is very popular, children under age 12 who reported living in a lush green neighborhood had lower levels of anxiety or depression. Researchers found that the environment influences positive mental health (Maas et al., 2008). Physical activity in the outdoors can provide emotional benefits as well. By being active in the outdoors may provide a healthy distraction from negative thoughts, and help individuals take their mind off of their worries. Some adults may choose to 'walk away their worries' as a coping mechanism.

Whether the changing of the environment or being active in a new environment influences psychological health, it is important to do something positive to manage symptoms of distress. Regardless of the outdoor setting, the natural environment has long been thought of as an ideal environment for rest, reflection, and positive mental health. The relationship between an individual's home, work and play life as well as their feelings of mental health, security and calmness will continue to be the subject of much discussion in future years.

A green environment has also been found to reduce stress (Pretty et. al., 2005). In some cities, planting of flowers and trees in the median of the roadways can to reduce accidents as the creation of these aesthetically pleasing surroundings narrows the roads causing drivers to reduce their speed and slow down. The use of aesthetically pleasing road designs such as buried utility cables, improved storm water management (e.g. raising curbs, improving storm water drainage) and pedestrian friendly sidewalks have also helped to reduce accidents among pedestrians and bicyclists. Another successful advancement in urban centers is the expansion of multi-use trails (those that connect residential areas with green spaces), the creation of pocket parks, planting of street trees (those planted along streetscapes) which help to establish green spaces and absorb heat. People who live in environments without viable green spaces may be forced to seek community options for places to participate in sports, exercise and physical activities.

5. Social health

The benefits of recreational physical activity also support social health. Being active outdoors gives people the chance to meet or socialize with others. Just exchanging a friendly smile or a greeting with others can help raise one's mood. The action of strolling around the block by foot or by rollerblade is an activity that can also boost self-confidence and familiarity with the environment and with those who reside in the surrounding area. Research has found that social support from both family and friends are positively associated with wellbeing (Warr et. al., 2009). Being active with a partner or in a group provides social cohesion or support, and this can enhance psychological health as well. Recently it has been found that people who lack a strong network of friends and family are at greatest risk of developing and dying from heart disease. Therefore, a lack of companionship can be a detriment to health.

The social environment can encourage physical activity, which does not need to be strenuous to be beneficial. The outdoor environment allows people to encounter others to make new friends or become acquainted with others who enjoy engaging in the same

activity (e.g., biking on a trail). Being part of a team-based activity (e.g., playing softball) can help one develop social skills as team activities require commitment to participating in a weekly practice schedule. Interacting on a team can encourage physical activity among people who tend to be socially isolated. Also selecting activities that require refined skill such as pool, shooting, archery, and so on, can enhance focus and attention. The challenge of these types of activities can increase self-confidence. Successfully developing new skills and builds self-esteem and mastery.

Neighborhood parks provide opportunities for social cohesion within a community. Neighborhood corner parks also provide viable outdoor recreational options to walk or bike to and are great places where people can gather. Access to parks via multi-use trails provide socially responsible communities opportunities to volunteer to assist with trail maintenance. Natural environments also allow local residents to have places to read, relax or view birds or animals. The provision of parks and connective trails in non-urban areas has been found to improve wellbeing for local residents and increase overall physical activity levels (Sugiyama et al., 2008).

6. Physical activity and weight loss and weight maintenance

Research has shown that physical activity helps to control weight, contributes to healthy bones, muscles and joints. The negative consequences of an inactive lifestyle and being obese have resulted in over 300,000 premature deaths a year. Increasing physical activity is one of the cornerstones of a long-term healthy weight management program (USDHHS, 2008). Physical activity has been effective at helping people to keep from gaining weight and in losing weight when combined with a decrease in caloric intake. Injured athletes may find themselves inactive for the first time after an injury, and as a result, start to gain weight.

Physical activity should be an integral part of a weight control treatment plan since an inactive lifestyle is an important contributor to gradual weight gain and can lead to obesity. Sometimes the reason for being inactive in the first place is because of an acute or re-occurring sports injury. An athlete in this predicament may need to look closely at their activity pattern and select an activity that they can participate in fully without being re-injured. More research on patterns of physical activity among persons trying to lose weight or trying to maintain their weight may provide injured athletes with direction as to how to increase their physical activity levels beyond their preferred form of sport.

The inter-relationship between physical activity and weight maintenance is complex. Research has found that aerobic physical activity alone only produces a modest weight loss of 1-2kg compared to that seen with combined physical activity and diet interventions (USDHHS, 2008). Research has found that sedentary habits may lead to obesity. In the general population, those trying to lose weight or maintain their weight, compared to those not trying to control their weight are three times more likely to be regularly active than inactive (Kruger et. al., 2008). Pooled data from the 1999-2002 National Health and Nutrition Examination Survey (NHANES) showed that the most common physical activities reported by those trying to control their weight were: yard work, biking, running and weight lifting (Table 1). Walking was the most common activity reported across all weight control categories, although the prevalence of walking was greater among those trying to maintain (45.3%) compared to those trying to lose (38.3%) or not lose/maintain (24.0%).

	Lose weight		Maintain weight only		Not lose/maintain	
Activity	% *	95%CI**	% *	95%CI**	% *	95%CI**
Walk	38.3	(36.1, 40.7)	45.3	(41.1, 49.6)	24.0	(21.4, 26.8)
Yard work	14.5	(11.5, 18.1)	15.9	(11.8, 21.1)	11.9	(9.5, 14.8)
Biking	12.5	(10.9, 14.4)	15.4	(11.8, 19.9)	8.3	(6.9, 9.9)
Run	11.6	(10.3, 13.0)	12.6	(8.6, 18.1)	8.7	(7.1, 10.6)
Weight lifting	10.0	(8.5, 11.7)	11.1	(8.4, 14.5)	6.2	(5.0, 7.6)
Dancing	9.8	(8.5, 11.3)	9.7	(7.7, 12.2)	6.4	(5.5, 7.5)
Aerobics	9.0	(7.6, 10.6)	6.2	(4.7, 8.0)	2.9	(2.3, 3.6)
Basketball	5.2	(4.0, 6.7)	7.3	(5.6, 9.4)	5.2	(4.3, 6.1)

* Percent is weighted.; ** Confidence interval.

Table 1. Prevalence of most common physical activities reported among all adults (≥18 years), stratified by trying to lose weight, maintain weight only or not lose/ maintain – National Health and Nutrition Examination Survey, 1999-2002.

Studies have also shown that increases in physical activity can result in reductions in abdominal adiposity (LaMonte et al., 2009) and an increased dose of physical activity can improving overall health. Research shows that increasing the amount of energy expended can result in more calories being burned. Thus persons trying to lose weight or keep from gaining weight should be active at a minimum level of ≥150 minutes on most days through moderate- or vigorous intensity physical activity.

7. Sports injury prevention

Because injury results in days lost from work or training, it is important to promote safe alternatives to protecting joints and muscles while maintaining a physically active lifestyle. Murphy’s Law states that “If anything is used to its full potential, something will break”. This saying sums up the etiology of overuse injuries. Recovery from a sports injury requires time for the area to heal. Pain often accompanies injury and may occur when starting to be active after a period of rest. That is why it is important set activity goals that are pain-free, promote range of motion and gradual increase in intensity and duration when the area is restored back to normal function. Injury incidence may differ by physical activity level because of the differences in the amount of potential overuse of a specific body part due to repetitive activities. Outdoor recreation is a healthy option for injured athletes to consider because low intensity recreational physical activities can be modified easily in regard to frequency, intensity and duration.

Because recovery requires a change in usual activities (from the original activity which caused the initial injury to occur), community options offer viable solutions to maintaining an active lifestyle. Walking has been shown to produce lower rates of injury than other activities such as running. Walking is also the most common form of physical activity and can be performed in any environment such as an inside or outside track, park, beach or neighbourhood. In general, walking can be performed by most people at varying speed. It has been estimated that’ in front of 50% of athletes

50% of athletes who participate in team sports have reported one or more injuries over a season of activity. This is much higher than estimates in the general public (non-athletes)

where 5% those who participate in sport activities report an injury. One reason that injuries are not as common in the general public is because they engage in sports less frequently (they are only occasionally active). Second they may be active at a lower intensity level instead high-intensity activities of sprinting or.

Table 2 reports the distribution of sports injuries by the specific region or site of the injury. Data from the Aerobics Center Longitudinal Study showed the most frequently injured site of the body for both men and women (Hootman et al., 2002). In general for both sexes, the three most common sites of the body are the knee (23.3% men, 22.3% women), the foot (12.9% men, 15.7% women), and the back (10.6% men, 10.3% women). Interestingly, less than one percent of women reported eye injury compared to 12.9% of men.

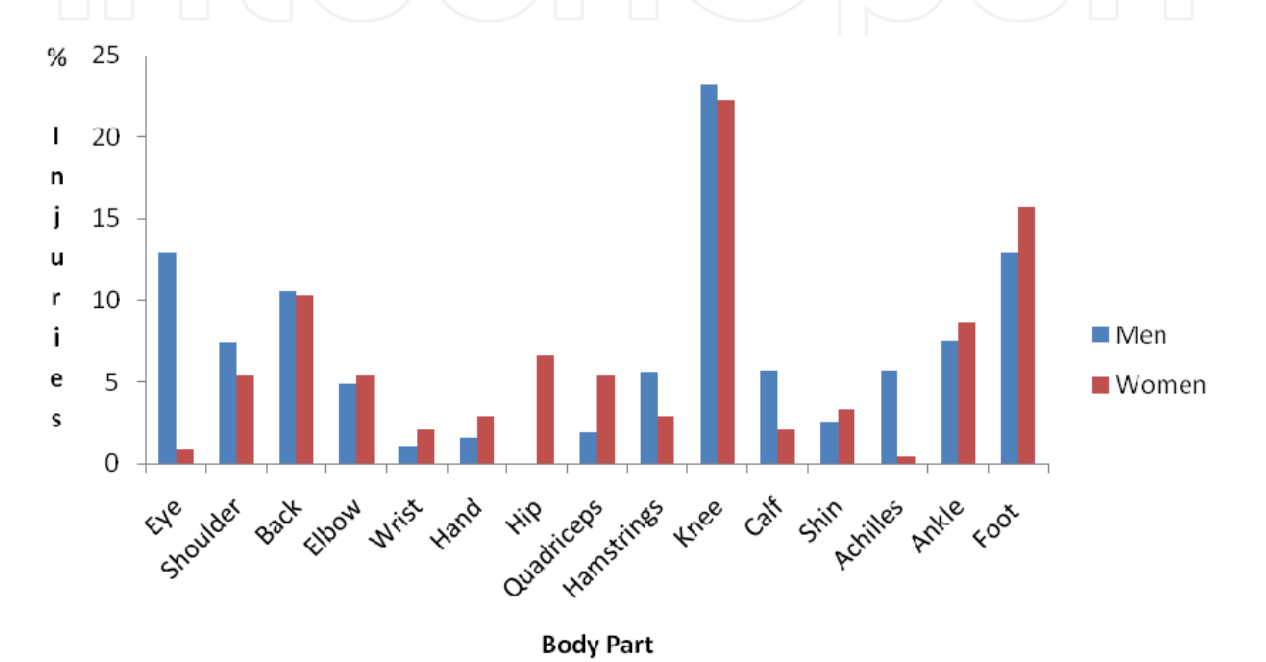


Fig. 1. Distribution (percentage) of injuries by body part for men and women – Aerobics Center Longitudinal Study, 1970-1886.

8. Classification of sprains, strains and other injuries

Injuries can be classified by the body part affected, or the site of the injury. Table 2 is a simple classification overview of the anatomical site (includes the area, tissue and anatomical structures affected) and resultant injury (what is wrong with the area). Depending on the nature of the problem and its severity, rest or modified activity may be recommended. The type of injury reported may depend on the sport.

Regardless of the cause of sports injury, general management include restoring function, enhancing the healing of the injury and being comfortable while engaging in activities of daily living. Sprains and strains are the most common form of sports injury. A sprain is defined as damage to a ligament or its attachment due to overstress. A strain is defined as damage to a muscle or tendon due to overstress (acute strain) or over use (chronic strain). Sprains, when acute require the traditional RICE approach which consists of Rest, Ice, Compression, Elevation, and encouraged movement. The principle is to prevent increased injury by controlling swelling and promoting recovery of function. Rest may require a tensor bandage, and adhesive strap, splint or plaster cast. Sprains can become chronic

depending on the severity of the initial injury, and re-occurrence due to additional injuries. Principles for treating chronic sprains require encouraging the individual to get back to regular physical activity as much as possible, localized muscle strengthening activities, pain management to relieve distress, prevention of further ligament lengthening problems (e.g., use of orthotic brace or straps) and in some situations surgery. Self-treatment modes used by injured athletes for musculoskeletal injuries also include the use of bandages, orthotics or change in the model or brands of the shoes they currently wear. Studies have shown that with these adaptations, injured athlete have been able to continue participating in moderate-intensity physical activity for >30 minutes a day.

Acute muscle strains often result from an accidental injury. A single event will cause sudden pain usually due to tears at the muscle-tendon junction. This types of this sports injury often results in localized tenderness at the muscle or tendon due to the violent force acting against great opposition. Chronic muscle strain often results from too much strain overtime on the muscle-tendon junction. In some cases, muscle strain begins as a minor injury (that is often neglected and becomes chronic), or as a poorly treated acute injury. Overtime, micro tears may occur at the muscle-tendon junction or muscle-bone junction, resulting in common problems such as shin-splints, jumper’s knee, and Achilles tendonitis.

Anatomical site	Result of injury
Soft tissue	Cut
	Abrasion
	Laceration
	Contusion/hematoma
	Muscle strain
	Ligament sprain
	Tendonitis/bursitis
Bone injury	Bruise
	Fracture: stable, unstable
Joint injury	Dislocation
	Cartilage: contusion/fracture
	Cartilage: bone/ligament sprains
Special areas: head injury	Fracture, concussion, hematoma
Special areas: chest injury	Rib cage, lungs, heart
Special areas: abdominal injury	Various internal organs

Table 2. Classification of Injuries

9. Common sports injuries

The human skin provides a protective cover for the internal body structure and organs. The skin is the largest body organ of the body and accounts for between 15-18% of total body weight. The skin has average thickness of 0.00394 mm and it is the most injured human organ. Injured athletes often sustain abrasions, cuts and lacerations to the skin. The layer of skin that envelopes the body is comprised of three separate components, namely the epidermis

(outer shell), the dermis (middle layer) and the sub cutis (lower layer). In general, abrasions and cuts are less serious and affect the more superficial outer shell. A common cause of an abrasion is the friction produced between an athlete’s unprotected skin and another surface (e.g., such as gravel or pavement). This type of injury generally heals within a few days after the initial incident. A cut is a penetration of the epidermis and generally results in damage to the circulatory system with blood being drawn to the opening. Contact with a sharp object such as a hockey puck or hockey stick can require stitches to close the opening and a bandage to prevent foreign objects from entering the skin. Generally, once the cut is bandaged and protected, athletic performance is usually not impaired. Lacerations are often regarded a more serious wound and often impact the deeper layers of skin, the fatty tissues or underlying muscles. A laceration is often associated with significant blood loss from a large opening. Repair often requires medical treatment to repair the jagged edges of the skin and may require suturing of the skin. Restricted movement may be required to allow the wound to heal (often 10-14 days).

Sports injuries often do not result in immediate death but may require hospitalization. In Table 3, U.S. data from 2009 are shown. These data provide an overview of the frequency of sports injury. Based on the number of injuries reported, the ten most popular sports injuries are: bicycling, basketball, football, exercise equipment, baseball/softball, playground equipment, soccer, swimming, skateboards and skiing/snowboarding. Of course popularity of these sports will influence the frequency in which these sports injuries are reported.

Estimated Number of Injuries	Sport	Type of Injury
544,470	Bicycling	Feet caught in spokes, head injury, collision
501,251	Basketball	Cut hands, sprained ankles, broken leg, eye and forehead injury
451,961	Football	Fractured wrists, chipped teeth, neck strain, head laceration, dislocated hips, jammed fingers
349,543	Exercise, Exercise Equipment	Twisted ankles and cut chins from tripping on treadmill. Head injury from falling backwards, ankle sprains
286,708	Baseball, Softball	Head injury from bats and balls. Ankle injuries from running or sliding on bases
237,184	Playground Equipment	Fractures from climbers, slides, swings, falls to the surface below playground equipment
208,214	Soccer	Twisted ankles or knees after falls, fractured arms during game
160,542	Swimming	Head injuries from hitting the bottom of pools, leg injuries from accidental falls
144,416	Skateboards	Fractures and cuts from falls
100,359	Skiing, Snowboarding	Head injuries from falling, cut legs and faces, sprained knees or shoulders

Table 3. Estimated Number of Sports Injuries in the 2009 National Electronic Injury Surveillance System.

Sports injuries are very common and can be examined using data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS). Data describing the number of injuries by sport type have been collected during hospital emergency department visits. Although fitness status (e.g., whether one is an athlete or not) is not determined with these data, estimates on the incidence of injury during sport and non-sport activities for the general population are provided. One limitation of these data is that adults who are physically active in general, have a lower incidence of injury compared to those who are inactive. However, data that make up the NEISS surveillance system are obtained from a national probability sample of hospitals of differing sizes and locations. Unintentional injuries (falling) may happen during performance of a skilled sport such as skiing, which can give rise to a number of injuries such as cuts, sprains, strains or fractures. As the body ages, it takes longer for the body to heal. For example the skin (epidermis) of a 60 year old is 30-80% thinner than that of a 20 year old. Both acute and overuse injuries will take significantly longer for the older athlete to heal. The growing increase in the number of baby boomers (those born between 1946 and 1964) and the desire of this cohort to remain active in recreation and competitive sports has resulted in an increase in the number of reported sports injuries over time. According to the U.S. Consumer Product Safety Commission, sports injuries among baby boomers (age ≥ 65) increased slightly from 2007 to 2009 (see Figure 2).

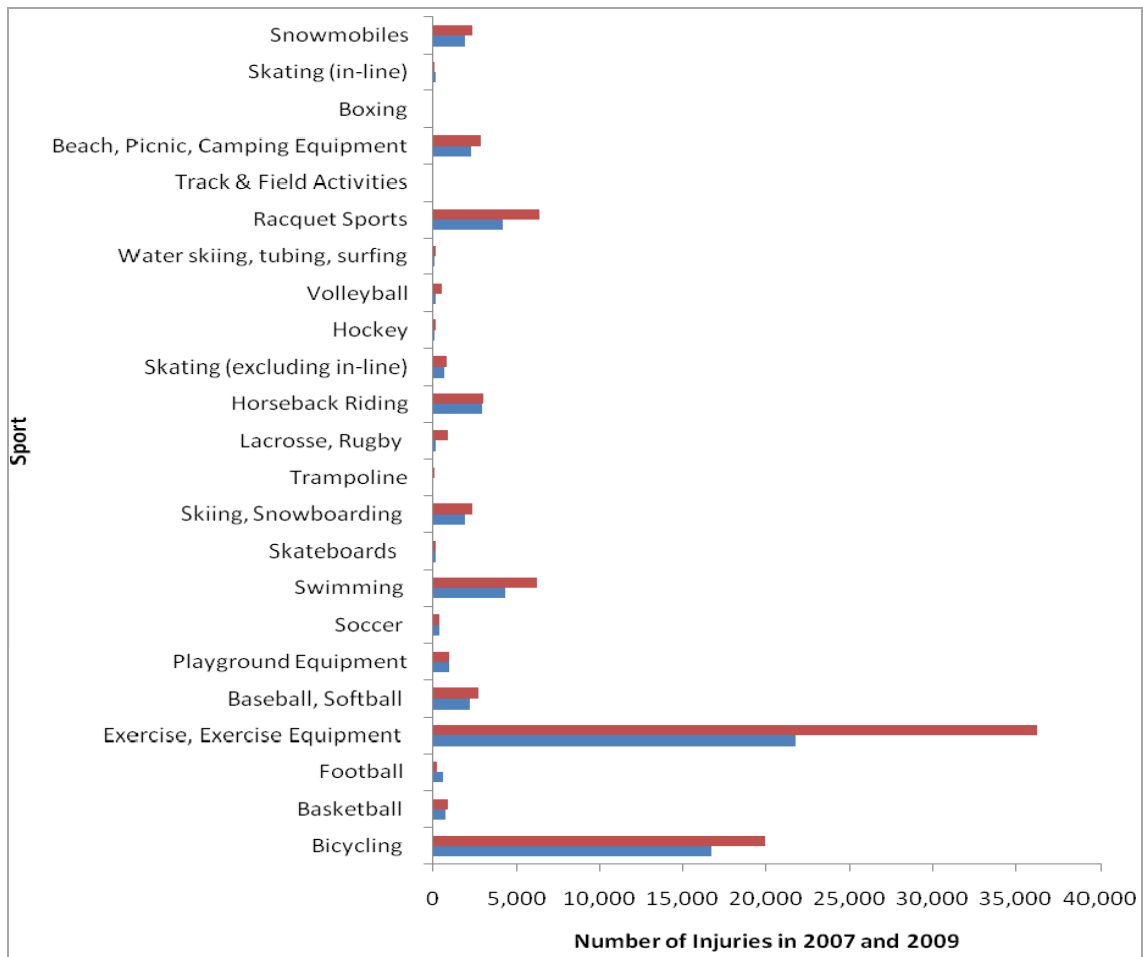


Fig. 2. Estimated Number of Emergency Room Treated Sports Injuries among Persons ≥ 65 Years of Age – National Electronic Injury Surveillance System, 2007 and 2009.

Figure 2 shows the number of injuries reported for 23 popular sports categories. The number of injuries associated with bicycling, basketball and football continue to rise. Although major advances have been made through the promotion of protective equipment, these data show that exercise equipment are the most popular category responsible for emergency room treated sports injuries among those ≥ 65 years of age. Educational efforts to assist older athletes to begin low-intensity activity programs and progress gradually to more intense activity levels are needed.

By 2050 the percentage of the population 65 years or older will be 21% (US Census Bureau, 2010). Research shows that baby boomers may appear to be aging actively. Data suggests sports-related injuries among baby boomer have been reported to cost almost \$20 billion dollars a year. Therefore, prevention of injuries through education on rehabilitation after injury, early recognition of symptoms of overuse and training principles in addition to the promotion of recreational physical activity is needed.

The rise in chronic disease rates among adults at large requires injured athletes to consider ways to prevent and manage their injuries as they grow older. The growing increase in the baby boomers as a whole will require promotion of sustainable recreational physical activities that encourage lifelong activity patterns. Although medical advances continue to improve recovery from sports injuries, the use of sports protective equipment such as helmets, mouth guards, skin pads and knee pads have been shown to be effective in reducing injury. To date, laws have been developed require the use of protective equipment to protect to protect athletes from injury. These laws require the use of select equipment such as face masks among hockey players, and helmets among bicyclists, have been shown to help reduce head injuries.

10. Implications and future research

Community options for outdoor recreation allow individuals to experience the physical, psychological and social benefits of nature directly as a preventative measure to maintain health and wellness. Participation in outdoor recreational activities offers viable alternative to sports, gyms and community centers and can be a fun way to be physically active. Within this chapter, an overview of activities and sport injuries observed in national surveys has been highlighted.

It is clear from an extensive body of evidence that movement is important for everyone. Given the acceptability of walking among people with and without sports injuries, and the fact that brisk (e.g., fast walking) can improve fitness, walking should be considered a community options for outdoor recreation. Elimination of sedentary behavior is a public health priority and most people can meet the 150 minute/week recommendation by engaging in intermittent walks throughout the day (e.g., such as three 10-minute bouts). This is especially important to athletes with a sports injury who may be unable to sustain prolonged activity.

As adults age, they begin to experience re-occurring aches and pains often as a result of a repetitive unintentional injury. Maintaining or increasing involvement in physical activity with or without a chronic disease has significant implications for health in terms of maintaining balance, muscular control prevention of falls, and offers mental stress relief. Because age-related injuries are common among high impact sports, some athletes will tend to switch to more moderate-intensity types of physical activity over time. Research suggests that participation in several types of recreational leisure activities can meet the functional needs of injured athletes.

Alternative options in the community allow individuals to engage in an active lifestyle by using local parks or nearby places as places to be physically active. As one ages, priorities change and participation in sports declines, community based approaches to obtaining physical activity may play a bigger role. Community engagement through physical activity can provide internal satisfaction for athletes. Outdoor recreational activity can be a forum for developing or maintaining a social support system different from the sports teams previously held.

11. Conclusion

The health benefits of outdoor recreational activity are extensive, and outdoor recreation is a viable community alternative for places to participate in sports, exercise and recreational physical activities. Among professional, elite amateur and recreational athletes, having a sports injury can cause psychological concern. Injuries require time to heal and considerations to adopt a modified training plan may be required. Community options for outdoor recreation can assist injured athletes to overcome functional decline, social isolation and depression. Outdoor recreation allows individuals with a sports injury to modify their activity in order to rest the injured part, and provides social opportunity to maintain health and wellness.

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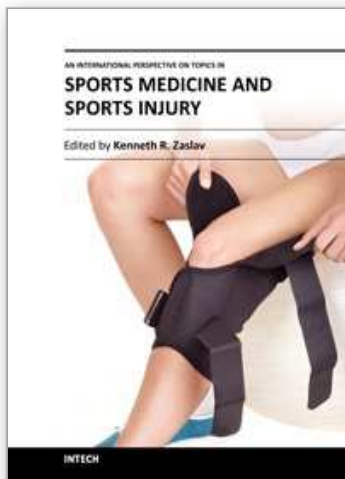
Thank you to the U.S. Consumer Product Safety Commission for use of the National Electronic Injury Surveillance System (NEISS). NEISS is available online at www.cpsc.gov/library/neiss.html.

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For the past two decades, Sports Medicine has been a burgeoning science in the USA and Western Europe. Great strides have been made in understanding the basic physiology of exercise, energy consumption and the mechanisms of sports injury. Additionally, through advances in minimally invasive surgical treatment and physical rehabilitation, athletes have been returning to sports quicker and at higher levels after injury. This book contains new information from basic scientists on the physiology of exercise and sports performance, updates on medical diseases treated in athletes and excellent summaries of treatment options for common sports-related injuries to the skeletal system.

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