The identification of risk factors for ankle sprains sustained during netball participation

ABSTRACT

Objectives: Ankle sprains account for a large percentage of injuries sustained in netball. The identification of risk factors for ankle sprain is the preliminary action required to inform future prevention strategies.

Design: Prospective study.

Participants: Ninety-four netball players from club and inter-district teams.

Methods: Preseason data were collected for; vertical jump height, perceived ankle instability, sprain history, arthrometry inversion-eversion angles, star excursion balance test reach distances, the number of foot lifts during unilateral stance and demi-pointe balance test results. Participants were followed for the duration of one netball season and ankle sprains were recorded.

Results: Eleven sprains were recorded for eleven players using a time-loss definition of injury. Ankle sprains occurred at an incidence rate of 1.74/1000 hours of netball exposure. One risk factor was identified to increase the odds of sustaining an ankle sprain during netball participation – a reach distance in the posterior-medial direction of the star excursion balance test of less than or equal to 77.5 % of leg length (OR=4.04, 95 % CI=1.00-16.35).

Conclusions: The identified risk factor can be easily measured and should be considered for preseason injury risk profiling of netball players. Netball players may benefit from training programs aimed at improving single leg balance.

Key Terms: Ankle Injuries, Prospective, Predictor, Sports

INTRODUCTION

Netball is a popular organised sport among the Australian community – with an estimated 649,000 Australians aged 15 years and over participating in the sport (Australian Sports Commission 2011). During a netball match, active players are required to change their direction of movement frequently, with movements in the forward direction occurring only 28 % of the time (Williams and O'Donoghue 2005). With players performing up to 28 leaps and 160 jumps per match (Williams and O'Donoghue 2005), there is the potential for an ankle sprain with each landing and directional change, especially when the ball is being contested by multiple players.

The ankle has been reported to be the most commonly injured body site among netball players (Smith, Damodaran, Swaminathan et al. 2005; Langeveld, Coetzee and Holtzhausen 2012). With sprains dominating the diagnoses (Fong, Hong, Chan et al. 2007), ankle injuries within netball are a problem across all competitive levels of the sport (Pillay and Frantz 2012). The results of a systematic review into ankle injuries in sport highlight that, across sports that are recognised as being problematic for ankle injuries, the ankle accounts for 46 % of volleyball injuries, 40 % of netball injuries, 21 % of soccer injuries and 16 % of basketball injuries (Fong et al. 2007).

Following an initial ankle sprain, individuals often report persisting limitations to the ankle joint (Anandacoomarasamy and Barnsley 2005) that can include pain and swelling, instability, recurrent sprain and/or functional impairment (Konradsen, Bech, Ehrenbjerg et al. 2002; Anandacoomarasamy and Barnsley 2005; Hiller, Nightingale,

Raymond et al. 2012). Chronic ankle instability is a term used to describe these persisting limitations that can often result from an acute ankle sprain and the most current model of chronic ankle instability incorporates aspects of perceived ankle instability, mechanical ankle instability and recurrent sprain (Hiller, Kilbreath and Refshauge 2011). Ultimately, a 'simple sprain' can lead to long-lasting problems and this highlights the need to prevent an initial acute ankle sprain.

Previous investigations have identified the prevalence of chronic ankle instability among netball players in terms of recurrent ankle injuries and perceived ankle instability (Hopper and Elliott 1993; Langeveld et al. 2012; Attenborough, Sinclair, Sharp et al. 2015). Recurrent ankle injuries have been reported to affect approximately 50 % of netball players (Langeveld et al. 2012; Attenborough et al. 2015) whilst moderate-severe perceived ankle instability has been reported among 64 % of netball players with a previously sprained ankle (Attenborough et al. 2015). As ankle injuries are reported to account for the highest percentage of total body injuries in netball (Hopper, Elliott and Lalor 1995; Fong et al. 2007) there is a need to reduce the incidence of acute ankle sprains so as to reduce the prevalence of chronic ankle instability within this population group. The identification of risk factors that predict the occurrence of ankle sprains within netball is the preliminary step required for the development of future prevention programs.

During netball participation, the risk of sustaining a lower limb or trunk injury increases in individuals with superior jumping abilities, an anthropometric somatotype that is low in relative fatness (endomorphy) and higher anaerobic fitness (Hopper, Hopper and

Elliott 1995) – that is, injury risk appears to increase as performance level increases. To our knowledge, however, specific risk factors for ankle sprain have not yet been investigated within a netball population. Therefore, the aim of this study was to determine whether pre-season measures of physical attributes and sport specific functional tasks could be identified as risk factors for ankle sprains sustained during netball participation. The results of this study will provide knowledge for future targeted interventions or training schedules that focus on the prevention of ankle sprains within 'at risk' netball players.

MATERIALS AND METHODS

Participants

Ninety-six female netball players from inter-district (n=54) and club (n=42) teams across the XX metropolitan area participated in this study and represented a sample of convenience. The majority of the inter-district level players were from The XX University Netball Club/City of XX Netball Association elite development squad. Additional inter-district players became interested in the study via university advertisements and played the same standard of representative netball, but competed for other inter-district areas. The club level players were involved in netball at a social level which comprised of netball matches and no more than one netball specific training session per week. To be included in the study, participants had to have at least one year of netball experience, be registered to play in the upcoming netball season, and be at least 15 years old. A previous history of ankle surgery or ankle fracture excluded individuals from being participants, as did any lower limb injury sustained in the six

months prior to pre-season testing. Individuals were informed of procedures and signed a consent form before participating. Participants under the age of 18 required additional written consent from a parent/guardian. The study was approved by The University of XX Human Research Ethics Committee (protocol number 2012/469).

Preseason measurement procedures

All preseason measures for each participant were recorded during a single data collection session at netball training venues across the XX metropolitan area. Each test was conducted barefoot with no external prophylactic supports and participants had a familiarisation period for any test that required physical effort. For tests where measures were recorded bilaterally, the order in which each limb was assessed was randomised. The order in which the test battery was administered to each participant was determined pragmatically.

Muscular power

Vertical jump height was assessed using either the Vertec vertical jump device (Sports Imports, Hilliard, USA) or a belt mat device (Sport Books Publisher, Toronto, Canada). Both devices have high reliability and are highly related (R^2=0.83) (Hutchison and Stone 2009). Each participant performed three single stationary countermovement jumps with arm swing. Rest periods between each trial were minimal, and only as long as it took the investigator to reset the testing equipment. When using the Vertec device, vertical jump height was calculated as the difference between each participant's standing reach height and their maximum jump height. When using the belt mat device,

vertical jump height was determined by the length of tape that was pulled through the feeder adjoined to the mat. The average of the three trials was calculated.

Ankle joint laxity

An instrumented ankle arthrometer (BlueBay Research, Milton FL) was used to measure ankle joint laxity during inversion-eversion. The device and methodology have previously been described in more detail (Kovaleski, Gurchiek, Heitman et al. 1999; Attenborough et al. 2015). The participant was positioned lying supine, with her malleoli approximately 5cm over the edge of the plinth. The foot of each participant was secured firmly into the device by way of a heel and dorsal clamp. The unloaded starting position reflected a neutral joint position and during the passive inversion-eversion movement, flexion was kept at 0 degrees. Both ankles of all participants were tested at torques of 3 Nm (inversion) and -3 Nm (eversion). The inversion/eversion angles achieved at these cut-off torques were calculated by a linear interpolation between the data points either side of the 3 Nm inversion torque and -3 Nm eversion torque respectively. The average of three trials for each participant was used to calculate means and standard deviations.

Perceived ankle instability

The Cumberland Ankle Instability Tool – Youth (CAIT-Y) is an adaptation of the adult version of the survey (CAIT) with good test-retest reliability (Mandarakas, Hiller, Rose et al. 2013). The CAIT is a reliable and valid nine item questionnaire that provides a measure of perceived ankle instability and an indication of its severity (Hiller, Refshauge, Bundy et al. 2006). The CAIT-Y questionnaire has the same scoring

protocol as the adult version of the test whereby a lower score is indicative of an ankle with a higher level of instability. The questionnaire is scored out of 30 with a score of ≤24 indicative of moderate-severe perceived ankle instability (Gribble, Delahunt, Bleakley et al. 2013; Attenborough et al. 2015). Each ankle was assessed separately.

Previous sprains

Lifetime previous ankle sprains that resulted in immobilisation and/or a cessation of activity were recorded for each player by way of a self-administered form. The number of previous ankle sprains was recorded, as was the ankle on which the sprain/s occurred.

Static and dynamic balance

The balance tests selected for the current study were chosen as they have been previously acknowledged as being able to identify individuals at risk of sustaining an ankle sprain (Plisky, Rauh, Kaminski et al. 2006; de Noronha, Franca, Haupenthal et al. 2013) and/or been recognised as tests that are affected by past ankle injury (Hiller, Refshauge, Herbert et al. 2007). The demi-pointe test assesses the ability to maintain static balance unilaterally for 5 seconds whilst positioned as high as possible on the ball of the foot (Hiller et al. 2007). The participant initially steadied herself with her hands on a wall at chest height. Keeping her hands at chest height, the stopwatch was started when the participant removed her hands from the wall. The contralateral foot rested lightly on the calf of the stance leg. Participants performed three trials of the test and were rated as failed if they lost balance in two out of three trials. The demi-pointe test was conducted bilaterally.

The foot lift test is a measure of static balance that requires a unilateral stance position to be maintained for 30 seconds whilst the eyes are closed (Hiller et al. 2007). The participant placed her hands by her side and stood on one foot while lightly resting the contralateral foot on the calf of the stance leg. The number of 'foot lifts' (where any aspect of the foot such as the toes or metatarsal heads lost contact with the ground) during the 30 second period were counted. If the contralateral foot touched the floor then one count was added to the foot lift score, as was an additional count for every second the contralateral foot remained grounded. The foot lift test has been shown to have good test-retest reliability (Hiller et al. 2007). The foot lift test was conducted bilaterally.

The star excursion balance test (SEBT) is a measure of dynamic balance with good to excellent test-retest reliability (Munro and Herrington 2010). The test was conducted in the anterior, posterior-lateral and posterior-medial directions. The participant was required to balance on her stance leg and reach as far as possible with the contralateral leg in the direction being assessed whilst keeping her hands on her hips. For the anterior direction, the distal aspect of the second toe of the stance leg was positioned at the centre of the test grid. In the posterior directions, the heel of the stance leg was positioned at the centre of the test grid. Participants were given three practice trials before any measures were recorded (Robinson and Gribble 2008). Three reach distances in each direction were averaged and normalised to each individual's leg length. Leg length was measured as the distance from the anterior superior iliac spine to the distal point of the medial malleolus on the same leg (Gribble and Hertel 2003). The star excursion balance test was conducted bilaterally.

Injury surveillance

Over the course of two netball seasons, prospective ankle sprain and exposure data were collected. Exposure data included the amount of time each participant was involved in netball training and match play. Exposure time was reported in minutes. Each participant was followed for one season only; 54 participants in 2013 and 42 participants in 2014. Data were collected in one of two ways:

1. The XX University Netball Club/City of XX Netball Association Elite Development Squad participants had no direct contact with study investigators following preseason measurements. Injury data were provided by team physiotherapists and exposure data were provided by the club's Director.
2. All remaining participants (n=52) had weekly text message contact with the investigators to self-report exposure data and the occurrence of any ankle sprains. If an ankle sprain was reported, the participant was telephoned in order to obtain further information relating to the injury (Moller, Attermann, Myklebust et al. 2012).

A lateral, medial or syndesmotic sprain to the ankle complex was recorded if it occurred during a netball training session or match. Sprains reported by the inter-district participants were diagnosed by team physiotherapists whereas sprains reported by club participants were diagnosed by physiotherapists and doctors (where consulted) or self-diagnosed. In order for a sprain to be registered in this study, the injury must have prevented the individual from participating in a full subsequent match or netball training session (Engebretsen, Myklebust, Holme et al. 2010; Hjelm, Werner and Renstrom 2010).

Statistical analysis

Injury incidence for ankle sprains was analysed per 1000 hours of netball exposure with the denominator being the total exposure hours for all players. Injury incidence was calculated separately for match play and training sessions.

Perceived ankle instability, inversion-eversion laxity, SEBT results, foot lift scores, demi-pointe results and previous sprain history were analysed for a single leg – the injured leg for participants who sustained an ankle sprain and a randomly selected leg for uninjured participants. For the remainder of the article, 'injured' limb refers to the injured limb of participants who sustained an ankle sprain while 'uninjured' limb refers to a randomly selected limb of the uninjured participants.

A Shapiro-Wilk test was run to test for normality among continuous data. Differences between injured and uninjured limbs were assessed with t-tests for variables with continuous data and with Fisher's exact tests for the demi-pointe balance test, level of play and previous sprain history. Mann-Whitney U tests were used to assess group differences for data that were not normally distributed. Significance was set at $p<0.05$.

For each variable, a cut-off point that signified the highest odds of sustaining an ankle sprain was determined (Peat and Barton 2005). For variables with continuous data, optimal cut-off points were calculated using receiver operator characteristic curves which dichotomise data for diagnostic evaluation (Portney and Watkins 2009). Following dichotomisation, participant data was coded into binary form according to

whether an individual's results for each test were above or below the defined cut-off point. Univariate, unadjusted odds ratios and 95 % confidence intervals were determined for each variable by comparing the proportion of participants on either side of each cut-off value, together with the associated injury status (Plisky et al. 2006). Significance was set at $p<0.05$. All statistical analyses were performed using SPSS (Version22).

RESULTS

Two inter-district players dropped out of their teams due to personal commitments before any longitudinal data were collected and their data have been removed from all analyses. The remaining 94 participants had a mean (±SD) age of 21.5 ± 6.3 years, height of 170.2 ± 6.7 cm, and mass of 70.0 ± 14.4 kg.

Eleven participants sustained eleven ankle sprains over the course of the study period. Two were diagnosed by practicing physiotherapists as syndesmosis sprains, seven were diagnosed by either doctors or physiotherapists as lateral ligament sprains, and a further two were self-diagnosed as lateral ligament sprains. Nine sprains occurred during competitive match play while 2 sprains occurred during netball training. Netball exposure data for the 94 netball players totalled 6325 hours and included 1333 match hours and 4992 training hours. Club players contributed 680 hours to the total exposure data while inter-district players contributed 5645 hours. Injury incidence was 1.74 ankle sprains/1000 hours of total netball exposure, 6.75 ankle sprains/1000 hours of match play and 0.40 ankle sprains/1000 hours of netball training. Overall, the injured players

contributed 742 hours to the total exposure data while the uninjured players contributed 5583 hours.

The preseason measures for the injured and uninjured limbs are presented in Table 1 whilst the univariate, unadjusted odds ratio data for each variable are presented in Table 2. The odds of sustaining an ankle sprain during netball participation was found to be 4.04 times greater for players who recorded a preseason reach distance in the posterior-medial direction of the SEBT of less than or equal to 77.5 % of their leg length (p=0.04, Table 2).

277 **Table 1. Mean ± SD of preseason measures for netball players with injured and**
278 **uninjured limbs.**
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Preseason measure	Injured (n=11)	Uninjured (n=83)	p value
Age (years)	20.3 ± 3.4	21.7 ± 6.6	0.78[b]
Height (cm)	169.7 ± 6.0	170.2 ± 6.9	0.81
Mass (kg)	71.9 ± 14.1	69.8 ± 14.5	0.54 [b]
Vertical jump (cm)	41.4 ± 5.5	41.4 ± 5.8	1.00
CAIT-Y score	24.3 ± 3.7	23.8 ± 3.8	0.59 [b]
Inversion-eversion (degrees)	32.6 ± 9.8	30.4 ± 8.2	0.41
Star excursion balance test			
Anterior reach (% leg length)	65.6 ± 6.2	66.3 ± 5.1	0.66
Posterior-lateral reach (% leg length)	71.3 ± 10.0	71.4 ± 10.4	0.97
Posterior-medial reach (% leg length)	76.1 ± 7.8	78.2 ± 9.4	0.48
Foot lifts in 30 sec (n)	30.1 ± 16.9	27.8 ± 11.0	0.56
Level of play (club/inter-district)	4/7[a]	38/45 [a]	0.40[c]
Demi-pointe (fail/pass)	7/4 [a]	28/55 [a]	0.06 [c]
Previous ankle sprain (yes/no)	5/6 [a]	49/34 [a]	0.30 [c]

[a] Displayed as counts, not mean ± SD.

[b] Mann-Whitney U test results.

[c] Fisher's exact tests, not t-tests.

CAIT-Y = Cumberland ankle instability tool – youth.

280 **Table 2. The cut-off points for each variable and the associated univariate,**

281 **unadjusted odds ratio for ankle sprain risk.**

Preseason measure	Variable cut-off	Unadjusted OR	Lower 90% CI	Upper 90% CI	p-value
Age (years)	≤18.5	1.55	0.42	5.52	0.36
Height (cm)	≤168.3	1.47	0.39	5.51	0.41
Mass (kg)	≥69.2	2.08	0.54	8.00	0.23
Vertical jump (cm)	≤39.1	1.59	0.42	5.96	0.36
CAIT-Y score	≥25.5	1.64	0.46	5.84	0.33
Inversion-eversion (deg)	≥36.8	3.78	1.02	14.03	0.05
SEBT anterior reach (% leg length)	≤64.5	1.64	0.46	5.84	0.33
SEBT posterior-lateral reach (% leg length)	≤69.8	2.65	0.72	9.78	0.12
SEBT posterior-medial reach (% leg length)	≤77.5	4.04	1.00	16.35	**0.04**
Foot lifts in 30 sec (n)	≥33.5	3.54	0.98	12.82	0.05
Level of play	Inter-district	1.48	0.40	5.43	0.40
Demi-pointe	Fail	3.44	0.93	12.74	0.06
Previous ankle sprain	Yes	0.58	0.16	2.05	0.30

OR = Odds ratio

CI = Confidence interval

CAIT-Y = Cumberland Ankle Instability Tool – Youth

SEBT = Star excursion balance test

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DISCUSSION

Ninety-four netball players were prospectively followed for the duration of one netball season for the identification of ankle sprain risk factors; however, only 11 ankle sprains were sustained. This was a lower number of ankle sprains than originally hypothesised and consequently it was inappropriate to perform a multivariate, logistic regression analysis. The univariate analysis revealed one risk factor for ankle sprain – a posterior-medial reach distance of less than or equal to 77.5 % of an individual's leg length.

Reach distances in the posterior-medial direction of the SEBT have previously been found to be the most representative of overall SEBT performance (Hertel, Braham, Hale et al. 2006) and, in the current study, a shorter posterior-medial reach distance was found to be a risk factor for ankle sprain. Furthermore, previous research has identified the posterior-medial reach direction as one of only three directions able to identify dynamic balance deficits in limbs with chronic ankle instability (Hertel et al. 2006). A research group developing a Netball Movement Screening Tool for injury risk identification have questioned the value of the SEBT within their assessment protocol (Reid, Vanweerd, Larmer et al. 2015); however, the findings of the current study support its continued inclusion as a screening measure. The inclusion of the SEBT in such a screening tool is further supported by previous research that found better performance in the posterior-lateral direction of the SEBT was protective against ankle sprains in active university students (de Noronha et al. 2013) and SEBT results were predictive of lower limb injury in youth basketball players (Plisky et al. 2006).

There are a number of previous investigations that have identified ankle sprain risk factors and, unlike the results of the current study, a history of ankle sprain is generally regarded as a risk factor for future sprain (Anandacoomarasamy and Barnsley 2005; Hjelm et al. 2010). Apart from the SEBT results already discussed, other intrinsic factors previously identified as risk factors for ankle sprain include a failed single leg balance test (Trojian and McKeag 2006), altered gait biomechanics (Willems, Witvrouw, Delbaere et al. 2005) and reduced dorsiflexion range of motion (Hadzic, Sattler, Topole et al. 2009).

Based on the current study's findings, three additional variables approached significance in relation to their odds ratio data and are worthy of discussion. Those three variables were; a high arthrometry measured inversion-eversion angle, a high number of foot lifts during unilateral stance and a failed demi-pointe balance test result.

A lateral ankle sprain often results from excessive inversion trauma (Denegar, Hertel and Fonseca 2002; Hertel 2002) and there is a heightened susceptibility for injury with a lax ankle joint complex (Hertel 2002) so it is not surprising that a high inversion-eversion angle was found to approach significance within this cohort. As approximately 70 % of netball players have reported using tape and/or ankle braces (Attenborough et al. 2015), perhaps the use of prophylactic ankle supports are limiting the number of sprains that are occurring (McGuine, Brooks and Hetzel 2011). Although the use of prophylactic ankle support was recorded during preseason measurements, the data were considered unsuitable for risk factor analysis as it was uncertain whether participants

continued to use the support throughout the season and this is acknowledged as a limitation of the study.

The demi-pointe balance tests and the number of footlifts during 30 seconds of unilateral stance are two measures of static balance. The full weight-bearing plantar-flexed position of the demi-point test is functionally specific to the sport of netball owing to the obstruction rule, whereby a defending player may attempt to defend the ball "if the distance on the ground is not less than three feet from a player in possession of the ball" (Netball Australia 2012). Thus, in order for a defending player to minimise the distance between her arms and the ball, whilst not violating the obstruction rule, a uni/bilateral stance in demi-pointe position is required. As a failed demi-pointe balance test result began to approach significance within the current study, perhaps the ability to control posture and subsequent movement in a plantar-flexed position, such as when landing from jumps or leaps, is important for netball players in order to reduce the potential for ankle injury. One potential shortcoming of the demi-pointe test for this population group is that the test is conducted barefoot whereas the players wear shoes during training and matches.

The number of footlifts during 30 seconds of unilateral stance was found to approach significance in terms of unadjusted odds ratio data within the current study (Table 2). It is possible that reduced stability, demonstrated by a higher number of footlifts, may be due to proprioceptive deficits which could reduce a netball player's capacity to adequately respond to an unexpected perturbation and thus sustain an ankle sprain. As the test is conducted with the participants' eyes closed, it is not specifically related to

on-court sporting movements; however, the test has been used in previous research aimed at predicting ankle sprain (Hiller, Refshauge, Herbert et al. 2008; de Noronha et al. 2013) and describing balance abilities among individuals with chronic ankle instability (Hiller et al. 2007). The previous research identified that, whist the footlift test was not identified as a risk factor for ankle sprain (Hiller et al. 2008; de Noronha et al. 2013), the test was associated with chronic ankle instability (Hiller et al. 2007).

It is interesting to note that a previous ankle sprain history was not associated with an increased risk of ankle sprain in the current study and we can only speculate on the reasons for this. Firstly, the unknown length of time since a previous ankle sprain may have affected the re-sprain rate. Secondly, it is feasible that players who had previously sustained an ankle sprain were taping and/or bracing their ankles to provide added external support. Thirdly, the severity of any previous ankle sprain was unknown. And lastly, there is the potential that the perceived severity of an ankle sprain, and therefore subsequent referral for treatment and cessation from exercise, is dependent on an individual's perception of pain and willingness to continue sporting involvement.

Time-loss definitions of injury are commonly used within ankle injury literature (Attenborough, Hiller, Smith et al. 2014), where the number of injuries reported depends on the frequency in which participants partake in training sessions and matches (Waldén, Hägglund and Ekstrand 2005). In this study, inter-district players may have had a greater chance of missing a subsequent training/match compared to the club players due to their higher training/match frequency. As a result, some ankle sprain cases may not have been captured by the injury definition used in this study, and

overall, injury definitions are acknowledged as a limitation present among all injury epidemiology investigations (Attenborough et al. 2014).

It could be argued that much of the emphasis of the current study has been placed on identifying intrinsic risk factors for ankle sprain when extrinsic factors such as court surface, prophylactic supports, other players and footwear might also be contributing to injury. Although extrinsic factors are worthy of future exploration it is worthwhile to note that the current study, being the first to investigate risk factors specific to ankle sprain within a netball population, is the starting point for further research within this population group. Future investigations should also consider using a longer follow-up period, or a larger sample size, to capture more ankle sprains within a specific study period.

CONCLUSION

This prospective study of ankle sprains in netball players has identified one risk factor for the development of ankle sprains during netball participation – a preseason reach distance in the posterior-medial direction of the star excursion balance test of less than or equal to 77.5 % of leg length. This risk factor is an easily administrable measure of dynamic balance that requires minimal equipment, cost and time and could be easily incorporated into preseason screening tests. It is suggested that netball training programs should consider incorporating exercises to promote single leg balance, stability, and proprioception in order to limit the risk of an individual sustaining an ankle sprain.

Conflict of interest statement

The authors wish to draw the attention of the Editor to the following fact which may be considered as a potential conflict of interest:

The collection of data within this study was partially supported by the XX Sporting Injuries Fund Research Program. The conclusions in the final report are those of the authors and any views expressed are not necessarily those of the XX Sporting Injuries Fund. We wish to confirm that the financial support for this work has had no influence on the outcome of the study.

Ethical Statement

The study was approved by The University of XX Human Research Ethics Committee (protocol number 2012/469).

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