Landing in netball: effects of taping and bracing the ankle

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Abstract

Objectives—To investigate the effect of bracing and taping on selected electromyographic, kinematic, and kinetic variables when landing from a jump.

Methods—Fifteen netball players performed a jump, so as to land on their dominant limb on a force plate. Electromyographic activity was recorded from the gastrocnemius, tibialis anterior, and peroneus longus muscles. Subjects were also filmed and measures of rearfoot motion were derived.

Results—Significantly less electromyographic activity ($p < 0.007$) was observed from the gastrocnemius and peroneus longus muscle groups when subjects were braced. No other significant electromyographical findings were observed. Peak vertical ground reaction force and time to peak for vertical ground reaction force were not affected by bracing and taping, nor were the rearfoot and Achilles tendon angles at foot strike.

Conclusions—The effect of bracing and taping on the selected biomechanics variables associated with landing was specifically limited to a reduction in muscle action, particularly for the braced condition. Netball players can be confident that the biomechanics of their landing patterns will not be altered whether they choose to wear a brace or tape their ankle joints.

(Br J Sports Med 1999;33:409–413)

Keywords: netball; ankle; electromyography; muscle action; ground reaction force; landing

The lateral ligaments of the ankle are the most common site of injury in netball.^{1,2} The incidence of ankle injury has been reported to be 3.3 injuries per 1000 player hours,² which is higher than that reported for soccer³ (1.7–2.0 injuries per 1000 hours) and volleyball⁴ (2.6 injuries per 1000 hours), but lower than that for basketball⁵ (5.5 injuries per 1000 hours). In netball, most ankle injuries occur when landing from a jump,^{1,2,6} with the ankle and subtalar joints most commonly in a position of plantar flexion and inversion respectively. If the neuromuscular system cannot control joint motion at this time, then inevitably increased stress is placed on the lateral ligament complex and injury may occur. The resulting pain, swelling, and loss of function associated with injury can take weeks to resolve, and it has been reported that 25% of soccer players will re-injure their ankle.⁷

Given these problems, a number of studies have investigated the prophylactic role of bracing and taping. The findings generally provide support for the role of strapping and bracing in reducing the incidence of injuries. For instance, Garrick and Requa⁸ reported the incidence of ankle injury to be 30.4 per 1000 games in basketball players who were untaped, compared with 6.5 per 1000 games in those who were taped. More recently, Sitler *et al*⁹ noted the injury rate in basketball players who used an Air stirrup brace to be 1.6 per 1000 games compared with 5.2 per 1000 games in those not using the brace. Similarly in soccer players, Tropp *et al*¹⁰ noted the incidence of ankle sprain in braced players to be 3% compared with 11% in unbraced subjects. In a comparative study examining whether braces were more effective in previously injured subjects than in non-injured subjects, Surve *et al*¹⁰ reported that braces significantly reduced the re-injury rate and the severity of the re-injury. However, they were not effective in reducing the incidence and severity of injury in previously uninjured subjects.

The mechanisms by which injuries can be reduced by an external support include an enhancement of mechanical stability. Biomechanical analyses indicate that taping and bracing can limit range of motion, but mechanical stability decreases considerably after only short bouts of exercise (10–20 minutes), particularly with respect to taping.^{11–13} Other researchers¹⁴ have reported that external supports may increase proprioceptive awareness. This effect is thought to involve modulation of the neuromuscular system via cutaneous stimulation, leading to enhancement of the activity of muscles about the ankle.

Landing from a jump is a task that is important to many sports. In netball it is a skill that is intrinsic to successful performance. The forces associated with landings in netball have been shown to be considerable. For instance, Steele and Milburn¹⁵ noted vertical ground reaction forces (VGRFs) up to 6.8 body weights (BW) during landings. Joint motion and muscle activity are important in decreasing the impact forces associated with landing,^{16,17} and, given that taping and braces have been shown to limit motion, they could induce increases in the magnitude of the forces in the lower limb. Therefore the purpose of this study was to investigate the effects of bracing and taping on muscle activity, rearfoot motion, and VGRFs when undertaking a landing similar to that performed during netball.

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Accepted for publication
2 August 1999

Methods

SUBJECTS

Fifteen elite female netball players with no musculoskeletal conditions affecting the lower limb participated in this study. Mean (SD) for age, mass, and height were 22.6 (4.2) years, 67.6 (9.3) kg, and 172.3 (6.5) cm respectively. All procedures were undertaken with the approval of the University of Western Australia human ethics committee.

LANDING TASK

Subjects performed a landing task that involved a single leg forward jump to land on the dominant limb, as indicated by each player, in a balanced position on a force plate. The distance from the force plate was calculated to be 1.25 times the subject's leg length. Based on pilot work, this distance was chosen to represent a typical distance that a player may jump during a netball game. In the laboratory, subjects were given time to practice the landing task. Thereafter, each subject performed three trials with their ankle untaped, braced, or taped, the order of which was randomly chosen.

In the bracing condition, subjects wore a lace up Swede-O-Brace (Orthotic Consultants). This brace is commonly used by netball players. In accordance with the manufacturer's instructions, subjects were asked to lace the brace in a manner that provided firm support about the ankle joint. The technique used to tape the subjects involved four "figure of six" tapes, together with calcaneal slings and locking strips. This technique is commonly used and is well documented.¹⁸ To establish the reliability of this taping technique, range of motion after taping on two separate occasions was measured. Intraclass correlation coefficients derived from measures of plantar flexion and inversion were 0.98 and 0.95 respectively.¹⁸

FORCE DATA

A force plate (type 9281; A G Kistler, Winterthur, Switzerland) was used to measure the VGRFs. Data were sampled at 500 Hz and relayed to a computer based data acquisition and analysis package. The variables of interest were the peak VGRF and time to peak vertical force.

ELECTROMYOGRAPHIC DATA

Electromyographic (EMG) activity from the medial gastrocnemius, tibialis anterior, and peroneus longus muscles was recorded using pre-gelled Ag-AgCl electrodes (3M; model 2259). After skin preparation which involved shaving and cleaning with alcohol, two electrodes were placed longitudinally over the belly of each muscle, between the motor point and the muscle's insertion. An earth electrode was placed over the lateral femoral condyle. Impedance levels were then checked, and if they were greater than 2500 ohms, the electrode site was prepared again. The raw EMG signals were amplified 1000 times, band-pass filtered (5 dB down at 10 Hz and 1 kHz) by a Grass series P511 amplifier (Grass Medical Instruments, Quincy, Massachusetts, USA). Data were collected at 500 Hz over a 200 ms epoch cen-

tred on footstrike, and transmitted to a computer based data acquisition system. The integrated EMG activity¹⁹ over a 100 ms period before footstrike was used in the analysis of these data.

FILM DATA

A 16 mm Photosonics high speed camera fitted with an Angenieux 12-120 mm zoom lens was used to film subjects at a nominal rate of 200 Hz (45° shutter angle). The camera was secured to a tripod so that the focal axis of the lens was in line with the plane of motion of the landing, and the camera-subject distance was large enough to minimise perspective error.

On each subject, four adhesive retro-reflective markers were placed on the skin, tape, or brace of the landing limb as reference markers for the motion of the lower leg and calcaneus (fig 1). The placement of these markers has been described by Edington *et al.*²⁰ Specifically, the proximal lower leg marker was placed on the posterior midline of the lower leg about 15 cm above the distal marker, which was placed 2 cm above the superior aspect of the calcaneus. The two markers on the calcaneus were placed to bisect the posterior aspect of this bone.

These reference markers were digitised using a Calcomp 648 digitiser, and the displacement data were smoothed with a second order digital filter at 6 Hz. Angular displacement information was then determined for the lower leg at footstrike. The first angle of interest was the rearfoot angle, which is defined as the angle between the calcaneus and the landing surface. The second angle of interest was the Achilles tendon angle, which is defined as the angle between the calcaneus and the lower leg on the medial aspect of the limb.²⁰

Figure 1 Adhesive retro-reflective markers fixed to the subject's leg.

Table 1 Mean and SEM of electromyographic activity (mV.s) across muscles and conditions

Conditions	Muscles	Mean	SEM
*Normal	Peroneus longus	68.51	5.83
	Gastrocnemius	142.81	18.56
	Tibialis anterior	47.55	5.06
*Braced	Peroneus longus	48.57	5.31
	Gastrocnemius	100.39	16.79
	Tibialis anterior	51.49	6.85
Taped	Peroneus longus	57.86	6.69
	Gastrocnemius	129.82	20.99
	Tibialis anterior	42.60	5.82

* $p < 0.007$.

STATISTICAL ANALYSIS OF THE DATA

An analysis of variance with repeated measures was used to examine the differences between the independent (normal, braced, and taped) and dependent variables of EMG activity (gastrocnemius, peroneus longus, and tibialis anterior muscles), kinetic (peak VGRF and time to peak vertical force), and kinematic variables (rearfoot and Achilles tendon angles at footstrike). A Bonferroni type adjustment was made ($p < 0.007$) to account for the possibility of a Type 1 error occurring with multiple dependent variables.²¹

Results

Table 1 reports the mean (SEM) of the integrated EMG data recorded during the 100 milliseconds before landing for the normal, braced, and taped conditions. There was a significant difference between normal, braced, and taped conditions for peroneal EMG activity. Post hoc comparisons showed that the braced condition was significantly less than the normal condition. There were no significant differences between normal and taped conditions and between taped and braced conditions.

With respect to gastrocnemius EMG activity, there was a significant difference between normal, braced, and taped conditions. Post hoc comparisons showed that the EMG activity was significantly less in the braced than in the normal condition. There were no significant differences between normal and taped conditions and between taped and braced conditions.

No significant differences were observed in tibialis anterior EMG activity across normal, braced, and taped conditions.

Tables 2 and 3 show the mean (SEM) of the peak and time to peak VGRFs respectively. There were no significant differences between the normal, braced, and taped conditions for these force variables.

With respect to the kinematics, all subjects landed on the forefoot in all conditions. Table 4 shows the mean (SEM) for the rearfoot and Achilles angles at footstrike. No significant differences were found for either the rearfoot angle or the Achilles angle across conditions.

Discussion

Jumping and landing activities form a major skill component of netball. The current rules related to stepping at landing from a jump restrict the player to taking only one step after landing. Therefore rapid deceleration of the body must occur, and VGRFs on landing are typically high—for example, 6.8 BW¹⁵. As taping and

Table 4 Mean and SEM of joint angles (radians) across conditions at footstrike

Conditions	Joints	Mean	SEM
Normal	Rearfoot	1.56	0.06
	Achilles	3.11	0.03
Braced	Rearfoot	1.36	0.10
	Achilles	3.17	0.03
Taped	Rearfoot	1.53	0.06
	Achilles	3.16	0.03

bracing decrease the amount of motion at the ankle and subtalar joints, it was speculated that ground reaction forces would be higher when subjects were taped or braced. However, this was not the case, as the peak VGRFs ranged from 3.12 to 3.37 BW across conditions. The magnitude of these forces is relatively low in comparison with previously reported landings in netball and for other landing activities. For instance, during fast running (7.8 m/s), peak VGRFs of 4.4 BW have been reported.²² In the triple jump, Ramey and Williams²³ reported initial VGRF peaks ranging from 7 to 12 BW, while Panzer *et al*²⁴ reported ground reaction forces ranging from 8.8 to 14.4 BW for vault landings in gymnastics.

Variations in the velocity at which the player approaches the force plate may have been the primary influence on landing forces. In this study, players moved from a stationary position, whereas in other netball landing studies players were instructed to either jog or sprint toward the force plate, and in some instances were also required to catch a ball.^{15 25–27} In these studies, VGRFs were higher (3.5–6.5 BW)^{15 25–27} than those recorded in the current study.

The position of the foot at the time of landing can also influence the magnitude of the VGRF. Subjects normally adopt one of two landing techniques, some choosing to land on the forefoot, while others land relatively flat footed.²⁸ Those subjects choosing the latter technique generally had higher ground reaction forces as they had little time to decrease the velocity of the heel after footstrike.²⁸ In the current study, all subjects landed on their forefoot. However, other researchers have noted that receiving a pass at the time of jumping can influence the player's foot position at landing.^{15 25 26} Steele and Milburn¹⁵ noted that subjects tended to land on the heel after receiving a pass at chest height, whereas higher passes led to forefoot landings. Those who landed on the heel in that study generated peak VGRFs 1.2 BW greater than forefoot landers. These researchers also noted a trend toward shorter times to peak force in heel strikers, a finding similar to that of Valiant and Cavanagh,²⁹ who examined landings in basketball. Although landing on the forefoot may therefore be a technique recommended to decrease ground reaction forces, there is evidence that it leads to increased stresses in tissues. For instance, Denoth³⁰ showed that, in heel strike jogging, the initial ground reaction forces were significantly higher than those during forefoot jogging (2.0 BW *v* 0.8 BW). However, about 20% higher forces were generated in the Achilles tendon and ankle joints during forefoot running.

Table 2 Mean and SEM of peak vertical ground reaction forces (body weight) across conditions

Conditions	Mean	SEM
Normal	3.37	0.14
Braced	3.12	0.21
Taped	3.33	0.18

Table 3 Mean and SEM of time to peak ground reaction forces (milliseconds) across conditions

Conditions	Mean	SEM
Normal	43.71	2.07
Braced	34.56	4.54
Taped	37.97	2.12

It is apparent that muscle activity and movement at lower limb joints can influence the magnitude of impact forces and resultant joint loadings. A number of authors^{16,17} have commented that the plantar flexors are important in reducing the VGRFs associated with landing. Interestingly, in this study, whereas gastrocnemius EMG activity was decreased when using a brace, mean VGRF measures were unchanged across the different conditions. However, there was a trend to a shorter time to peak vertical force when subjects were braced, and that may be worthy of further investigation.

At footstrike, the calcaneus was very close to the vertical position with respect to the landing surface, and the angle between the calcaneus and lower leg was in slight varus. No previous studies have examined rearfoot angles during landings from a jump. However, the rearfoot and Achilles tendon angles at foot strike were in the range of those reported for jogging.²⁰ No significant changes were induced by the taping or bracing. This finding may be related to where in the range of motion external supports exert their greatest effect. Although it has been reported that taping and bracing can increase resistance to motion in the mid-range of joint movement, they are most restrictive towards the end,^{31,32} and in the current study subjects did not approach this part of the range. Furthermore, the magnitude of the forces restricting motion—that is, those due to the external support—are likely to be much smaller than those associated with the ground reaction forces, and hence may not influence the motion at the rearfoot.

A possible source of error in the kinematic data is that the markers placed on the skin over the calcaneum had to be re-attached to the strapping tape and the brace when they were worn. Care was taken to ensure that the initial position of these markers was similar across conditions. However, whether the movement of the tape and brace followed that of the calcaneum is unknown. As it is not adhesive, the brace would be more likely to induce this error than the tape. Work examining shoes has shown that there is a small systematic error between calcaneal movement and the movement of the rear part of the shoe²⁰; however, the number of subjects used in that study was small.

With respect to the EMG findings in this study, the decreased EMG activity of the peroneal and gastrocnemius muscles induced by bracing may reflect a decrease in the need for these muscles to provide mechanical stability to the joint. These findings are in contrast with those of other researchers who examined subjects without significant ankle instability. For instance, in a small number of subjects ($n = 2$) with previous ankle injuries but no significant talar tilt, Glick *et al.*³³ noted no change in EMG activity in peroneus brevis muscle when taped during running. In subjects with no history of ankle problems, Sprigings *et al.*³⁴ noted no effect of taping on peroneus longus EMG activity during a sudden inversion motion. More recently, Karlsson and Andreasson³⁵ noted that reaction times were unchanged when subjects with low grade mechanical

instability were taped during sudden ankle inversion. Interestingly, these authors reported that, when subjects had a significant degree of instability, as measured by talar tilt and anterior translation, reaction times were longer than those of subjects without instability. Furthermore, these researchers showed that reaction time was decreased in subjects with instability when their ankles were taped. With respect to jogging, in subjects with significant talar tilt, Glick *et al.*³³ noted that taping led to changes in the phasing pattern of the peroneus brevis. Not all studies support the notion that injury is related to muscle activation changes. For instance, Nawoczenski *et al.*³⁶ and Ebig *et al.*³⁷ compared injured and uninjured ankles and noted no differences in peroneal response times in response to sudden inversion stress.

In this study, it is not clear why the changes in EMG activity were observed only when subjects were braced. However, some researchers,^{38,39} although not all,⁴⁰ have noted that bracing provides a longer period of restriction to motion than taping. It may have been that the time between taping the subjects' ankle and the completion of the jumps (about 10 minutes) was sufficient to generate this effect.

CONCLUSION

The findings of this study indicate that the use of an ankle brace can lead to specific changes in muscle activity. However, these changes were not of a magnitude to influence the position of the foot at landing or affect the time to peak VGRF. Thus no changes were observed that may be perceived as having the potential to increase the likelihood of injury or be detrimental to performance. Therefore our findings suggest that whether to use braces or tape should remain a matter of personal choice. In this respect, other researchers⁴¹ have noted that many players prefer a brace as they are more convenient to use and are more cost effective.

Gratitude is expressed to Curtin University of Technology and the University of Western Australia for funding this project and to Rob Bakes of Orthotic Consultants for donating the Swede-O-Braces.

Contributors: D H initiated and coordinated the formulation of the primary hypotheses in this study, designed the methodological protocol, and participated in data collection, statistical analysis, and writing the paper. P Mc discussed the core ideas, collaborated in the design of the methodological protocol, participated in data collection, data documentation, and quality control, and edited the paper. B E participated in the core issues of the study and its design and edited the paper.

- 1 Hopper D. A survey of netball injuries and conditions related to these injuries. *Australian Journal of Physiotherapy* 1986;32:231–9.
- 2 Hopper D, Elliott B, Lalor J. A descriptive epidemiology of netball injuries during competition: a 5 year study. *Br J Sports Med* 1995;29:1–6.
- 3 Ekstrand J, Tropp H. The incidence of ankle sprains in soccer. *Foot Ankle* 1990;11:41–4.
- 4 Bahr R, Karlson R, Overbo RV. Incidence and mechanisms of acute ankle inversion injuries in volleyball. *Am J Sports Med* 1994;22:595–600.
- 5 Leanderson J, Wredmark T. Treatment of acute ankle sprain. Comparison of a semirigid brace and compression bandage in 73 patients. *Acta Orthop Scand* 1995;66:529–31.
- 6 Hopper D, Elliott B. Lower limb and back injury patterns of elite netball players. *Sports Med* 1993;16:148–62.
- 7 Tropp H, Askling C, Gillquist J. Prevention of ankle sprains. *Am J Sports Med* 1985;13:259–62.
- 8 Garrick JG, Requa RK. Role of external support in the prevention of ankle sprains. *Med Sci Sport* 1973;5:200–3.
- 9 Sittler MR, Horodyski M. Effectiveness of prophylactic ankle stabilisers of prevention of ankle injuries. *Sports Med* 1995; 20:5–7.

- 10 Surve L, Scwellnus MP, Noakes T, *et al.* A fivefold reduction in the incidence of recurrent ankle sprains in soccer players using the sport stirrup orthosis. *Am J Sports Med* 1994;22: 601–5.
- 11 Rarick GL, Bigley G, Karst P, *et al.* The measurable support of the ankle joint by conventional methods of taping. *J Bone Joint Surg [Am]* 1962;44:1183–90.
- 12 Larsen E. Taping the ankle for chronic instability. *Acta Orthop Scand* 1984;55:551–3.
- 13 Frankney JR, Jewett DL, Hankd GA, *et al.* A comparison of ankle taping methods. *Clin J Sports Med* 1993;3:20–5.
- 14 Robbins S, Waked E, Rappel R. Ankle taping improves proprioception before and after exercise in young men. *Br J Sports Med* 1995;29:241–7.
- 15 Steele JR, Milburn PD. A kinetic analysis of footfall patterns at landing in netball. *Aust J Sci Med Sport* 1989;21:10–13.
- 16 Melville-Jones G, Watt DG. Muscular control of landing from unexpected fall in man. *Journal of Physiotherapy* 1971; 219:729–37.
- 17 McNitt-Gray, J. Kinematics and impulse characteristics of drop landings from three heights. *International Sports Biomechanics* 1991;7:201–23.
- 18 Hopper DM. Is ankle inversion taping reliable? *N Z J Sports Med* 1997;25:2–4.
- 19 Basmajian JV, DeLuca CJ. *Muscles alive. Their functions revealed by electromyography.* 5th ed. Baltimore: Williams and Wilkins, 1985.
- 20 Edington CJ, Frederick EC, Cavanagh PR. Rearfoot motion in distance running. In: Cavanagh PR, ed. *Biomechanics of distance running.* Champaign, IL: Human Kinetics, 1990: 134–61.
- 21 Ottenbacher KJ. Statistical conclusion validity. Multiple inferences in rehabilitation research. *Am J Phys Med Rehabil* 1991;70:317–22.
- 22 Nummela A, Rusko H, Mero A. EMG activities and ground reaction forces during fatigued and nonfatigued sprinting. *Med Sci Sports Exerc* 1994;26:605–9.
- 23 Ramey M, Williams K. Ground reactions forces in triple jump. *International Journal of Sports Biomechanics* 1985;15: 487–92.
- 24 Panzer VP, Wood GA, Bates BT, *et al.* Lower extremity loads in landings of elite gymnasts. In: de Groat G, Hollander AP, Huijing PA, van Ingen Schenau GJ, eds. *Biomechanics XI-B, International Series on Biomechanics.* Amsterdam: Free University Press, 1987:727–35.
- 25 Neal RJ, Sydney-Smith M. The effects of footfall pattern and passing height on ground reaction forces in netball. *Aust J Sci Med Sport* 1992;24:73–8.
- 26 Steele JR, Lafortune MA. A kinetic analysis of footfall patterns at landing in netball: a follow-up study. In: Morrison P, ed. *VIIth international symposium of biomechanics in sports.* Footscray: Footscray Institute of Technology, 1989:101–12.
- 27 Steele JR, Milburn PD. Ground reaction forces on landing in netball. *Journal of Human Movement Studies* 1987;13: 399–410.
- 28 McNair PJ, Marshall RN. Concepts related to impact forces at footstrike during jumping and landing activities. *New Zealand Journal of Physiology* 1993;21:21–5.
- 29 Valiant G, Cavanagh P. A study of landing from a jump: implications for the design of a basketball shoe. In: Winter D, Norman R, Wells R, *et al.*, eds. *Biomechanics IX-B.* Champaign, IL: Human Kinetics, 1985:117–21.
- 30 Denoth J. Load on the locomotor system and modelling. In: Nigg BM, ed. *Biomechanics of running shoes.* Champaign, IL: Human Kinetics, 1986:74–88.
- 31 Laughman RK, Carr TA, Chao JW, Sim FH. Three-dimensional kinematics of the taped ankle before and after exercise. *Am J Sports Med* 1980;8:425–31.
- 32 Greene TA, Wight CR. A comparative support evaluation of three ankle orthoses before during and after exercise. *J Orthop Sports Phys Ther* 1990;11:453–66.
- 33 Glick JM, Gordon RM, Nishimoto D. The prevention and treatment of ankle injuries. *Am J Sports Med* 1976;4:136–41.
- 34 Spriggins EJ, Pelton JD, Brandell BR. An EMG analysis of the effectiveness of external ankle support during sudden ankle inversion. *Canadian Journal of Applied Sports Science* 1981;6:72–5.
- 35 Karlsson J, Andreasson GO. The effect of external ankle support in chronic lateral ankle joint instability. *Am J Sports Med* 1992;20:257–61.
- 36 Nawoczenski DA, Owen MG, Ecker ML, *et al.* Objective evaluation of peroneal response to sudden inversion stress. *J Orthop Sports Phys Ther* 1985;7:107–9.
- 37 Ebig M, Lephart SM, Burdett RG, *et al.* The effect of sudden inversion stress on EMG activity of the peroneal and tibialis anterior muscles in the chronically unstable ankle. *J Orthop Sports Phys Ther* 1997;26:73–7.
- 38 Greene TA, Hillman SK. Comparison of support provided by a semirigid orthosis and adhesive ankle taping before during and after exercise. *Am J Sports Med* 1990;18:498–506.
- 39 Paris DL, Vardaxis V, Kokkalis J. Ankle ranges of motion during extended activity periods while taped and braced. *Journal of Athletic Training* 1995;30:223–8.
- 40 Gross MT, Batten AM, Lamm AL, *et al.* Comparison of Donjoy ankle ligament protector and subtalar sling taping in restricting foot and ankle motion before and after exercise. *J Orthop Sports Phys Ther* 1994;19:33–41.
- 41 Callaghan MJ. Ankle taping and bracing in the athlete. *Br J Sports Med* 1997;31:102–8.

Take home message

Netball players can be confident that the biomechanics of their landing patterns will not be altered whether they choose to wear a brace or tape their ankle joints.