

# The prevention of ankle sprains health and social care essay



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**ABSTRACT:**

**Objectif:** To determine the effectiveness of prophylactic ankle support, such as ankle braces and ankle taping in the prevention of ankle sprains in competitive athletes and to identify the most effective one. **Method:** A literature search was conducted using the "Fontys Mediatheek" database called "biep. nu" and the databases "PubMed" and "SPORTDiscus". In the three databases the same search terms were used: "prophylactic ankle support", "prevention of ankle sprains" and "competitive athletes" and in order to extend the search, synonyms, such as "ankle bracing", "ankle taping", "external ankle support", and "athletes" were used. Only full text, English articles dating after 1997 and containing a reference list and reporting on competitive adolescent or adult athletes were included. **Results:** Four articles, all based on previously conducted studies by other authors, were included in this review. A selection was made by picking out the studies that were most referred to in the articles. In total, four studies were retained. Two prospective randomized studies analyzed the effect of either ankle taping or ankle bracing compared to no use of prophylactic ankle support, one retrospective study compared ankle taping to ankle bracing and the last study compared two different types of ankle braces to ankle taping. **Conclusion:** The reviewed studies suggest that prophylactic ankle support is effective in the prevention of ankle sprains in competitive athletes with a previous history of ankle sprain injuries. There is no evidence which external ankle support is the most efficient and further studies must be conducted on this respect.

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**Introduction:**

Several epidemiological studies have shown that ankle sprains are the most common sport's injuries, accounting for 10-30% from all musculoskeletal injuries and constituting approximately 85 % of all injuries to the ankle and foot region. 1, 2, 3, 4 Especially individuals participating in recreational or competitive sport activities are very susceptible to experience an ankle sprain sooner or later in their athletic career and have to face its significant and quite prolonged impact on daily activities and athletic participation. 2, 4 In fact, it is the medial and lateral ligamentous complexes that give the strongest support to the ankle joint and so contribute in maintaining the

movements of the foot in the right planes. The lateral collateral ligament, which is affected in 85% of all ankle sprains, consists of four bands: the calcaneofibular ligament, the posterior talofibular ligament, the lateral talocalcaneal ligament and the anterior talofibular ligament. As a consequence of the weak tensile strength of the anterior talofibular ligament, it is most often damaged if the foot is forced into an abnormal inversion position. Inversion ankle sprains generally occur with the foot in slight plantar flexion and internal rotation, a movement which frequently happens in sports like basketball, volleyball, soccer and ballet. 1, 3 The risk is even higher in athletes with a history of ankle sprain injury, because there might be a mechanical instability, deficits in the awareness of ankle positioning or peroneal muscle weakness. 1, 2 In order to reduce the occurrence of initial ankle sprains, but also to protect the injured ankle and to prevent recurrent sprains, athletes often get a prescription for prophylactic ankle braces, orthoses or tapes, applied in different techniques, to the athletes. 2, 4 Some research has already been made on the effectiveness of these prophylactic devices that are used in acute stages of ankle sprain to control swelling and range of motion and in the chronic stage to support and stabilize the ligaments and the joint by limiting inversion movement. 3, 4 Furthermore, it is also proven that they increase the proprioception of the ankle joint. 4 Researchers found out that whether a tape or brace is effective, depends on factors such as the material and the way the tape or brace is applied, but also on the athlete's previous history of ankle sprain injuries and the current stability of the ankle. 4 However aspects such as comfort, costs, ease of application, age, the type of sport and personal preferences also have to be taken into consideration, because each

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individual is unique in its physiological nature. This research report has the aim to find out to what extent prophylactic ankle support, such as braces, tapes and orthoses, contribute in the prevention of occurrence and recurrence of ankle sprains in competitive athletes and also considers which type of external support is most effective in doing so.

## Methods

After the formulation of the final research question, search terms were evaluated in order to look for relevant articles in online databases. The search was based on three databases: the first database to be browsed was the one from "Fontys Mediatheek" called "biep. nu", followed by the database "PubMed" and last but not least by "SPORTDiscus" which is international database containing information in the areas sport, health, physical education, fitness and sport medicine. The search terms were the same in the three databases: "prophylactic ankle support", "prevention of ankle sprains" and "competitive athletes". In order to make sure that no potentially important articles were missed, synonyms were also used: "prophylactic ankle support" was replaced by "ankle bracing", "ankle taping" and "external ankle support", "competitive athletes" by "athletes" and "prevention" by "secondary prevention". Only publications dating after 1997, as well as full text articles that are written in English and peer-reviewed trials were included. Also only articles comprising trials with adolescent or adult competitive athletes were considered relevant. Furthermore, only studies comparing athletes wearing different external ankle supports, such as variable semi-rigid orthoses, lace up braces and prophylactic ankle tapes to athletes wearing no external ankle support, were included. Whether

participants had or had no previous history of ankle sprain was not a criterion. All studies considered relevant for this research report tested the prophylactic ankle supports either related to the hours of exposure to practice or games, or to the number of exercises accomplished wearing the prophylactic device. All publications dating before 1997, as well as all articles without a reference list and without a full text were excluded from the search. Furthermore all studies reporting on athletes with musculoskeletal injuries other than ankle sprains were excluded. Studies that didn't report on competitive athletes were also excluded.

## Results

In the database "SPORTDiscus", the search terms "ankle bracing and ankle taping and athletes and secondary prevention ankle injuries" led to four hits of which one was an interesting article to give an answer to the research question. In the database "PubMed", the search terms "ankle bracing and ankle taping and athlete and prevention ankle injuries" provided ten hits, of which one article was selected. Another article was found in the list of the related citations in "PubMed". In the database "biop. nu" seven articles were found with the search terms "ankle bracing, ankle taping, competitive athletes, prevention ankle injuries" and one article, a systemic review of the subject to be treated, was considered relevant. All in all, eighteen articles were excluded based on their title or abstract. The four remaining articles, which also included review articles, were chosen amongst others, because there was only a limited amount of full text articles available that were originally conducting studies on this subject. Thus these four articles were all based on different studies previously conducted by other authors. As the

studies accomplished by Garrick J and Requa R<sup>5</sup>(1973), Surve I et al. 6 (1994), Rovere GD et al. 7 (1988) and Gross et al. 8 (1992) are most frequently referred to in the retained articles and because their studies meet best the objective of this scientific report, it will be based on the studies accomplished by these authors. These four studies were also chosen according to the previously mentioned inclusion and exclusion criteria. The most commonly cited prospective randomized study on the prevention of ankle sprains was made by Garrick and Requa<sup>5</sup> (1973). In fact, they did an examination on the effect of prophylactic ankle taping and orthoses in prevention of ankle sprains. Therefore they tested 2563 intramural basketball players, that were either uninjured, occasionally or frequently injured, over two successive seasons. They created four groups of participants, wearing either low-top or high-top shoes and with and without taped ankle. In order to tape the foot, a zinc oxide stirrup horseshoe and figure of eight technique was used. (Appendix 1) Group A was taped, group B wore a Jflex brace and the third group C remained untaped. All in all, the taped group, wearing high-top shoes presented an injury recurrence of 6.5/1000 games, compared to the untaped group with the same shoes among which the injury incidence was 17.6/1000 games. Furthermore, they also compared the use of ankle tape with a control group among non-injured players, as well as the effect of ankle taping compared with a control group among previously injured players. Whereas in the group of non-injured players, there was no significant reduction of ankle sprains between the two groups, 71% fewer ankle sprains have occurred among the taped group among the players that have previously been injured. So regardless of the shoe type, Garrick and Requa<sup>5</sup> (1973) have assessed a significant decrease

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in recurrent ankle sprains by applying ankle tapes. Surve I et al. 6 (1994) performed a similar prospective randomized clinical evaluation. The purpose of the study was to determine the effect of an Aircast Sport Stirrup (Aircast, Inc. Summit, NJ), in the incidence and severity of ankle sprains among soccer players. The Aircast Sport Stirrup has a plastic shell which provides support and which contains a gel to disperse the swelling. In fact, they tested 504 senior male soccer players throughout one playing season (equivalent to 140192 playing hours) and excluded all players with gross pathological ankles. In the group of 258 previously injured players, 127 wore the Aircast Sport Stirrup and 131 wore none, whereas in the group of none-injured players, 117 wore the Aircast Sport Stirrup and 129 constituted the control group. The ankle brace was worn on the dominant leg in the group of non-injured players and on the previously injured leg in the group of previously injured athletes. The result was a total of 123 ankle sprains in the two groups, of which 48 occurred in the braced group and 75 in the control group. Among the group with previous ankle sprains, there was a significant reduction of ankle sprains in the braced group (0.14 per 1000 exposures) compared with the non-braced group (0.86 per 1000 exposures).

Furthermore, the incidence of ankle sprains in the non-braced group with previous sprains (0.86 per 1000 exposures) was significantly higher than the incidence of sprains in the non-braced group without previous sprains (0.46 per 1000 exposures). Thus the Aircast Sport Stirrup significantly reduced the incidence of recurrent ankle sprains in previously injured soccer players, whereas in players without previous history of ankle sprains, no significant differences could be assessed. Rovere GD et al. 7 (1988) conducted a

retrospective study of collegiate football players that lasted over 6 seasons.  
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In total 360 football players participated in the study among which 233 wore athletic tape and 127 wore laced ankle braces. During 38658 exposures to practice or games, 159 initial ankle sprains (4.1 per 1000 exposures) and 23 recurrent ankle sprains (0.6 per 1000 exposures) were registered in the taped group. In the braced group, during 13273 exposures to practice or games, 37 players incurred an initial ankle sprain (2.8 per 1000 exposures) and 1 athlete had a recurrent ankle sprain (0.8 per 1000 exposures). Thus the overall risk to incur an ankle sprain in the taped group was 4.7 per 1000 exposures, whereas in the braced group only 2.9 sprains occurred in 1000 exposures. (Table 1)

Table 1: Characteristics of included studies

The last study that is referred to quite often is Gross et al. 8 (1992). It consists of an analysis comparing the Swede-O Universal® brace (Figure 1), the Aircast® Sport Stirrup™ (AS) (Figure 2) and ankle taping. The Aircast® Sport Stirrup™ is of the same type as in the study of Surve I et al. 6 (1994). Inversion and eversion restriction of motion was assessed for 30 healthy ankles using one of the 3 types of prophylactic ankle support which were evaluated pre-application, post application and post exercise. The Biodex dynamometer system was used to assess all range of motion (ROM) data and all taping was performed by the same person in order to standardize the results. The participants were asked to perform a 10 minute figure-of-8 run and 20 toe raises. The taping provided the highest initial stiffness, but with exercise it quickly reached a point where it provided equivalent stability as the AS. All tested external ankle supports turned out to be effective in restricting inversion and eversion of the ankle after application and exercise, but the AS and ankle taping gave more effective support than the Swede-O Universal® lace up brace. (Table 2)

Figure 1: Swede-O Universal®  
Figure 2: Aircast®

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Sport Stirrup™ Table 2: Mean percent reduction in the inversion and eversion range of motion as evaluated by Gross et al. 8 (1992) pre- and post-exercise

## Discussion

This research report is aimed at revealing the effectiveness of prophylactic ankle support in the prevention of ankle sprains in competitive athletes and at determining the most effective one. Within each study, several comparisons were made either between a control group wearing no ankle support and a taped group or a braced group, or different kinds of braces were compared to each other and to ankle taping. Two studies included in this research report concluded that ankle taping and ankle bracing, in comparison to a control group, effectively reduced the incidence of recurrent ankle sprains, whereas no difference could be assessed in athletes without previous history of ankle sprains. 5, 6 Only one study assessed ankle braces to be twice as effective as ankle taping per 1000 exposures to soccer. 7 Another study concluded that ankle taping and the Aircast® Sport Stirrup™ were more effective than the Swede-O Universal® lace up brace, but that all the devices used were effective in restricting eversion and inversion of the ankle following application and exercise. 8 Other authors, such as Sitler et al. 9 (1994), also conducted a randomized controlled trial, in order to determine the efficacy of a semi-rigid ankle stabilizer in reducing the frequency and severity of ankle injuries among Basketball players over 2 years. As the authors used for this review article, they also made the difference between athletes with and without previous history of ankle injuries. Tropp et al. 10 (1985) conducted a study, comparing an ankle orthosis to proprioception training and a control group. Both studies, just as the studies used in this

report, provided good evidence that ankle braces were effective in preventing ankle sprains especially in athletes with previous history of ankle sprain injuries. All in all, external ankle support was found to be effective in the prevention of recurrent ankle sprains in competitive athletes<sup>6, 7, 8</sup>, even if it was experimentally shown that both, ankle braces and especially ankle tapes loosened after brief periods of exercise. <sup>8</sup> This finding suggests that ankle taping and bracing may not only have a mechanical effect on the joint by restricting its ROM, but also on the nervous and musculotendinous units of the ankle joint, the so called functional stability. <sup>2, 3</sup> Thus, ankle taping and ankle bracing may not only prevent abnormal movement of the ankle and so stabilize the damaged ligamentous structures, but may also improve important functional factors impaired by ankle sprains, such as the slowed reaction time of the peronei muscle, the proprioception of the joint and the awareness of the foot position. <sup>2, 3, 4</sup> A study conducted by Glick et al. <sup>11</sup> (1976), using electromyographic analysis of runners, confirmed that the peronei muscle group could contract for a longer period of time at the pre-heel strike stage when using ankle taping. Moreover, the studies from Robbins et al. <sup>13</sup> (1995) and Jerosch et al. <sup>12</sup> (1995) resulted in different results in what concerns the effect of ankle supports in the proprioception of the ankle, which was assessed by means of postural sway and single leg balancing tests. While Robbins et al. <sup>13</sup> (1995) concluded that ankle taping had an improving effect on foot position awareness and so also on the prevention of ankle sprains in athletes; Jerosch et al. <sup>12</sup> (1995) assessed that only ankle bracing and not ankle taping improved the proprioception and functional ability of the injured and normal ankles. More studies must be conducted analyzing the effect of external ankle supports in relation to <https://assignbuster.com/the-prevention-of-ankle-sprains-health-and-social-care-essay/>

proprioception, in order to be able to draw a conclusion. In comparing the results of the included studies, it can be inferred that, total prevention of ankle sprain was not possible by using either ankle tape or ankle brace. This is probably due to the fact that the forces leading to ankle sprain injuries are so great that the reduction in range provided by the external ankle support is not enough to withstand them. Garrick and Requa<sup>5</sup> (1973) claimed that ankle taping has a protective influence on the ankle and that even though it lost some of its mechanical strength during exercise, it still constituted a clinically effective device in the prevention of secondary ankle sprains in intramural basketball players. Surve I et al. <sup>6</sup> (1994) drew a similar conclusion as Garrick and Requa<sup>5</sup> (1973), but for the use of an Aircast Sport Stirrup brace: It significantly reduced the incidence of recurrent ankle sprains in soccer players with a previous history of ankle sprains, whereas no significant differences could be assessed in players without previous history of ankle sprains. Both authors also considered the effect of ankle braces on injuries of other parts of the lower extremity and especially the knee, which could outweigh the beneficial effects of the braces on the ankle. However no significant results were found concerning such injuries in closed kinetic chain activities. In their retrospective study on the efficacy of a laced ankle stabilizer compared to ankle taping in collegiate football players, Rovere GD et al. <sup>7</sup> (1988) concluded that non rigid lace up braces apparently reduced the risk of an ankle sprain by half compared to taping. This may be due to the fact that athletes were able to readjust the tension of their brace regularly during exercise. In contrast, Gross et al. <sup>8</sup> (1992) concluded, after having compared ankle taping, the Swede-O Universal<sup>®</sup> brace and the Aircast<sup>®</sup> Sport Stirrup<sup>™</sup>, that even though all devices showed effective

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eversion and inversion restriction following application and exercise, ankle taping and the Aircast® Sport Stirrup were more efficient in preventing ankle sprains than the Swede-O Universal® lace up brace, especially after brief periods of exercise. These two studies stand in contradiction to each other. However it has to be taken into account that the retrospective study of Rovere GD et al. 7 (1988) was not as reliable as the one conducted by Gross et al. 8 (1992), because there was no experimental control, no randomized treatment groups were formed and there was no precision of which taping method or exact bracing type was used. In order to draw a conclusion on which external ankle support is more effective, more prospective randomized trials have to be conducted directly comparing the two devices, as there are too few at this moment. Furthermore, comparing ankle taping to ankle braces, it can be concluded that braces are not only less expensive and reusable, but also easier to apply and to readjust by the affected person herself and don't require an athletic trainer. Ankle braces also seem to provoke less skin irritations, such as blisters. 3, 4 Thus the use of ankle braces slowly starts to replace ankle taping, which, until now, was the most common intervention used in the prevention of ankle sprains. 2 However also tape has its advantages, such as the fact that it is less bulky, it doesn't interfere with the normal biomechanics of motion while restricting joint mobility and it has a greater initial stiffness than a brace. Though this stiffness weakens after a certain period of time, because of moisture accumulation under the tape, weakening of the tape and mobility of the skin on which the tape is applied, so that its preventive effectiveness decreases to a similar level of the one initially provided by ankle braces. 2, 3, 4 There are also other factors that have an effect on the efficacy of an external ankle

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support. Athletes may not be compliant with an ankle tape or brace if it is uncomfortable, causing blisters, or if they think that it may have a negative impact on their athletic performance, even though there is no evidence supporting that theory. <sup>1</sup> In such a case, the clinician should evaluate different types of external ankle support, taking the athlete's feedback into consideration, in order to provide him with an optimal prophylactic support for his ankle. <sup>1</sup> Consequently braces and taping for competitive athletes engaged in sports that require a lot of cutting maneuvers, vigorous jumping and landing may be considered to prevent ankle sprain injuries, especially with those with a previous history of ankle sprain injuries. <sup>1</sup> The greatest limitation of this research review was the limited amount of articles describing prophylactic ankle support in terms of prevention of ankle sprains. As a result primary sources, consisting mainly of review articles, couldn't be used throughout the report, so that a preliminary selection of secondary sources, which appeared appropriate to answer the research question, had to be made. Furthermore there was no blinding of the participants and the assessors conducting the studies and there were differences in the study design, such as the number and type of participants and the respective study surroundings. Furthermore there is little evidence in what concerns potentially negative effects of taping and bracing. <sup>3</sup> Further study will have to be done before a conclusion can be drawn whether long term use of ankle support may have a harmful effect on muscle strength, other tissue of the ankle or its neighborhood joints. <sup>1, 4</sup> Future studies must also analyze the possible effects of continued use of braces on other joints of the lower extremity and also directly compare the different kinds of newly launched braces in order to determine which braces are used the most and which

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braces constitute the most efficient prevention against ankle sprains.

Another important question that has to be experimentally assessed is the using time of prophylactic ankle supports following an injury in order to sufficiently prevent the risk of recurrence. 1

## **Conclusion**

The studies reviewed suggest that, even though ankle braces and ankle tapes lose some of their mechanical restriction after short periods of exercise, both constitute an effective prevention against ankle sprains in competitive athletes with a previous history of ankle sprain injuries. There is no evidence on which type of prophylactic ankle support is most effective, as each has its advantages and disadvantages and it also depends on personal preferences. Further studies have to be conducted in order to assess the effect of external ankle supports on athletes that have no previous history of ankle sprains and it is important that the authors will ensure good methodological procedures in order to assess the isolated effect of the prophylactic ankle supports. So even if prophylactic ankle supports were shown to be effective in the prevention of recurrent ankle injuries in basketball and soccer players, there are still a lot of questions that have to be answered before a final conclusion can be drawn.