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**Exploring influences on return to sport and work after lateral ankle sprain - a systematic review and meta-analysis**

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**Abstract**

**BACKGROUND**

Lateral ankle sprains are the most common traumatic musculoskeletal injuries of the lower extremity, with an incidence rate of 15% to 20%. The high incidence and prevalence highlights the economic impact of this injury. Ankle sprains lead to a high socioeconomic burden due to the combination of the high injury incidence and high medical expenses. Up to 40% of patients who suffer from an ankle sprain, develop chronic ankle instability. Chronic instability can lead to prolonged periods of pain, immobility and injury recurrence. Identification of factors that influence return to work and return to sports after a lateral ankle sprain may help seriously reduce healthcare costs.

**AIM**

To identify factors that potentially affect return to work (RTW) and sport (RTS) after sustaining a lateral ankle sprain.

**METHODS**

Embase and PubMed were systematically searched for relevant studies published until June 2023. Inclusion criteria were as follows: (1) injury including LAS or CAI, (2) described any form of treatment, (3) assessment of RTW or RTS, (4) studies published in

English and (5) study designs including randomised controlled clinical trials (RCT), clinical trials or cohort studies. Exclusion criteria were (1) studies involving children (age <16 year) or (2) patients with concomitant ankle injury besides lateral ankle ligament damage. A quality assessment was performed for each of the included studies using established risk of bias tools. Additionally quality of evidence was assessed using the GRADEpro tool in case outcomes were included in the quantitative analysis. A best evidence synthesis was performed in case of qualitative outcome analysis. For all studied outcomes suitable for quantitative analysis a forest plot was created to calculate the effect on RTW and RTS.

## RESULTS

A total of 8904 patients were included in these 21 studies, 10 randomised controlled trials, 7 retrospective cohort studies and 4 prospective cohort studies. Fifteen studies were eligible for meta-analysis. The overall RTS rate ranged from 80 to 83% in the all treatments pool and surgical treatments pool, respectively. The pooled mean days to return to sport ranged from 23 to 93 days. The overall RTW rate was 89%. The pooled mean time to return to work ranged from 5.8 to 8.1 days. For patients with chronic ankle instability, higher preoperative motivation was the sole factor significantly and independently ( $P = 0.001$ ) associated with the rate of and time to return to sports following ligament repair or reconstruction. Higher body mass index (BMI) was identified as a significant factor ( $P = 0.04$ ) linked to not resuming sports or returning at a lower level (median 24, range 20-37), compared to those who resumed at the same or higher level (median 23, range 17-38). Patients with a history of psychological illness or brain injury, experienced a delay in their rehabilitation process for sprains with fractures and unspecified sprains. The extent of the delayed rehabilitation was directly proportional to the increasing likelihood of experiencing a recurrence of the ankle sprain and the number of ankle related medical visits. And 10% of athletes who did return to sport after lateral ankle sprain without fractures, described non-ankle related reason for not returning.

## CONCLUSION

Preoperative motivation may influence rehabilitation after lateral ankle sprain. Grading which factor has a greater impact is not possible due to the lack of comparability among the included patients.

## INTRODUCTION

Ankle sprains are the most common traumatic musculoskeletal injury of the lower extremities in individuals who engage in physical activity, including both athletes and non-athletes.<sup>1-3</sup> This is especially applicable for lateral ankle sprains which account for 80% of ankle sprains, with an incidence rate of 15% to 20%.<sup>1-4</sup> Sports such as basketball, soccer, running, American football and volleyball are specifically associated with an increased risk of ankle sprains.<sup>5-8</sup> Everyday, approximately one lateral ankle sprain (LAS) is recorded per 10,000 people in Western countries.<sup>9</sup> Annually approximately 1.6 million patients suffer from a LAS of which as many as 8,000 are hospitalised in the United States alone.<sup>10</sup> In the United Kingdom the incidence at emergency departments was estimated to be 5.7 per 10,000 persons per year.<sup>10 11</sup> The estimated incidence of ankle sprains, including both first-time and recurrent sprains, is between 2.15 and 3.29 per 1000 persons per year.<sup>12</sup> Up to 40% of these patients develop chronic ankle instability (CAI), which can lead to prolonged periods of pain, immobility and injury recurrence.<sup>13 14</sup> Yet despite the high incidence and high risk of developing CAI, only about 50% of the patients who sustained a LAS seek medical attention.<sup>15</sup>

Ankle injuries not only inflict pain and functional restriction, but also result in sick days at work and inability to participate in sports. Additionally LASs are directly correlated to low work efficiency in the days following ankle trauma, depending on the work-related ankle loading demands.<sup>10</sup> The high incidence and prevalence in combination to loss of working days and high medical expenses highlights the great socio-economic impact of this injury. The total costs per individual for LAS management varies widely

ranging from 360 to 1300 euros. In the Netherlands, approximately 187.2 million euros is spent annually on the treatment of sports-related ankle sprains alone.<sup>13 14</sup> Although patient burden is our primary concern, insights in the costs indicate the need for cost-efficiency to minimise the socio-economic burden.

The objective of this systematic review and meta-analysis is to determine factors that may influence return to work (RTW) and return to sports (RTS) after lateral ankle sprain.

## **MATERIALS AND METHODS**

### Search strategy

The purpose of this study was to determine the top ten factors that influence RTW and RTS in patients who sustained a LAS. A systematic search was conducted in Embase and PubMed to identify all relevant studies published until May 2023. The search consisted of the search entries (1) ankle sprain, (2) return to work and return to sports, and (3) treatments and their corresponding synonyms (see Supplementary Appendix 1).

### Selection criteria

Two authors independently screened the identified studies for relevance based on titles and abstract using Rayyan QCRI 16 as data management software. If there was any disagreement the studies were openly discussed to reach consensus on initial inclusion or exclusion. Full texts of all potentially relevant studies were screened and selected based on the predefined inclusion and exclusion criteria. The selection process is shown in the PRISMA Flow Diagram in figure 1.<sup>17</sup>

Studies were included in case (1) patients who sustained a LAS or suffered from CAI, (2) patients received any form of treatment, (3) they assessed RTW or RTS, (4) studies were published in English and (5) the study designs included randomised controlled clinical trials (RCTs), clinical trials or cohort studies. Exclusion criteria were (1) studies involving children (age <16 year) or (2) patients with solely concomitant ankle injury besides lateral ankle ligament damage.

### Quality assessment

A comprehensive quality assessment was conducted by scoring the risk of bias of each of the included studies using established tools and scales depending on each study design.

For the cohort studies and clinical trials the ROBINS-I (Risk of Bias in Non-randomised Studies- of Interventions)<sup>18</sup> was used to assess the risk of bias in non-randomised therapy studies. The risk was scored as 'low', 'moderate', 'serious', or 'critical risk'. The lowest scored category was decisive for the overall risk of bias. For RCTs, the Cochrane Risk of Bias Tool (RoB 2)<sup>19</sup> was used to assess the risk of bias. The risk of bias for the RCTs was scored as 'low', 'high' or 'unclear' per key domain. Overall low risk of bias was only assigned to studies that scored low risk of bias for all key domains. In case one or more key domains were scored as high risk of bias, the overall risk of bias was scored as being high. All other scenarios were scored 'unclear' for the overall risk of bias.

Additionally, to a risk of bias assessment for study quality, quality of evidence was assessed per outcome. The quality of summarised evidence in the quantitative analysis was assessed using the GRADEpro GDT tool (GP)<sup>20</sup>. Quality of evidence was scored as 'high', 'substantial', 'moderate', 'low' or 'very low'. In case <3 studied the same outcome and a meta-analysis could not be performed, outcomes were included in the qualitative assessment. The quality of these outcomes was scored using a best evidence synthesis<sup>21</sup> (see table 1).

#### Data collection

First study characteristics were collected including the first author, year of publication and study design. Secondly baseline characteristics of each study were extracted including number of included patients, patient characteristics (including age, gender and weight), duration of follow-up, treatment type and studied outcomes (minimally including RTW and RTS) and injury recurrence. If reported whether patients represented a specific group within the population (i.e. athletes or military) this was also recorded.

A quantitative and qualitative analysis was performed. For inclusion in the quantitative analysis, at least three studies reporting the same outcome variable were required. In case less than three studies reported the specific outcome measure, or heterogeneity was considerable ( $\geq 75\%$ ), studies were included in the qualitative analysis.

To determine the degree of heterogeneity the I<sup>2</sup> was used. The I<sup>2</sup> was interpreted as 0%–40% representing no important heterogeneity, 30%–49% representing moderate heterogeneity, 50%–90% representing substantial heterogeneity and 75%–100% meaning considerable heterogeneity.<sup>22</sup> For the analysis and calculation of the effect, correction for heterogeneity was performed using a fixed model (I<sup>2</sup> <50%) or a random effects model (I<sup>2</sup>  $\geq$ 50%).

To calculate the effect of each studied outcome (i.e. factor) on RTW and RTS a forest plot was created. Using RevMan (V.5.4, Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2020) the mean difference (MD) or odds ratio (OR) and corresponding 95% confidence interval (95%CI) were calculated. A p-value of <0.05 was considered significant.

## **RESULTS**

### *Study selection*

The initial search identified 957 potential studies. After removing 183 duplicates and following screening of title and abstract 59 were selected for full-text review. A secondary search yielded 1158 potential studies. Of these, 78 studies remained after removal of duplicates, exclusion for not meeting eligibility criteria, or being previously reviewed in the initial search. After screening the remaining 78 records, 12 studies were selected for full-text assessment. Lastly, a reference search yielded 5 additional studies. Fifty-nine studies from the initial search, 12 studies from the secondary search and 5 studies from the reference search remained for full-text assessment. Resulting in a final selection of 21 eligible studies for qualitative and quantitative syntheses. The inclusion process of studies is illustrated by the PRISMA flowchart in Figure 1. All included

studies were published in English. Publication dates of included studies ranged from 1995 to 2023.

#### Study characteristics

A total of 8904 patients were included in these 21 studies, 10 randomised controlled trials, 7 retrospective cohort studies and 4 prospective cohort studies. Of the studies that provided information on age, the mean age of included patients was 28 years. Of the studies that reported on gender a total of 957 (36%) were female and 1682 (65%) were male patients. Eleven studies reported on return to sport. Eight studies reported on return to work (ref). These patients received surgical treatment, functional treatment or no treatment. One study reported on costs solely. Within these studies no significant difference was found in age, sex, laterality or between team or individual sports. The follow up period ranged from 1.5 to 84 mo. Eleven (52%) studies assessed surgical interventions, whereas 10 studies (48%) assessed non-surgical interventions, such as physical therapy, brace, tape or external support bandage (see table 2).

#### Study quality

All eighteen included studies were assessed for study quality using corresponding risk of bias tools depending on the study design. Of the fourteen included studies a total of five studies were cohort studies. From the studies assessed according to the ROBINS-I scale, 100% of studies had an overall moderate risk of bias. The moderate risk of bias was mainly due to moderate assessment of confounders ( $n = 3$ ), uncertainties in the patient selection process ( $n = 3$ ) and missing data (see table 3) The lowest risk of bias was seen in the cohort study by White *et al*<sup>42</sup>. only scoring moderate risk of bias for patient selection.

The remaining nine studies (64%) included RCTs. Only Slatyer *et al* scored an overall low risk of bias for study quality. This high risk of bias of the remaining eight studies was explained by unclarity or missing information regarding the blinding of patients and personnel. Two studies, Avci *et al* and O'Connor *et al* additionally scored a high risk of bias for outcome blinding.<sup>23 35</sup> Despite the overall high risk of bias, Hupperts *et*



*al*, Punt *et al* and Razzano *et al* scored well on five out of six key domains (see table 4).<sup>28</sup>

36 37

Seven studies reported on the rate of return to sport (RTS) on a total of 532 patients. Overall, a total of 460 patients were reported to have returned to sports at final follow-up. The pooled return-to-sport rate from meta-analysis was 80% (95%CI 71 to 87%). The pooled return-to-sport rate for operative treatments from meta-analysis was 83% (95%CI 69 to 92%). No significant difference was found (level 1 of evidence) in the rate of return to sport between these 4 treatment groups (figure 2 and 3). Six studies reported on time to return to sports on a total number of 482 patients. The pooled mean days to return to sport ranged from 23 to 93 days. The RTS results from the meta-analysis are categorised as low quality of evidence.

A higher percentage ( $P = 0.029$ ) of athletes with grade I or II ankle sprain treated with electrotherapy were observed to (72%) return to sports at the 2-month mark, when compared to a sham treatment (55%). However, by the 4-month mark, the numbers in both groups were similar (84%,83%, respectively) without significant difference. The Visual Analog Scale (VAS) at 30 days after treatment ( $P = 0.043$ ) favoured the electrotherapy treatment group (1) over the Sham device group (1.7).<sup>37</sup> Categorised as evidence level 2. In another study on patients with grade III chronic ankle instability, VAS during walking was lower ( $P = 0.018$ ) at 3 mo follow up in favour of arthroscopic treatment (2.3, SD± 2.5) which had quicker ( $P = 0.023$ ) return to sport when compared to open surgery (4.9, SD±2.5).<sup>27</sup> Categorised as evidence level 2.

Arthroscopic ligament repair and simultaneous procedures for other pathologies delayed ( $P < 0.001$ ) mean days to return to sports (42 days, SD ±19, range 1-58) when compared to ligament repair alone without concurrent procedures (61 days, SD ±23, range 32-123). Ankle stabilisation surgery with concurrent procedures allowing weight bearing (mean 45 days, SD ± 14, range 32-75) showed shorter time to return to sports than ankle stabilisation surgery with simultaneous procedures that required non-

weight bearing after surgery ( $P < 0.001$ , mean 71 days, SD  $\pm 23$ , range 35-123).<sup>40</sup> Categorised as evidence level 3. A delayed ( $P < 0.001$ ) return to sports is also seen when associated injuries (median 105 days, range 82-178 ) are present compared to isolated injuries (median 72, range 56-127) in patients with grade I or II ankle sprain.<sup>42</sup> Categorised as evidence level 3.

In a single study, it was found that individuals with CAI who had a higher BMI (median 24, range 20-37) were more likely ( $P = 0.04$ ) to refrain from resuming sports or to return to sports at a lower level, in contrast to those with a similar or lower BMI (median 23, range 17-38) who were more inclined to resume their sports activities at the same or higher level. In this study higher preoperative motivation emerged as the sole factor significantly and independently ( $P = 0.001$ ) associated with both rate of and time to return to sports following ligament repair or ligament reconstruction.<sup>24</sup> Categorised as evidence level 3.

Five studies reported on the rate of RTW on a total of 693 patients. Overall, a total of 614 patients were reported to have returned to work at last follow-up. The pooled return-to-work rate from meta-analysis was 89% (95%CI 79 to 95%), see figure 4. Seven studies reported on time to return to work on a total of 1284 patients. The pooled mean time to return to work ranged from 5.8 to 8.1 days (table 8). The RTW results from the meta-analysis are categorised as low quality of evidence.

The open modified Broström procedure allowed the majority of patients (73%) in an examined military population with chronic ankle instability (complaints for  $>6$  mo) to return to active duty.<sup>34</sup> Categorised as evidence level 3. For patients with grade III CAI (complaints for  $>6$  mo), arthroscopic surgery showed quicker return to work (mean 6.8 days, SD  $\pm 2.1$ ), compared to patients in the open surgery group (mean 8.1 days, SD  $\pm 2.4$ ,  $P = 0.006$ ).<sup>41</sup> Categorised as evidence level 2.

When comparing immobilisation of 3 days to immobilisation of 10 days, 53% ( $P < 0.001$ ) of the early mobilised patients returned to work after 10 days compared to 13% of the immobilised patients. A lower percentage of patients in the early mobilisation group (57%) reported levels of pain compared to the Immobilisation Group (87%,  $P < 0.05$ ). After 3 wk, all patients in both groups were able to return to any type of work, and after 3 mo, they were able to resume full work.<sup>25</sup> Categorised as evidence level 2. Comparing two different forms of immobilisation for grade III ankle sprain, the Soft Cast® (2.5 days) demonstrated significantly better results ( $P < 0.001$ ) in terms of days away from work compared to Scotchcast Plus® (6.3 days).<sup>23</sup> Categorised as evidence level 2.

One study conducted a study on patients who suffered from an ankle sprain with fracture. They found that those individuals with a previous history of traumatic brain injury, depression, anxiety, or substance abuse experienced a delay in their rehabilitation process. In the case of patients diagnosed with post-traumatic stress disorder (PTSD), the impact of the delay was observed in unspecified ankle sprains.<sup>38</sup> Categorised as evidence level 2.

## **DISCUSSION**

Psychological factors such as preoperative motivation, were shown to be correlated with both return to sports and work. The effect of psychological factors on the delay of rehabilitation after an ankle sprain can be substantial and multi-faceted. Psychological factors can influence an individual's perception of the severity of their injury and their perceived control over the recovery process. Depression, anxiety, post-traumatic stress disorder (PTSD), and substance abuse, can have a significant impact on an individual's willingness, motivation, and ability to engage in the rehabilitation process. Conditions like depression and anxiety may lead to a lack of interest or reduced commitment to the recovery process, resulting in delays in attending therapy sessions, neglecting exercises, or not adhering to treatment plans.

One study found that the extent of the delayed rehabilitation was directly proportional to the increasing likelihood of experiencing a recurrence of the ankle sprain and the number of ankle related medical visits. People who received delayed care had up to 10 additional visits.<sup>2</sup> Costs were also 1.13 times more likely to be greater (up to \$1400 per episode), with a linear relationship noted with each day rehabilitation care was delayed.<sup>2</sup> The total financial burden (adjusted for inflation) of ankle sprain ranges from \$11.7 to \$90.9 million per year, and costs in military and civilian settings are similar.<sup>38</sup> Home based proprioception training adjacent to physical therapy showed costs 4 times lower than physical therapy alone.<sup>28</sup> Higher grade ankle sprains also increased the cost per patients ( $P < 0.001$ ).<sup>39</sup>

After sustaining an ankle sprain, simple tasks such as walking, climbing stairs or standing for extended periods, may become challenging and uncomfortable. Fear of re-injury, loss of confidence, and psychological distress can arise, impacting individuals' mental well-being. A patient with PTSD might be hesitant to engage in activities that remind them of the traumatic event, including activities related to rehabilitation. Fear of re-injury or the pain can also hinder progress and lead to delays. Individuals with a history of substance abuse may rely on maladaptive coping mechanisms to deal with stress and pain. These coping strategies can interfere with the recovery process and lead to setbacks. Patients with work-related injuries were observed to be at a greater risk for experiencing persistent pain. This finding suggests that occupational factors may have a significant impact on pain outcomes and delayed return to work after an ankle sprain.<sup>43</sup> Our results show that patient satisfaction after Modified Bröstrom surgery was very high (88%), even among athletes who were unable to return to pre-injury levels.<sup>3</sup> A large proportion of those athletes (46%) did not return to their preinjury activity, but only 37% reported ankle-related reasons for not returning.<sup>33</sup>

While certain studies have indicated a potential connection between psychological factors and delays in RTW, it is important to recognize that additional variables, such as

proprioceptive disturbance, may also contribute to these delays. Future studies should aim to assess the weight of psychological factors in return to sports and work. Treatment plans that address physical, psychological, and social aspects of recovery, may aid regaining mobility, overall well-being and returning to pre-injury level of activities after a lateral ankle sprain. Our results also show that the extent of the delayed rehabilitation is directly proportional to the increasing likelihood of experiencing a recurrence of the ankle sprain and the number of ankle related medical visits. If taking into account these psychological factors improve rehabilitation, considering these factors will also lead to lower healthcare cost per patient.

This study represents a first attempt to comprehend which factors may influence return to sports and work using a meta-analysis. While our analysis provides valuable insights into which factors may potentially be influential, it is essential to acknowledge that grading which factor has a greater or lesser impact is not possible due to the lack of comparability among the included patients regarding the grading of ankle ligament injury and concomitant injuries. Other limitations were variations in terms of methodology, small sample size, and short follow-up time. There is inconsistency in how RTS is defined within orthopaedic sports medicine literature. While many studies define RTS as the athlete's return to competitive play, other variations include returning to practice, training or meeting specific competition levels and objectives. The studies in our review have employed different outcome measures to assess RTS and RTW, making it challenging to directly compare and synthesise the findings. In one study, some patients even returned to sport before any treatment was even started.<sup>36</sup> The different ways that RTS or RTW was defined can cause potential limitations in the interpretation of the results. Additionally, there is a wide range of years between the earliest and latest published studies that have been included. We have noted that more recent studies have tried to define their return in the best way possible, but due the lack of comparable studies, older studies still may cause bias in pooled results.



As shown in table 3 and 4, certain studies exhibited a moderate or high risk of bias. For instance, when evaluating the risk of bias in table 4, some studies were assigned a high risk due to the absence of blinding for participants and personnel or the lack of blinding in outcome assessment. In the case of our included studies, implementing blinding was deemed physically impossible, which could lead the risk of bias assessment tool to assign a lower score to a study that is, in qualitative terms, superior.

Overall, our findings indicate that all treatments yield comparable results, with each treatment potentially offering unique advantages or benefits. Given the variety of factors that affect return to work and sports after lateral ankle sprains, tailored interventions targeting these psychological and physical factors have great potential to improve recovery and accelerate return to normal activities. For example, Scotchcast Plus® had a quicker ( $P < 0.001$ ) return to work compared to the Soft Cast®. The ROM measurements were also better ( $P = 0.001$ ) in the Scotchcast Plus® group ( $43^\circ$ , range:  $35-55^\circ$ ) compared to the Soft Cast® group ( $54^\circ$ , range:  $35-65^\circ$ ).<sup>23</sup> Another study found that following 3-5 days of functional treatment with either air-stirrup or compression bandage, women experienced a greater restriction in range of motion (ROM) in their injured ankle compared to men ( $P < 0.05$ ).<sup>29</sup> In current literature men are approximately 1.5 times more likely than women to return to either their previous level of sport or competitive sport after obtaining a lateral ankle sprain.<sup>44</sup> Future research should be conducted in possible co-factors affecting the differences in outcomes between men and women such as ROM.

In one study, higher body mass index (BMI) was found to be a significant factor associated with not returning to exercise or returning to a lower level ( $P = 0.04$ ). Individuals with a higher BMI may experience challenges related to weight-bearing and joint stress during recovery, which can contribute to a longer delay in returning to sports activities. This finding underscores the importance of addressing weight management strategies and implementing appropriate rehabilitation protocols tailored to individuals with higher BMIs to optimise their recovery. Other concomitant injuries

or additional procedures have shown to have a negative effect on RTS or RTW. Consideration of simultaneous procedures for other medical conditions should be factored in while evaluating the timeframe for resuming work or sports activities.

Further, it is common to treat an ankle sprain non-surgically unless chronic complaints persist.<sup>36</sup> In the studies included some patients have received surgical treatment in acute situations. Therefore, any surgical treatment performed earlier is highly debatable. Despite our efforts to include high-quality studies, many are listed as high or moderate risk due to patients or personnel physically not being able to be blinded in order for a patient to receive treatment. Although we aimed to comprehensively identify and analyse the factors influencing return to work and sports after a lateral ankle sprain, there is a possibility that certain relevant factors were not considered or included in our analysis due to lack of published data. The complex nature of ankle sprain recovery may involve additional factors that were not captured in our study. When identified, these new factors may improve our current protocols and knowledge in treatment of ankle sprains.

## CONCLUSION

Collectively, the findings derived from these studies provide valuable insights into the various treatment approaches employed and their associated outcomes. However, it is important to note that the current body of literature does not provide sufficient comparative data to draw definitive conclusions on what factors work in favour of or negatively influence return to work or sport. Further research with larger sample sizes and standardised methodologies is warranted to establish more robust evidence regarding treatment approaches and their effectiveness in facilitating the return to work and sports after a lateral ankle sprain.

This systematic review and meta-analysis identified several factors that were observed to influence the return to sport or work after a lateral ankle sprain. In random order, these factors include:

Factors favouring return to sport or work:

Preoperative Motivation and Psychological factors – In patients with chronic ankle instability, higher preoperative motivation was the primary factor associated with a faster return to sports following ligament repair or reconstruction. However, patients with a history of psychological illness or brain injury experienced delays in their rehabilitation for ankle sprains with fractures and unspecified sprains. Among athletes who returned to sports after lateral ankle sprain without fractures, 10% cited non-ankle related reasons for not returning. The evidence for these findings is categorised as level 2.

Early mobilisation – Immobilisation of 3 days was found to have a positive impact on the return to sport or work when compared to immobilisation of 10 days after. Categorised as evidence level 3.

Postoperative weight bearing – Ankle stabilisation surgery with concurrent weight-bearing procedures resulted in a shorter time to return to sports compared to ankle stabilisation surgery with simultaneous non-weight-bearing procedures. Categorised as evidence level 3.

Factors negatively influencing return to sport or work:

Absent ligament structures – An additional procedure such as ankle stabilisation surgery due to other pathologies than ligament rupture may result in a longer time to return to work. Categorised as evidence level 3.

Associated Injuries – The presence of associated injuries along with the ankle sprain negatively impacted the return to sport or work. Categorised as evidence level 3.



It is important to consider these factors when developing personalised treatment plans and interventions for individuals recovering from a lateral ankle sprain to optimise their chances of returning to sport or work successfully.

## **ARTICLE HIGHLIGHTS**

### ***Research background***

Lateral ankle sprains (LAS) are a highly prevalent musculoskeletal injury affecting both athletes and non-athletes, constituting 80% of all ankle sprains with an incidence of 15% to 20%. Up to 40% of LAS cases progress to chronic ankle instability (CAI), causing prolonged pain and reduced mobility. This interplay of high incidence, prevalence, workdays lost, and substantial medical expenses underscores the profound socioeconomic impact of LAS.

### ***Research motivation***

The consequences of ankle sprains extend beyond pain and functional impairment. Despite the alarmingly high incidence and CAI risk, only around half of LAS patients seek medical attention.

### ***Research objectives***

In light of these compelling circumstances, the primary objective of this systematic review and meta-analysis is to comprehensively investigate the factors that may exert an influence on RTW and RTS following lateral ankle sprain.

### ***Research methods***

Embase and PubMed were systematically searched for relevant studies published until June 2023. Quality assessments were carried out for each study using established risk of bias tools, and the quality of evidence was evaluated using the GRADEpro tool for quantitative outcomes. Qualitative outcome analysis was subjected to a best evidence

synthesis, and for outcomes amenable to quantitative analysis, forest plots were generated to ascertain the impact on RTW and RTS.

### ***Research results***

The RTS rate varied from 80% to 83% in both the all treatments and surgical treatments groups. Mean return-to-sport times ranged from 23 to 93 days, with an overall RTW rate of 89%. The average time to return to work ranged from 5.8 to 8.1 days. Preoperative motivation, early mobilisation and postoperative weight bearing resulted in a shorter time to RTS.

### ***Research conclusions***

Overall, our findings indicate that all treatments yield comparable results. Given the variety of factors that affect return to work and sports after lateral ankle sprains, tailored interventions targeting both psychological and physical factors have great potential to improve recovery and accelerate return to normal activities.

### ***Research perspectives***

Future studies should aim to assess the weight of psychological factors in return to sports and work. Treatment plans that address physical, psychological, and social aspects of recovery, may aid regaining mobility, overall well-being and returning to pre-injury level of activities after a lateral ankle sprain.

### **ACKNOWLEDGEMENTS**

Besides the aforementioned authors there are no further contributors to be acknowledged.

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SIMILARITY INDEX

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