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TECHNICAL REPORT

Comparison of an Adaptive Ankle Brace to Conventional Taping for Rehabilitation of Acute Ankle Injury in Young Subelite Soccer Players: A Pilot Study

Dirk Krombholz,[1] Steffen Willwacher,[2] Tobias Consmüller,[3] Anna Linden,[3] Burkay Utku,[2] and Jessica Zendler[4,5]

[1]SG Dynamo Dresden, Dresden, Germany; [2]Institute for Advanced Biomechanics and Motion Studies, Offenburg University of Applied Sciences, Offenburg, Germany; [3]Betterguards Technology GmbH, Berlin, Germany; [4]Rimkus, Houston, TX, USA; [5]University of Michigan, Ann Arbor, MI, USA

Context: Ankle sprains are a common injury in sports, for which use of external ankle support during rehabilitation has been suggested to improve clinical outcomes. ***Design:*** Cohort study. ***Methods:*** Thirteen soccer players experiencing acute lateral ankle sprain injury were provided a novel adaptive ankle brace or conventional ankle taping (control) as external ankle support throughout the injury rehabilitation process. All other clinical procedures were identical, and rehabilitation was supervised by the same team staff member. Time from injury to clearance to return to sport was tracked. Player experience with the ankle brace also was queried via electronic surveys. ***Results:*** The median time to return to sport was less for the Brace group (52.5 d) compared to the Control group (79.5 d), but the distributions of the 2 groups were not found to differ significantly ($P = .109$). Player surveys indicated they felt the brace to be comfortable or very comfortable, with better freedom of movement than other braces and the same freedom of movement as wearing no brace. All players reported wearing the brace to be the same or better experience as ankle taping. ***Discussion:*** These preliminary results indicate that the adaptive ankle brace is at least as effective as ankle taping for providing external support during the rehabilitation phase following acute lateral ankle sprain and suggest it may be a more effective ankle support solution in terms of patient compliance than conventional bracing or taping.

Keywords: return to sport, lateral ankle sprain, patient compliance, external ankle support, football

Key Points

- The adaptive ankle brace provided similar effects during rehabilitation as conventional taping or bracing.
- The adaptive ankle brace provides more breathability, comfort, and freedom of motion compared to conventional braces, as well as a better user experience compared to conventional taping.

Ankle injuries are one of the most common injuries in both elite and amateur sports.[1–4] In the National Basketball Association, the single-season risk of sustaining an ankle sprain was 25.8% across the 2013–2014 to 2016–2016 seasons.[2] Among National Collegiate Athletic Association men's soccer athletes, the ankle was the second most common injury location behind the thigh.[4] Across all National Collegiate Athletic Association athletes for the academic years 2014–2015 to 2018–2019, lateral ankle sprains, the most common type of ankle sprain, were reported at a rate of 4.61 per 10,000 athlete exposures.[3] Half of these injuries resulted in time loss from sport of >1 day, with a mean time loss of 8.5 (11.4) days in men's sports and 9.6 (13.0) days in women's sports.[3] For this reason, it is not only important to study ways to prevent ankle sprains in athletes but also to investigate means for reducing time loss from sport following injury.

Ankle sprains are often perceived as minor, but up to 70% of individuals who sustain an acute ankle sprain report residual symptoms or persistent functional limitations, and up to 40% develop chronic ankle instability within the first year following sprain.[2,5] Furthermore, the loss of full ankle joint function increases the propensity for not only recurrent sprains but also other subsequent musculoskeletal injuries and reduction in quality of life.[6,7] One study found that out of 312 amateur soccer players who sustained an ankle sprain over a 2-year period, 64% had previously sustained an ankle sprain.[8] Among National Basketball Association players, the ankle sprain incidence rate in games was 41% higher among players with a history of ankle sprain in the last year.[2] Thus, proper rehabilitation of ankle sprains is critical to restoring function and reducing the burden of subsequent injuries.[9,10]

Early rehabilitation is believed to reduce the downstream medical costs for ankle-related issues.[11] External support of the injured ankle, via bracing or taping, has been recommended to provide immobilization and protection of healing tissues in the immediate, acute phase following injury, particularly for severe injuries, and may also be beneficial during the rehabilitation

Zendler (jzendler@rimkus.com) is corresponding author, https://orcid.org/0000-0003-4295-9917

phase.[12,13] Some data suggest bracing is superior to taping for rehabilitation outcomes, such as time to clearance to return to team sport (RTS), but results are inconclusive.[14–17] Despite the potential benefits of bracing over taping or use of no external support, athlete compliance with ankle bracing is a challenge due to complaints of discomfort and restriction.[18,19] For this reason, there is a critical need for a more comfortable and less restricting brace that provides the same level of protection while improving athlete compliance.

Recently, an adaptive ankle brace was developed that selectively resists sudden, high-velocity ankle inversion motions; it allows unrestricted ankle motion at physiological movement speeds while providing similar protection performance to traditional passive braces for potentially injurious motions.[20,21] Additionally it was found to provide better comfort and freedom of movement compared to traditional passive braces in a cohort of healthy athletes without chronic ankle instability.[21] These data suggest it may be a viable alternative to traditional bracing methods for providing ankle protection during rehabilitation from acute ankle injury without compromising athlete compliance. However, previous research on the brace has only examined athletes without acute injury, with an aim to consider prevention of lateral ankle sprain during sports participation.[20,21] The extent to which the brace could aid individuals actively rehabilitating from an acute ankle injury prior to being ready for RTS remains unknown. Thus, the purpose of this pilot study was to obtain preliminary proof-of-concept data comparing the use of the adaptive ankle brace to conventional taping during rehabilitation following acute lateral ankle sprain in a semielite soccer cohort. The primary hypothesis was that the adaptive ankle brace reduced time to RTS compared to conventional athletic taping.

Methods

Study Design

The study was designed as a cohort study.

Participants

Study participants were recruited from a convenience sample of players on the male academy squads of 2 German association soccer clubs. Inclusion criteria were male, member of the youth academy squads of the respective clubs, and experiencing an acute lateral ankle sprain. Exclusion criteria were injury requiring surgical treatment and the presence of other concomitant injuries, for example, acute fracture to the lower-extremity or syndesmotic or medial ankle sprain. Participants provided written informed consent in the spirit of the Helsinki Declaration. In the case of individuals under 18 years old, participants provided written informed assent and a parent or legal guardian provided written informed consent. Details on the injury diagnosis, whether it was initial or recurrent, mechanism, and setting, were recorded, along with the player's height, weight, club, and playing position at time of injury.

Patients were allocated to one of 2 groups: Brace or Control. The adaptive brace became available to the football clubs on June 10, 2021. Initially, all players injured between June 10, 2021, and September 30, 2022, received the brace (Brace group). Beginning October 2022, a control group was added, after which time allocation into the Brace or the Control group was randomized. The Control group was supplemented by a historical cohort from the period immediately prior to when the brace became available (February 1, 2021–June 10, 2021).

Procedures

Diagnosis and Treatment

Figure 1 summarizes the study intervention. At the time of the injury, players were assessed by the team's physiotherapist and then were referred to the team's physician for evaluation, imaging, and diagnosis. Each team had a different team physician and team physiotherapist. Treatment was managed by the team physician along with the team physiotherapist and a single rehabilitation coach who worked with both teams (D.K.). The rehabilitation coach holds a Master's degree in Sports, certification as an athletic trainer in professional sports, and an athletic trainer A-License including rehabilitation. During the acute injury phase, all patients received ice, compression, elevation, and nonsteroidal anti-inflammatory

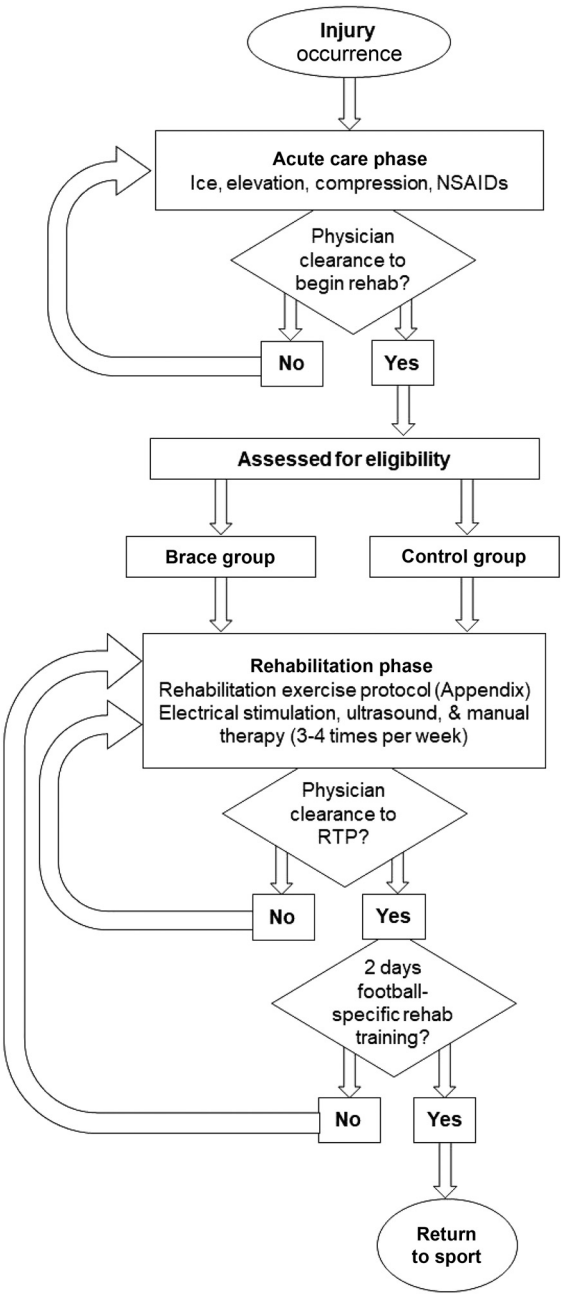

Figure 1 — Flowchart of the study intervention. NSAID indicates nonsteroidal anti-inflammatory medication; RTP, return to play.

medication as needed. Electric stimulation, ultrasound, and manual therapy also were applied as needed, typically 3 to 4 times per week.

Rehabilitation Protocol

Rehabilitation exercises were initiated upon the physician's approval, typically 2 to 4 days after the injury occurred. The Brace group was fitted with the adaptive ankle brace and required to wear it during all rehabilitation activities. Participants in the Control group did not receive a brace, but they were required to have their injured ankle taped for all rehabilitation activities. Ankle taping was applied by 1 team physiotherapist of each team using 2 layers of Leukotape and additional stabilization tape in a standardized manner. The study was not blinded to bracing/taping condition. All participants received the same rehabilitation protocol, which is provided in the Supplementary Material (available online). The same medical staff conducted all brace fitting, ankle taping, and rehabilitation exercise supervision and progression.

Return to Sport

The treating physician provided initial approval for clearance to return to play following completion of the rehabilitation protocol. Subsequently, the player had to successfully complete 2 days of rehabilitation training at maximum effort to be cleared to RTS. After RTS, no taping or bracing was used by the players. The rehabilitation training also discontinued after RTS, but players participated in additional biweekly stabilization and strength (balance) training for the lower-extremities over a period of 8 weeks after RTS.

Adaptive Ankle Brace

The adaptive ankle braces used for this study were the Betterguard and the Sportomedix Malleo Fast Protect ankle braces, both with Betterguards adaptive technology (Betterguards Technology GmbH, Patents EP3238670B1, PCT/EP2019/08385, PCT/EP2018/061933, and WO 2020/074606 Figure 2). Two braces were used because a product update became available during the course of the study. Both braces consisted of the same materials and dimensions. The main difference between the braces was a reinvented closure system providing a more individualized fit. The braces involved a close-fitting compressive ankle sleeve with the Betterguards adaptive technology attached to it along the lateral aspect of the ankle. The Betterguards adaptive technology consists of a semiflexible mini-piston embedded in an adaptor element with a valve, which allows fluid to pass within the piston when extending at physiological movement velocities. At fast movement velocities (~300°/s), however, the valve closes within milliseconds due to fluid dynamic drag forces and inhibits further extension of the mini-piston, resulting in a limited range of motion. Afterward, the mini-piston can be extended and lock again if needed.

Outcome Measures

The primary outcome, time to RTS, was calculated in days from the date of injury to the date of clearance to RTS. Additionally, the patients in the Brace group were provided with an electronic survey following RTS that queried their experience with the adaptive brace, including perceptions of comfort, ease of use, freedom of movement, and confidence.

Statistical Analysis

Statistical analyses were conducted with SPSS (version 28). Descriptive statistics were calculated for all variables. Shapiro-Wilk test was used to check for normality. Grubbs test was used to check for outliers. In the case of normally-distributed data, 2-tailed independent *t* tests were used to assess for significant differences. In the case of a nonnormal distribution, the nonparametric 2-tail Mann–Whitney *U* test was used to assess differences in time to RTS between groups. Significance level was set at .05 for all analyses. Nonparametric effect sizes were calculated using the

Figure 2 — The adaptive ankle brace used during rehabilitation by the Brace group.

median absolute deviation from the median (deltaMAD; Equation 1) where MADb and MADt are calculated using Equations 2 and 3 and B or b indicate the Brace group and T or t indicate the Control group.[22] Small, medium, and large effect sizes correspond to values of 0.2, 0.5, and 0.8, respectively.

$$\text{deltaMAD} = \frac{\text{Median}_b - \text{Median}_t}{sqrt\left(\frac{([n_b-1]\times MAD_b^2)+([n_t-1]\times MAD_t^2)}{n_b+n_t-2}\right)}, \quad (1)$$

$$\text{MAD}_b = \text{Median}(|B_i - \text{Median}_b|), \quad (2)$$

$$\text{MAD}_t = \text{Median}(|T_i - \text{Median}_t|). \quad (3)$$

Results

Participant Demographics and Injury Information

Thirteen players participated in the study from the U16 (n = 1), U17 (n = 6), and U19 (n = 6) male squads. Details of the participants are provided in Table 1. Seven participants received the adaptive brace, and 6 received ankle taping for rehabilitation. There were no significant differences in height ($P = .84$) or weight ($P = .21$) between the groups.

Table 2 provides injury details and time to RTS. All but 1 case represented a first-time injury. Injuries were diagnosed as either "distortion external malleolus," which was an external ligament tear in combination with a lateral ankle bone injury, or "lateral collateral ligament rupture." Injury mechanism was a mix of contact and noncontact, and injuries occurred during both training and matches.

Table 1 Mean (SD) of Participant Characteristics by Intervention Group

Group	Brace	Control	P ($\alpha = .05$)
N (U16/U17/U19)	7 (1/3/3)	6 (0/3/3)	
Height, m	1.81 (0.08)	1.82 (0.03)	$P = .84$
Weight, kg	78.0 (10.7)	71.8 (4.2)	$P = .21$

Time to RTS

RTS time ranged from 20 to 202 days across all cases (Table 2). Figure 3 shows boxplots of RTS time by group. Case B7 was found to be an outlier based on the Grubbs test and excluded from subsequent analyses. The median time to RTS was less for the Brace group (52.5 d, interquartile range [IQR] = 32) compared to the Control group (79.5 d, IQR = 116), but the distributions of the 2 groups were not found to differ significantly ($P = .11$, deltaMAD = 0.94). When examining only distortion external malleolus injuries, which were 10 of the 12 included cases, the median time to RTS remained less for the Brace group (52.5 d, IQR = 32) compared to the Control group (61.0 d, IQR = 131; Figure 4), but the distributions of the 2 groups were not found to differ significantly ($P = .39$, deltaMAD = 0.52). None of the players, neither in the Control group nor the Brace group, experienced a setback or re-injury through the end of the study monitoring period (June 30, 2023).

User Experience (Brace Group Only)

Table 3 summarizes the user survey results from the Brace group. All users felt that they could put the brace on properly, noted that they felt the system activate during training, and felt very confident in the brace's protection while wearing it. All users rated the brace as comfortable (14%) or very comfortable (86%) and indicated it had very good breathability. All users felt the freedom of movement of the brace was the same as wearing no brace, and all users who had previous experience with at least 1 other brace (6 out of 7) rated the freedom of movement as better than other braces they had used. Two users (29%) indicated the experience was the same as their previous experiences with ankle taping, while the remaining users (71%) indicated it was better than previous ankle taping.

Table 2 Injury Case Details and Time to RTS

ID	Diagnosis	Club	Position	Initial or recurrent	Setting	Mechanism	Brace version	Time to RTS, d
Brace group								
B1	Distortion external malleolus	A	Striker	Initial	Football training	Noncontact	1	27
B2	Distortion external malleolus	A	Defender	Initial	Football training	Noncontact	1	20
B3	Distortion external malleolus	B	Midfield	Initial	Football training	Noncontact	2	51
B4	Distortion external malleolus	B	Midfield	Initial	Match	Contact (opponent)	2	56
B5	Distortion external malleolus	B	Striker	Recurrent	General training	Contact (ball)	2	54
B6	Distortion external malleolus	B	Goalkeeper	Initial	Football training	Contact (opponent)	2	61
B7[a]	Lateral collateral ligament rupture	A	Defender	Initial	Football training	Noncontact	1	105
Control group								
C1	Distortion external malleolus	A	Defender	Initial	Football training	Noncontact		39
C2	Distortion external malleolus	A	Midfielder	Initial	Football training	Noncontact		44
C3	Distortion external malleolus	B	Midfielder	Initial	Match	Contact (opponent)		78
C4	Distortion external malleolus	B	Midfielder	Initial	Training match	Noncontact		202
C5	Lateral collateral ligament rupture	A	Goalkeeper	Initial	Football training	Noncontact		144
C6	Lateral collateral ligament rupture	B	Defender	Initial	Training match	Contact (opponent)		81

Abbreviation: RTS, return to sport.
[a]Excluded from statistical analyses due to being a statistical outlier.

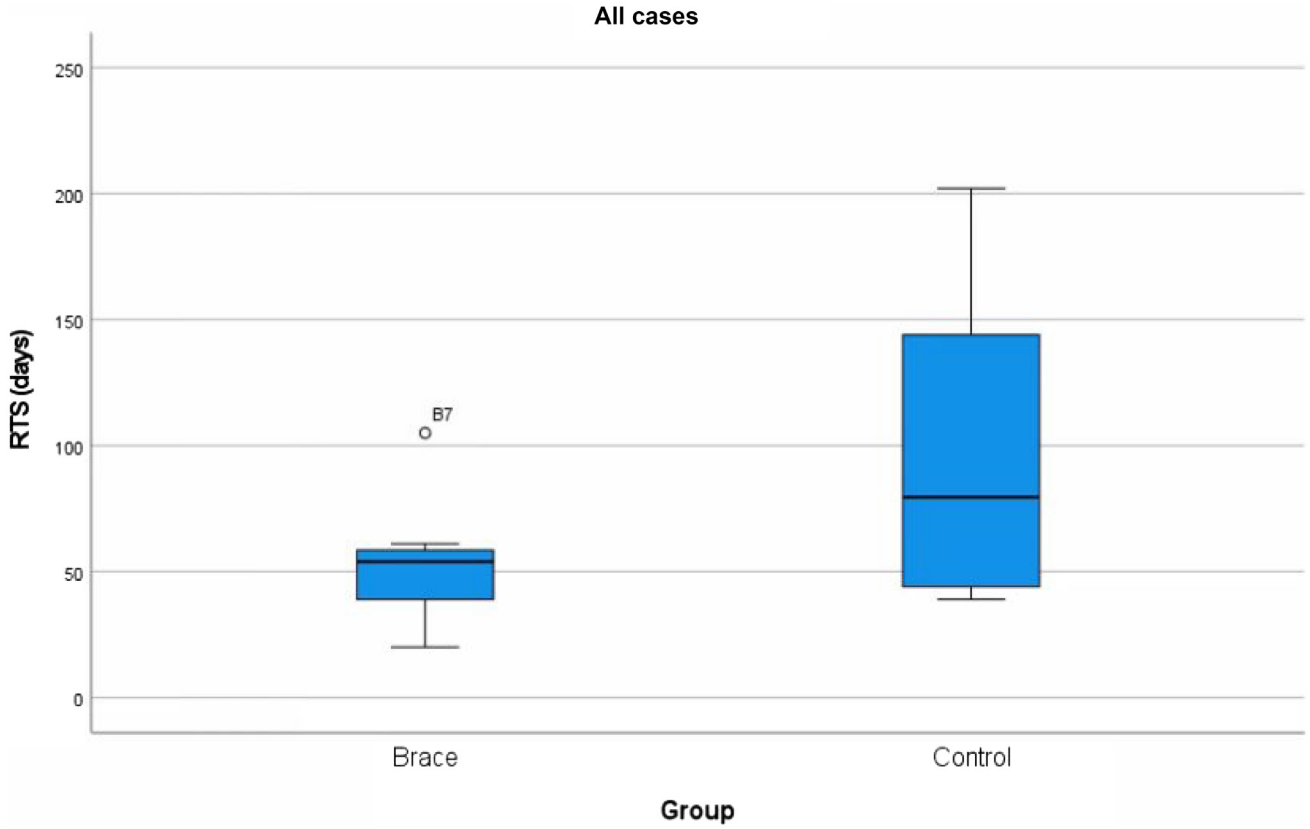

Figure 3 — Boxplot of time to RTS in days for all cases, separated by Brace (n = 7) and Control (n = 6) groups. Solid dark lines indicate the median value for each group, top and bottom of the box indicate the interquartile range, whiskers indicate the minimum and maximum, and the circle indicates the outlier case. RTS indicates return to sport.

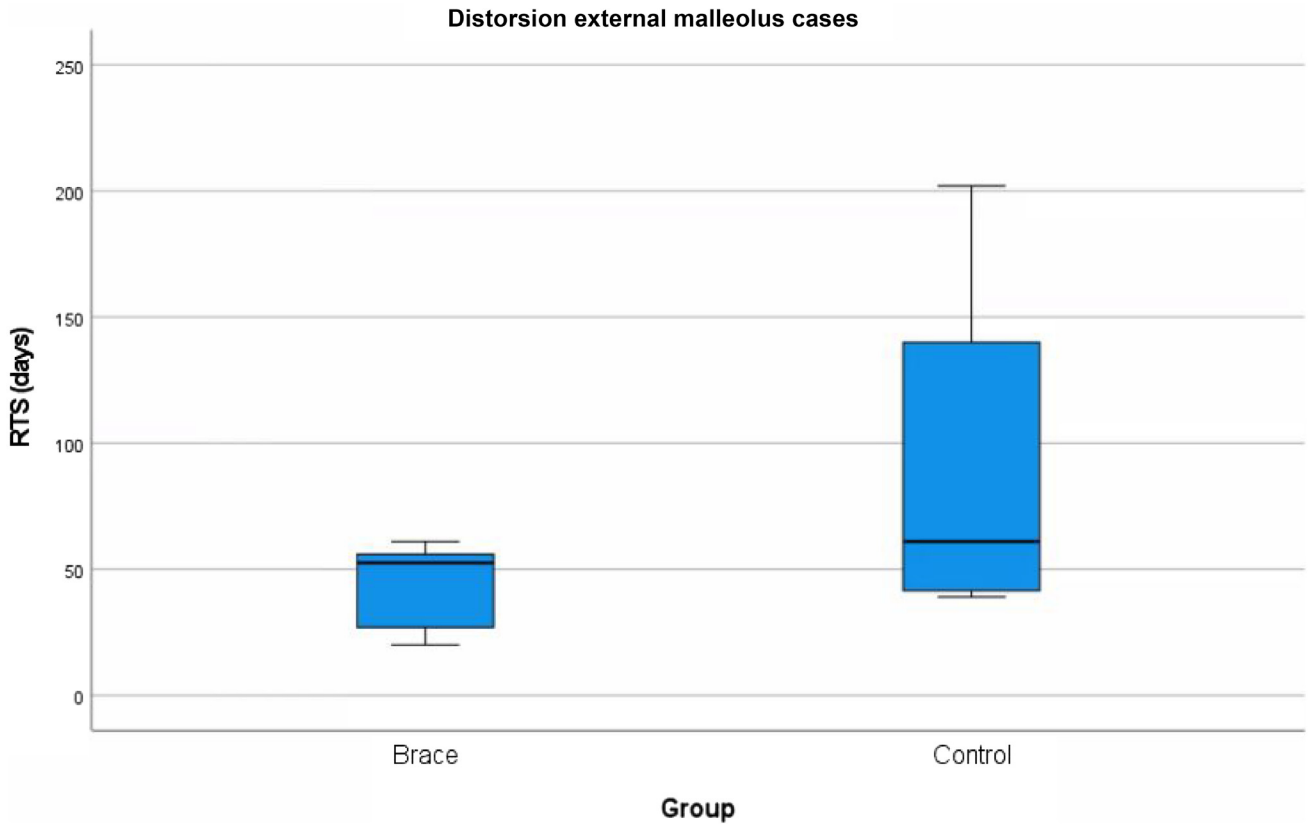

Figure 4 — Boxplot of time to RTS in days for distortion external malleolus injury cases excluding outliers, separated by Brace (n = 6) and Control (n = 4) groups. Solid dark lines indicate the median value for each group, top and bottom of the box indicate the interquartile range, and whiskers indicate the minimum and maximum. RTS indicates return to sport.

Table 3 Responses of Brace Group About Their Experience With the Adaptive Ankle Brace

Question	Count (%)
Were you able to put on the brace properly?	
Yes	7 (100%)
No	0 (0%)
Do you feel the system activate during training?	
Yes	7 (100%)
No	0 (0%)
How comfortable was the brace to wear?	
Very uncomfortable	0 (0%)
Somewhat uncomfortable	0 (0%)
Okay	0 (0%)
Comfortable	1 (14%)
Very comfortable	6 (86%)
How would you rate the freedom of movement compared to wearing no brace?	
Worse	0 (0%)
Same	7 (100%)
Better	0 (0%)
How would you rate the freedom of movement compared to other braces used?	
Worse	0 (0%)
Same	0 (0%)
Better	6 (86%)
Not applicable	1 (14%)
How confident do you feel that the brace will support/protect you while wearing it?	
Very unconfident	0 (0%)
Unconfident	0 (0%)
Neutral	0 (0%)
Confident	0 (0%)
Very confident	7 (100%)
How do you rate the breathability of the product?	
Very bad	0 (0%)
Bad	0 (0%)
Okay	0 (0%)
Good	0 (0%)
Very good	7 (100%)
If you tape your ankle, what is the comparative experience?	
Worse	0 (0%)
Same	2 (29%)
Better	5 (71%)

During the course of the study, no adverse device effects or complications were detected.

Discussion

The purpose of this pilot study was to compare the effects of using a novel adaptive ankle brace to conventional ankle taping during ankle sprain rehabilitation in a convenience sample of 13 young subelite soccer players. While our hypothesis that the use of the adaptive brace would reduce RTS time compared to ankle taping was not proven, the results indicate that the RTS outcomes with the device were not inferior than ankle taping and trended to be better. Further, the large effect size (deltaMAD = 0.94) suggests that a follow-on study with a larger sample size would be warranted to further evaluate our hypothesis. Overall, these preliminary results indicate that the adaptive ankle brace is at least as effective as ankle taping for providing external support during rehabilitation from acute ankle sprain. Additionally, users of the adaptive brace reported a highly positive user experience, including better experiences compared to their previous experiences with conventional bracing or taping. As athlete compliance remains a challenge to effective use of external ankle support, the adaptive brace may offer an effective alternative to traditional methods of ankle support following acute injury.

The present study represents the first investigation into the use of the adaptive brace for rehabilitation following lateral ankle injury. Agres et al[20] studied the effect of the adaptive brace on simulated inversion and landing kinematics in a population with a history of ankle sprain and chronic ankle instability but who were not experiencing an acute ankle sprain.[20] The study found that the adaptive brace performed better than a conventional passive brace for limiting ankle inversion angle during a sudden ankle inversion perturbation. Willwacher et al[21] evaluated ankle kinematics during athletic tasks, along with measures of athletic performance, user perception, and active range of motion in a population of athletes with no injury within the prior 12 months, although some of these subjects had a history of ankle injury >12 months prior.[21] The authors determined that the adaptive brace limited ankle inversion angle slightly less than the tested passive braces, particularly the rigid brace, during sudden inversion and plantar flexion, change of direction, and side-shuffling but provided similar protection to passive braces during benchtop testing. Additionally, the adaptive brace provided superior range of motion at noninjurious ankle inversion speeds and superior ratings of comfort and restriction compared to passive braces.

Both of these studies were focused on use of the device to prevent primary or secondary ankle sprain injury during sport participation and indicate that it provides similar protection and better user experience compared to conventional passive braces, suggesting it could be beneficial for preventing ankle sprain injury. Building on these findings, the current study focused primarily on an acutely injured athlete population who were undergoing rehabilitation from ankle injury to assess whether the protective benefits and positive user experience found previously translated to improved rehabilitation outcomes, namely time to RTS. While no statistically significant difference between taping and bracing on time to RTS was found, a trend toward improved RTS time in the Brace group was noted, which is supported by a large effect size. Due to the convenience sample population, this study did not have as large of a sample size as these other studies (n = 16, n = 20). Future works should include a larger sample size where possible to improve the statistical power. These findings are somewhat in line with previous research on the adaptive brace as they indicate that the adaptive brace is at least as effective as ankle taping for supporting rehabilitation. Likewise, players provided very positive ratings of the user experience with the adaptive brace across all dimensions queried in line with prior findings.

External ankle support, via ankle bracing or taping, has been recommended as part of a functional treatment approach to acute ankle sprains.[12,13] Early mobilization and rehabilitation have been advocated for improving clinical outcomes following acute ankle sprain,[10] but the injured ankle tissues are vulnerable to re-injury

during the rehabilitation phase.[23] Thus, external support to prevent re-injury during rehabilitation is recommended. In terms of clinical rehabilitation outcomes, however, it is unclear whether bracing and taping differ. Several systematic reviews have indicated limited support for improved functional outcomes and reduced recurrent injury when using an ankle brace as compared to taping or elastic bandage.[9,14,15] However, a recent randomized controlled trial of 161 grade II and grade III acute lateral ankle sprains found no difference in outcomes at 6 months when comparing patients treated with taping, semirigid brace, or lace-up brace.[17] Likewise, a nonrandomized controlled trial of 157 adults with acute lateral ankle sprain injury found no difference in injury recurrence or residual symptoms at 1 year following injury for patients using a soft brace compared to standard ankle taping.[16] Our preliminary findings in a small sample of male soccer players appear in line with previous research, suggesting at a minimum the adaptive brace is as effective as ankle taping for use during rehabilitation following acute lateral ankle injury.

Achieving high compliance with brace wearing is often challenging, which in turn limits the effectiveness of a bracing intervention. Janssen et al[24] presented a randomized controlled trial of 3 different preventative interventions (neuromuscular training, bracing, and combined neuromuscular training and bracing) and found that 45% of athletes in the training reported full compliance compared to 23% and 28% in the brace only and combined groups, respectively.[24] A survey of 1506 athletic trainers actively practicing in high school or college settings in the United States indicated that patient compliance was one of the top reasons for not using ankle bracing with athletes, despite a substantial proportion of respondents believing ankle braces would decrease an athlete's risk of sustaining injury.[25] Janssen et al[18] surveyed 86 young adult recreational athletes and found that increased comfort and decreased hindrance of movement, as well as increased stability, were important factors in selecting an ankle brace, which also may relate to better compliance.[18] A study of 140 basketball players found that esthetic appearance, performance, and comfort were commonly cited barriers to ankle brace adoption.[19] In the present study, players in the Brace group rated the adaptive brace highly on comfort and breathability. They also felt it provided similar freedom of movement to having no brace and greater freedom of movement compared to other braces with which they had prior experience; although, it should be noted that no other braces were provided to the participants for direct comparison. These findings are consistent with a prior study of the brace in which participants rated the adaptive brace as more comfortable and exhibited greater measured active ankle range of motion than the 2 provided traditional braces (Basko Lace-up and T2 Active Ankle).[21] These findings suggest that the adaptive ankle brace may overcome some of the barriers to adoption for traditional ankle braces, offering an opportunity for improved athlete compliance.

In the present study, players in the Brace group indicated having a better experience with the adaptive ankle brace compared to previous experiences with ankle taping. Similar to the survey question on bracing, it should be noted that no taping intervention was provided for direct comparison nor was taping history tracked. Nonetheless, this is an interesting finding as anecdotally many athletes report preferring taping to bracing because it is more comfortable, less restricting, and less bulky. Players often report having to "size up" their footwear to fit an ankle brace in their shoe, which is particularly problematic for soccer players who rely on tight-fitting boots to ensure adequate ball feel and control, which makes taping more appealing.[12] However, taping has several limitations compared to bracing: It is more expensive than bracing because it is not reusable, it has been found to loosen with exercise to a greater extent than braces,[26] it takes considerably more time to apply than a brace, and it requires a clinician with specialized training to properly implement. If players do not perceive the adaptive ankle brace as a worse experience than taping, then they may be more amenable to adopting bracing over taping.

The adaptive brace selectively limits ankle inversion at high (potentially injurious) angular velocities while allowing full range of motion at lower speeds synonymous with rehabilitation and sport-specific tasks.[20,21] Despite allowing greater motion, all players in the Brace group indicated high ratings of movement confidence when wearing the brace. As patients have been found to limit use of the injured ankle for fear of re-injury, which may result in maladaptive movement patterns, the increased feeling of stability and confidence coupled with greater active range of motion afforded by the brace may support better rehabilitation outcomes.[27] We hypothesize that the adaptive ankle brace may help to accelerate RTS by allowing the player to utilize a larger and less restricted range of motion during the rehabilitation process while still maintaining protection of the vulnerable healing tissues during potentially injurious motions.[10] This would enable the patient to place greater demands on their body during the rehabilitation exercises compared to other versions of ankle support that are always active in supporting the ankle, which in turn may provide greater rehabilitation gains and faster RTS. Similarly, as restoring ankle coordination and stability throughout the functional range of motion is critical to ankle sprain recovery, the increased freedom of movement afforded by the adaptive ankle brace compared to standard braces may allow the patient to regain preinjury movement patterns more effectively, thus accelerating the rehabilitation process. However, further data must be acquired to evaluate this speculation.

It should be noted that the small sample size and substantial heterogeneity in RTS times limit the statistical power of the study. The mix of injury diagnoses reduces the ability to do subanalyses and may have introduced further heterogeneity that limited statistical significance. In contrast, the recruitment of all cases from 2 football clubs with the same rehabilitation program overseen by the same rehabilitation coach strengthens comparisons between groups. The study was not blinded, which limits interpretation of results.

Conclusions

In summary, in this small pilot cohort study, the novel adaptive ankle brace was associated with similar time to RTS following acute lateral ankle sprain when compared to ankle taping in a young subelite soccer population. The ankle brace received high user ratings on dimensions of comfort, freedom of movement, and movement confidence and had better user experience compared to conventional bracing and taping. These preliminary results indicate that the adaptive ankle brace is at least as effective as ankle taping for providing external support during the rehabilitation phase following acute lateral ankle sprain and suggest it may be a more effective ankle support solution in terms of patient compliance than conventional bracing or taping.

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employees of Betterguards Technology GmbH, a manufacturer of adaptive protection systems. Zendler and Willwacher are paid consultants to Betterguards Technology GmbH and have received fees for consulting services.

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