CRITICALLY APPRAISED TOPIC

Effect of Ankle Taping or Bracing on Creating an Increased Sense of Confidence, Stability, and Reassurance When Performing a Dynamic-Balance Task

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Clinical Scenario: Ankle taping and bracing are commonly used to reduce the risk of sports-related ankle sprains. Mechanical- and neuromuscular-control facilitation has been the focus of their effectiveness. Another potential advantage to using ankle taping or bracing is an increased sense of confidence, stability, and reassurance that the individual may experience when performing a dynamic-balance activity. Since ankle sprains are one of the most common sport-related injuries treated by clinicians, treatment and prevention of these injuries is a priority for many health care providers. However, the psychological effects of taping or bracing on athletes are still unknown. Researchers have described athletes' emotional responses and psychological reactions after athletic injuries. However, athlete reactions related to adhesive taping or bracing are limited. There is anecdotal evidence showing that football players stated they would tape a body part even if it was not injured as part of a superstitious pregame ritual. Therefore, the purpose of this article was to determine if individuals who have had their ankle taped or braced experience an increased sense of confidence, stability, or reassurance when performing a dynamic-balance activity. ***Focused Clinical Question:*** Does ankle taping or bracing create an increased sense of confidence, stability, and reassurance when performing dynamic-balance activity in physically active people?

Clinical Scenario

Ankle taping and bracing are commonly used to reduce the risk of sports-related ankle sprains. Mechanical- and neuromuscular-control facilitation have been the focus of their effectiveness. Another potential advantage to using ankle taping or bracing is an increased sense of confidence, stability, and reassurance that the individual may experience when performing a dynamic-balance activity. Since ankle sprains are one of the most common sport-related injuries treated by clinicians, treatment and prevention of these injuries is a priority for many health care providers. However, the psychological effects of taping or bracing on athletes are still unknown. Researchers have described athletes' emotional responses and psychological reactions after athletic injuries. However, athlete reactions related to adhesive taping or bracing are limited. There is anecdotal evidence showing that football players stated they would tape a body part even if it was not injured as part of a superstitious pregame ritual. Therefore, the purpose of this article was to determine if individuals who have had their ankle taped or braced experience an increased sense of confidence, stability, or reassurance when performing a dynamic-balance activity.

Focused Clinical Question

Does ankle taping or bracing create an increased sense of confidence, stability, and reassurance when performing dynamic-balance activity in physically active people?

Summary of Search, "Best Evidence" Appraised, and Key Findings

- The literature was searched for research studies of level II evidence or higher that investigated the effect of taping, bracing, or prophylaxis on perceived confidence, stability, and reassurance when performing a dynamic balance activity.
- The literature search resulted in 4 studies for possible inclusion.
- One article was not included in this critically appraised topic (CAT) because it did not allow for a comparison with the other cited articles due to differences in methodology (resulting in 3 included articles).
- All 3 studies revealed that participants had a statistically significant increase in perceived stability, confidence, and reassurance with the taping techniques used in their study.

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Clinical Bottom Line

There is moderate evidence to support that adhesive taping or bracing provides individuals with a perceived self-confidence, reassurance, and sense of stability during a dynamic-balance activity.

Strength of Recommendation: Level B evidence exists that ankle taping or bracing creates an increased sense of confidence, stability, and reassurance in physically active people when performing functional balance activities.

Search Strategy

Terms Used to Guide Search Strategy

- **P**atient/Client group: college aged and physically active or athlete
- **I**ntervention/Assessment: ankle bracing or ankle taping or prophylaxis
- **C**omparison: no intervention and control
- **O**utcomes: false sense of confidence and stability and reassurance

Sources of Evidence Searched

- PEDro Database
- Cochrane Library
- Medline
- EBSCO
- Google Scholar
- Other resources obtained through reference lists
- Reference lists of the included studies

Inclusion and Exclusion Criteria

Inclusion Criteria

- Dynamic-balance measure
- Investigated perceived self-confidence, reassurance, and sense of stability
- Level II evidence or higher
- Limited to English language
- Limited to humans
- Limited to the last 10 years (2003–2012)

Exclusion Criteria

- Non-physically-active subjects
- No use of prophylactic devices

Results of Search

Three applicable studies[1–3] were located and categorized as shown in Table 1 (based on Levels of Evidence, Centre for Evidence Based Medicine, 2011).

\<<<<<<<<<<<<<TABLE 1>>>>>>>>>>>>\

Best Evidence

The studies listed in Table 2 were identified as best evidence and selected for inclusion in this CAT. These articles were selected because they were graded with a level of evidence of II or higher, studied perceptions of stability, and described the use of ankle taping, bracing, or other prophylaxis.

\<<<<<<<<<<<<<TABLE 2>>>>>>>>>>>>

Implications for Practice, Education, and Future Research

Three studies[1–3] reviewed in this CAT demonstrated that physically active individuals have a significantly increased perceived sense of stability, reassurance, and confidence when performing active tasks when their ankle is taped or braced compared with no prophylactic support. These findings indicate that in general, ankle taping and bracing are effective in making people feel better or more psychologically assured when performing a dynamic-balance task. However, the use of ankle taping or bracing did not translate to improved performance during the Star Excursion Balance Test or the overall stability index measured by the Biodex Balance System.

The 2 studies[1,2] that investigated ankle taping and the SEBT found no significant differences in reach among the taping conditions (no tape, mechanical/closed basket-weave, placebo, lateral subtalar sling, and fibular repositioning). However, these studies revealed that ankle tape influenced participants' perceptions of stability, confidence, and reassurance when performing functional balance tests. The authors referred to this outcome as a placebo effect. Sawkins et al[1] showed that the "mechanical taping" condition, closed basket-weave, had the greatest effect on perceived stability. Ninety-seven percent (n = 29) of participants in a hopping test and 80% (n = 24) of participants in the SEBT reported that their perceived stability was improved with the mechanical-tape condition compared with the no-tape condition. Delahunt et al[2] found that feelings of stability increased for 87.5% (n = 14) of participants when using the lateral subtalar sling and 75% (n = 12) of participants when using the fibular-repositioning tape.

While the actual dynamic task investigated by Gear et al[3] was different than that in the Sawkins et al[1] article, the conclusions remained the same. Gear et al used the Biodex Balance System as their dynamic task. The results of the Gear et al study demonstrated that the 3 taping conditions (no tape, lateral subtalar sling, and fibular repositioning) did not differ on the overall stability index. The mean overall stability index for the barefoot condition

was 2.31 ± 1.19, for the ankle-tape condition the overall stability index was 2.18 ± 0.93, and for the ankle-brace condition the overall stability index was 2.23 ± 0.85. However, the largest perception of stability occurred for the ankle-tape condition, with a mean score of 3.38 ± 0.67. The perception of stability for the ankle-brace condition was 2.90 ± 0.77, and for the barefoot condition the perception of stability was 2.57 ± 0.60.

An article by Hunt et al[4] used a qualitative approach to investigate perceptions of ankle taping. That article was not included in this CAT because it did not allow for a comparison with the other cited articles due to differences in methodology. The differences in methodology included using a qualitative rather than a quantitative approach. The authors interviewed 11 athletes about their history of ankle taping and their perceptions of it. Even though the authors had a different methodology, their study does provide some further insight on perceptions of ankle taping or bracing. The study revealed that 79% (15/19 text responses) of participants stated that tape made their injured area "stronger" or "more comfortable." Four individuals in the uninjured group also sought ankle taping because it allowed them to feel "confident in their ankle."

Clinicians employing ankle taping or bracing should consider the psychological impact of taping or bracing against the limited empirical data demonstrating the effectiveness of these techniques in improving postural stability measured by the SEBT and the Biodex Balance System. Clinicians should understand that there is a potential for these taping and bracing techniques to have psychological effects and create a false sense of security for the athlete.[1–4] This potential false sense of security may lead an individual to take greater risk after sustaining an injury and returning to play. Even though taping an ankle usually takes less than 2 min, it still requires a significant expenditure of resources (time and money) for limited established benefits to improve a balance task.[1–3]

Even though the articles included illustrate that taping and bracing techniques may create a psychological effect for the athlete it is important to note several limitations of the 3 studies. The SEBT and Biodex Balance System that were used may not have created enough perturbation to challenge the ankle to its mechanical limits. Using a different task may provide more insight into the observed perceptual changes associated with taping or bracing. In addition, all of the included publications only examined the acute, immediate effects of ankle taping or bracing. It may be more appropriate to also examine the long-term effects of ankle taping or bracing on a dynamic-balance task. The variety of prophylactic conditions (tape, brace, sling, etc) used in these research studies demonstrates diverse ways clinicians try to offer support to clients. The use of different prophylaxes makes it harder to compare across the 3 studies; however, none of the different prophylactic conditions tested improved the measured dynamic-balance task but they did make the individuals perceive an increase in stability.

Future CATs should also include more recent well-designed prospective studies (preferably randomized controlled trials) considering the impact of ankle taping and bracing while following individuals throughout the healing process and tracking the perception of the tape and injury over time. Investigating the varying effect of ankle taping and bracing on perceptions in a variety of populations such as high school and collegiate athletes may also bring to light new information regarding perceptions of ankle taping and bracing. In addition, investigators should explore athletes with a current injury using bracing or taping, with a previous injury using prophylaxis, and with athletes with no injury history using taping or bracing preventively and their perceptions of the prophylaxis. Finally, this topic should be revisited in 2 years to determine whether other evidence has been published that would alter clinical recommendations.

References

1. Sawkins K, Refshauge K, Kilbreath S, Raymond J. The placebo effect of ankle taping in ankle instability. *Med Sci Sport Exerc.* 2007;39(5):781–787. PubMed
2. Delahunt E, McGrath A, Doran N, Coughlan G. Effect of taping on actual and perceived dynamic postural stability in persons with chronic ankle instability. *Arch Phys Med Rehabil.* 2010;91:1383–1389.
3. Gear W, Bookhout J, Solyntjes A. Effect of ankle taping and bracing on dynamic balance and perception of stability. *Int J Exerc Sci.* 2011;5(2):S13–S14.
4. Hunt E, Short S. Collegiate athletes' perceptions of adhesive ankle taping: a qualitative analysis. *J Sport Rehabil.* 2006;15:280–298.

Table 1 Summary of Study Designs of Articles Retrieved

Level of evidence	Study design or methodology	Number located	Reference
I	Traditional randomized cross-over	2	Sawkins et al[1] Delahunt et al[2]
II	Traditional cross-over	1	Gear et al[3]

Table 2 Characteristics of Included Studies

	Sawkins et al[1]	Delahunt et al[2]	Gear et al[3]
Study design	Traditional randomized cross-over	Traditional randomized cross-over	Traditional cross-over
Participants	30 participants (11 men, 19 women; age 21 ± 3 y, height 174 ± 9 cm, and weight 72 ± 11 kg) with ankle instability. Ankle instability was defined as ≤24 of 30 on the Cumberland Ankle Instability Tool (CAIT). The average CAIT score was 18 ± 5. Participants were excluded if they had a history of fracture or surgery to the lower limb, ankle sprain within the last 3 wk, pain or palpable effusion of the ankle, or neurological, visual, or vestibular deficit or other orthopedic or arthritic problems. Physically active subjects were not defined by the study. Participants were blinded to the purpose of the study.	16 participants (10 women, 6 men; age 21.32 ± 1.35 y; height, 1.76 ± 0.8 m; mass 74.94 ± 10.43 kg). Ankle instability was defined as ≤24 of 30 on the CAIT. The average CAIT score was 17. Participants were excluded if they had less than 2 inversion ankle sprains or history of eversion or "high ankle" sprain. Participants were included if they were physically active. This was determined by participating in 2–6 h/wk of sports involvement.	21 participants (12 women, 9 men; age 20.76 ± 1.58 y; height, 1.72 ± 0.11 m; mass 76.38 ± 12.69 kg). All subjects were free from lower extremity injury for at least 6 mo prior to testing, did not have a history of vestibular or balance disorders, and were physically active. Physically active was not defined by the study.
Intervention	Data collection was completed on the ankle with the lowest (more unstable) CAIT score in a single 1.5-h test session. There were 3 conditions: real (mechanical) tape, placebo (proprioceptive) tape, and control (no tape). To minimize bias, tapings were referred to as mechanical, proprioceptive, and control. Participants were blindfolded during application, and a skirt was placed over the foot and ankle, without intruding on the sole of the foot.	Data collection was completed on the ankle with the lowest (more unstable) CAIT score. Three conditions were applied to the ankle: no tape, lateral subtalar sling, and fibular repositioning tape.	Data collection was completed on the participant's nondominant leg. Three conditions were applied to the ankle: no tape barefoot, ankle tape barefoot, and ankle brace barefoot (Swede-O Inner Lok 8 ankle brace).
Outcome measures	Participants completed 2 performance tests in random order for each tape condition: a hopping test (s) and the modified Star Excursion Balance Test (SEBT; cm). After each test for each condition, participants were questioned regarding their perceived lateral ankle instability, confidence, and reassurance when performing the test compared with their practice trials (which were not taped; control). For example, participants were asked, "When performing the hopping test, how confident did you feel compared with the practice trial?"	Participants completed a modified SEBT standing bilaterally on 2 force plates. The force plates were used to determine when the participant transitioned from single- to double-leg stance (measured by 2.5 N). After each set of SEBT trials for each tape condition participants were questioned regarding their perceived levels of stability, confidence, and reassurance compared with their practice trails (no taped) and responded no change, more stable/confident/reassured than practice trials, or less stable/confident/reassured than practice trials.	Participants completed a dynamic-balance assessment using the Biodex Balance System SD. The assessment included a single-leg stance during three 20-s trials at stability level 4, which allowed for 20° of platform tilt in all directions. Perception of stability was assessed using a 4-point Likert scale (1, *very unstable*, to 4, *very stable*) after each testing session.

	Sawkins et al[1]	Delahunt et al[2]	Gear et al[3]
Main findings	There was no significant difference in performance among the 3 conditions on the hopping test (P = .865). Participants completed the hopping test with the real tape (10.5 ± 3.6 s), placebo tape (10.5 ± 3.5 s), and no tape (10.5 ± 3.7 s). There was no significant difference in performance among the 3 conditions on the modified SEBT (P = .491) or significant interaction between the condition and reach direction (P = .08). Ankle tape (real and placebo) influenced participants' perceptions of stability, confidence, and reassurance when performing functional tests. Chi-square indicated that for each perception measure and for both tests, the proportion of participants reporting a positive effect was different between conditions (real tape vs placebo and vs control P < .0001 for all chi-square analyses).	There was no statistically significant difference in reach distance among the 3 tape conditions on the SEBT ($F_{6,56}$ = 1.30; P = .273). Confidence increased for 56% of participants (P = .002) under both tape conditions. Stability increased for 87.5% of participants (P < .001) using lateral subtalar sling taping and 75% of participants (P = .001) using fibular repositioning. Reassurance increased for 68.75% and 50% of participants (P < .005) for subtalar sling and fibular repositioning, respectively. There was no statistically significant difference for participants' when comparing the 2 taping conditions (P > .05).	Significant differences between tape conditions were not found for overall stability measured by the Biodex Balance System ($F_{2,40}$ = 0.288, P = .751). Significant differences between conditions were found for perceived support ($F_{2,40}$ = 11.87, P = .001). The ankle-tape condition was statistically significant for perceived support compared with the barefoot no tape and brace conditions (P = .001 and P = .026, respectively).
Level of evidence	I	I	II
Validity score[a]	14	16	10
Conclusion	There were no significant differences in taping conditions on the hopping or SEBT tests. However, participants had a statistically significant increase in perceived stability and confidence with the real tape compared with the placebo and no-tape conditions.	There was no significant difference in taping conditions on the SEBT. However, participants had a statistically significant perceived increase in stability, confidence, and reassurance for both taping conditions.	There was no significant difference for dynamic balance and the tape or brace conditions compared with the no-tape condition. However, there was a significant difference between the ankle-tape and no-tape and the brace condition.

[a] STROBE Checklist maximum score: 22.