RELATIONSHIP BETWEEN ANKLE DORSIFLEXION RANGE OF MOTION AND DYNAMIC BALANCE IN JUVENILE ATHLETES OF THE BRAZILIAN SURF CONFEDERATION

Helena de Sousa Waiczyk, Luana Beatriz Sassi, João Antônio Gesser Raimundo, Fabrizio Caputo, Rodrigo Okubo

INTRODUCTION

Surfing demands neuromuscular control and lower-limb postural stability over an unstable surface, highlighting the importance of ankle mobility for the sport. In surfers, a greater ankle dorsiflexion range of motion is associated with performance-related characteristics, reinforcing the relevance of this mobility (DOWSE et al., 2021). Dorsiflexion also influences dynamic balance by contributing to lower-limb control during functional tasks (HOCH et al., 2011). In this context, the modified Star Excursion Balance Test (mSEBT) is used to evaluate dynamic postural control through reaches in the anterior, posteromedial, and posterolateral directions (GRIBBLE et al., 2012). Within the Brazilian competitive framework, the Brazilian Surf Confederation (CBSurf) organizes youth surf across male and female age categories, including under-18, under-16, under-14, and under-12, overseeing the development of young athletes (CBSURF, 2026). Thus, this study aimed to investigate the association between ankle dorsiflexion range of motion and mSEBT performance in young surfers, hypothesizing that greater dorsiflexion would be associated with greater reach distances.

DEVELOPMENT

Surfing demands precise neuromuscular control and lower-limb postural stability over an unstable surface, highlighting the critical role of ankle mobility in athletic performance. In surfers, greater ankle dorsiflexion range of motion (ROM) is associated with key performance characteristics, reinforcing its functional relevance (DOWSE et al., 2021). Ankle dorsiflexion also directly influences dynamic balance by contributing to lower-limb control during functional tasks (HOCH et al., 2011). In this context, the modified Star Excursion Balance Test (mSEBT) is widely used to evaluate dynamic postural control via reach distances in the anterior, posteromedial, and posterolateral directions (GRIBBLE et al., 2012). Within the Brazilian competitive framework, the Brazilian Surf Confederation (CBSurf) organizes youth development divisions across male and female age groups, including under-18, under-16, under-14, and under-12 categories (CBSURF, 2026). Therefore, this study aimed to investigate the relationship between ankle dorsiflexion ROM and mSEBT performance in youth surfers, hypothesizing that greater dorsiflexion ROM would correlate with greater reach distances.

RESULTS

Paired *t*-tests confirmed no statistically significant differences between right and left limbs for ankle dorsiflexion ROM or mSEBT reach scores ($p > 0.05$). Correlation analyses revealed a strong, highly significant positive correlation between ankle dorsiflexion ROM and anterior reach distance ($r = 0.690$, $p < 0.001$). This finding highlights the direct biomechanical contribution of anterior tibial translation during center-of-mass projection in the anterior vector. Additionally, ankle dorsiflexion ROM showed moderate positive correlations with posteromedial reach ($r = 0.417$, $p = 0.034$)and the overall mSEBT composite score ($r = 0.429$, $p = 0.029$). Conversely, the correlation with posterolateral reach distance did not reach statistical

significance (r = 0.292, p = 0.148), suggesting that posterolateral control may depend more heavily on hip and knee neuromuscular strategies than on isolated ankle ROM.

CONSIDERATIONS

The findings of this study demonstrate that greater ankle dorsiflexion range of motion is associated with superior dynamic balance in youth surfers, most notably for anterior reach distance and overall performance (composite score) on the mSEBT. From a practical and clinical standpoint, measuring dorsiflexion mobility proves to be a simple, accessible, and relevant tool for integration into functional screening protocols and physical assessments for youth surfing athletes. Preventive and training strategies focused on gaining and maintaining ankle range of motion can enhance static and dynamic stability on the surfboard. Finally, future research is recommended to explore larger sample sizes to specifically analyze the distinct biomechanical demands between the front foot and rear foot in the sport's characteristic stance.

Keywords: Ankle dorsiflexion; Joint mobility; Dynamic balance; Surfing; Adolescents.

ATTACHMENTS



Figura 1. *Modified Star Excursion Balance Test (mSEBT) for the left stance limb. a: Anterior reach direction; b: Posteromedial reach direction; c: Posterolateral reach direction (GRIBBLE et al., 2012).*

Table 1. *Correlation between ankle dorsiflexion and mSEBT performance in youth surfers. Values are presented as Pearson's correlation coefficient (r) and p-value. Source: Created by the authors (2026).*

OUTCOME	*r*	*p*
Anterior	0,690	<0,001
Posteromedial	0,417	0,034
Posterolateral	0,292	0,148
Composite score	0,429	0,029

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