

Methods: This is an observational cross-sectional study. Forty-four swimmers of both sexes classified in the children's, youth and junior categories participated in the study. The athletes responded to the Pain Catastrophizing Scale, which ranges from 0 to 52 points, with values above 30 points representing a significant level of pain catastrophizing. The Total Pain Catastrophizing score was calculated. Analysis of Variance and independent t-test were used for analysis.

Results: Of the 44 athletes evaluated, 33 completed the Pain Catastrophizing Scale, 13 of whom were in the Children's category, 10 in the Youth category and 10 in the Junior category. Of these, 21 were men and 12 were women. Only 6 athletes had a score higher than the cutoff point. There was no significant difference between the categories ($p = 0.946$) and, when comparing genders, there was no significant difference in pain catastrophizing ($p = 0.145$).

Conclusion: The study revealed that most of the athletes evaluated presented low levels of pain catastrophizing, with only 6 athletes demonstrating scores above 30 points, indicating a significant level of catastrophizing. Furthermore, there was no significant difference between categories and genders. Future studies with larger sample sizes and with athletes at different levels of competition need to be carried out to better investigate the factors that influence catastrophizing.

Implications: Pain catastrophizing is an exaggerated negative orientation towards harmful stimuli and should be considered important for the performance and well-being of athletes, especially those with a history of previous injuries. The presence of catastrophic thoughts can impair adaptation to physical discomfort and negatively influence sports performance. Therefore, it is essential that sports training and rehabilitation programs include psychological approaches that help to reduce pain catastrophizing, covering different factors that may be associated with the amplification of pain sensation. Continued studies on the impact of pain catastrophizing may contribute to the development of more specific and effective interventions for different age groups and sports modalities.

Keywords: athletes, catastrophization, pain perception

Conflict of interest: The authors declare no conflict of interest.

Funding: Programa Revelar Talentos - Secretaria Nacional de Excelência Esportiva - Ministério do Esporte - Brazil (30879720240003-002858 – TED N° 002858/2024).

Ethics committee approval: Not applicable.

Registration: Not applicable.

<https://doi.org/10.1016/j.bjpt.2025.101349>

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KINEMATIC AND KINETIC ADJUSTMENTS AT THE TRUNK DURING SUBMAXIMAL AND MAXIMAL INSTEP SOCCER KICKS

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Background: During soccer matches, players frequently adjust kicking effort to modulate ball velocity and meet specific tactical demands. Submaximal kicks are typically used for short passes, while maximal kicks are employed for long passes or goal attempts. In maximal kicks, the trunk plays a crucial role in generating a downward energy flow toward the pelvis and the kicking limb, which may avoid excessive effort and overload at the lower limb. However, how these contributions vary across different kicking effort levels remains unclear.

Objectives: This study investigated the kinematic and kinetic adjustments at the trunk, hip, and knee joints of the kicking limb during instep kicks performed at three effort levels.

Methods: Forty-four amateur soccer players (age: 23.9 ± 4.8 years) performed kicks at maximal effort, 70-80% of maximal, and 50-60% of maximal. Three-dimensional motion capture was performed at 300 Hz, and ground reaction forces were recorded at 1200 Hz. Kinematic and kinetic data were processed using Visual 3D software. Statistical parametric mapping with repeated measures ANOVA was used to compare time series between effort levels.

Results: The trunk exhibited distinct adjustments in the sagittal plane depending on the kicking effort. During maximal kicks, in the backswing and leg cocking phases, trunk flexion moments generated a downward energy flow toward the pelvis, accelerating its retroversion and contributing to the forward motion of the kicking limb toward the ball. Subsequently, part of this energy was redistributed to the thigh and shank during the acceleration phase, favoring increased final velocity. In contrast, during submaximal kicks, trunk extensor moments were predominant and generated an upward energy flow from the pelvis to the trunk, decelerating pelvic retroversion. In the transverse plane, in both maximal and submaximal kicks, trunk rotation moments generated a downward energy flow toward the pelvis, inducing pelvic rotation toward the support limb and assisting the forward displacement of the kicking limb. Additionally, hip and knee moments in the kicking limb increased with effort, optimizing energy transfer to the shank.

Conclusion: Trunk-generated moments and energy flows act as additional resources for advancing the kicking limb, with axial trunk moments being recruited at all effort levels and sagittal trunk moments being used exclusively during maximal kicks. These findings highlight the importance of trunk muscles in coordinating kicking performance.

Implications: Training programs should include exercises to strengthen trunk flexor and rotator muscles, especially for maximal kicks. Incorporating strength and power training for the trunk and lower limbs at different intensities may improve intermuscular coordination and kicking efficiency. Educating players about proximal-to-distal control of movement may enhance performance across different kicking efforts and avoid joint and muscle overloads.

Keywords: Soccer kicking, Biomechanics, Kinetic chain, Energy flow

Conflict of interest: The authors declare no conflict of interest.

Funding: CNPq - 302887/2009-1; FAPEMIG - APQ-02250-15; CAPES - Finance Code 001.

Ethics committee approval: CAAE 53152221.3.0000.5235.

Registration: Not applicable.

<https://doi.org/10.1016/j.bjpt.2025.101350>

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INFLUENCE OF BIOPSYCHOSOCIAL FACTORS ON UPPER LIMB PERFORMANCE IN UNIVERSITY HANDBALL ATHLETES

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Background: Handball is an Olympic team sport played on a court, involving running, shooting, jumping, repeated accelerations, and directional changes. However, research on handball athletes is limited, especially among university-level players. High-performance throwing requires a combination of biomechanical factors, such as upper limb power and precise coordination of joint movements. Although these factors are crucial for performance, psychological and social variables may also influence sports outcomes. University