



# External and Internal Feedback Techniques: Which One Is More Effective in Preventing Anterior Cruciate Ligament Injuries?

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## Dear Editor,

Although neuromuscular training programs have been implemented to reduce the number of anterior cruciate ligament (ACL) injuries, the percentage of injuries has not been reduced as much as targeted and there is a need to identify more successful strategies and methods in reducing the risk of injury.<sup>[1]</sup> Therefore, the integration of different motor learning strategies into neuromuscular training programs should be investigated.

Recently, the importance of adding cognition to injury prevention programs has been emphasized. One variant of the cognitive approach is the external and internal focus of attention. In this approach, instructions for performing the movement aim to improve neuromuscular performance and motor learning. In the external focus of attention, the athlete's attention is directed to objects or the environment outside the human body. Example feedback is "Stand on one leg and slowly bend your knee while keeping your knee over your foot." In the internal focus of attention, attention is directed directly to the person's body and movements. Example feedback is "stand on one leg and slowly reach towards the cone with your knee while bending your knee."<sup>[2]</sup>

There are studies in the literature showing that external focus of attention increases performance, retention, transfer, and greater movement automaticity and learning to a superior level. Directing attention externally rather

than internally allows the motor control system to regulate and organize motor movements. Thus, movements will be fast and reflexive.<sup>[3]</sup> However, there are also controversial results in the literature. At some points (better conscious control of the body, movement acuity, and muscle activity), the internal focus of attention is superior to the external. Gottwald et al.<sup>[4]</sup> investigated whether endogenous focusing facilitates performance when relevant afferent information is compatible with proprioceptive and attentional focusing. The results showed that movement acuity and muscle activity were higher as a result of internal focus training than external focus training. Results make us to think both focuses of attention have been shown to appeal to the movement pattern of the whole body.

Real-world sports are complex, and many different movements occur simultaneously. In other words, the information the player perceives from the outside varies every second. An athlete can switch between internal and external focuses of attention and even adopt both types of cues simultaneously during play. However, studies in the literature mostly focus on the comparison of internal and external attention-focused training.<sup>[5]</sup> The focus of attention literature has not emphasized such combinations of attentional focuses and potential interaction effects. There is a need for studies examining the effects of combined (internal and external) attentional focuses and potential interaction effects on ACL prevention programs in different sports branches.

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