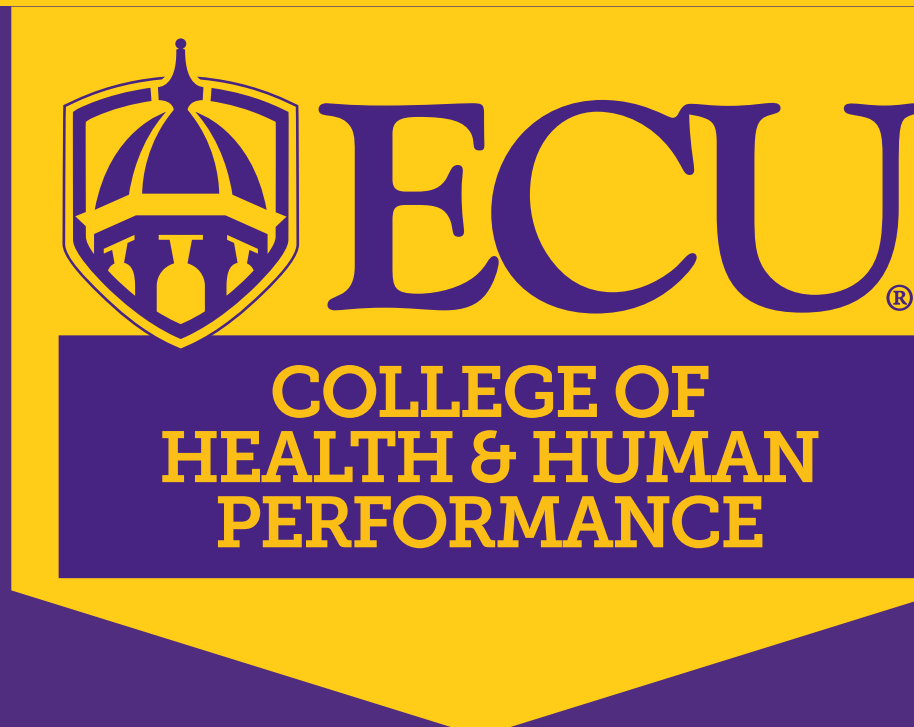


Discrepancies in visual attention toward task-relevant stimuli in collegiate women soccer players post-ACL reconstruction: a pilot study



Taylor Kinney MS, CPSS¹, E. Whitney G. Moore PhD¹, CSCS*^D, Courtney Smith MS, LAT, ATC², Thomas Demirjian PhD, CSCS¹, Patrick Rider¹, Robert R. Horn PhD², Christine Habeeb PhD¹, Nicholas P Murray PhD¹
¹Department of Kinesiology, East Carolina University, Greenville, NC, USA; ²ECU Athletics, East Carolina University, Greenville, NC, USA; ³Department of Kinesiology, Montclair State University, Montclair, NJ, USA

BACKGROUND

Visual attention is an athlete's ability to fixate on task-relevant visual cues while suppressing distractions; a foundational ability for informing goal-directed movement and efficient perception-action coupling⁷

Competing areas of interest (AOIs) within an environment can distract the athlete, making them more susceptible to poor performance, or worse, (re)injury due to attentional overload^{4,7}

Following ACL reconstruction (ACLr), athletes often rely more on visual feedback to maintain knee control, allocating more attention toward the lower limb to safeguard against reinjury, delaying decision-making and impairing movement execution²⁻³



Illustration by Madison Ketchum

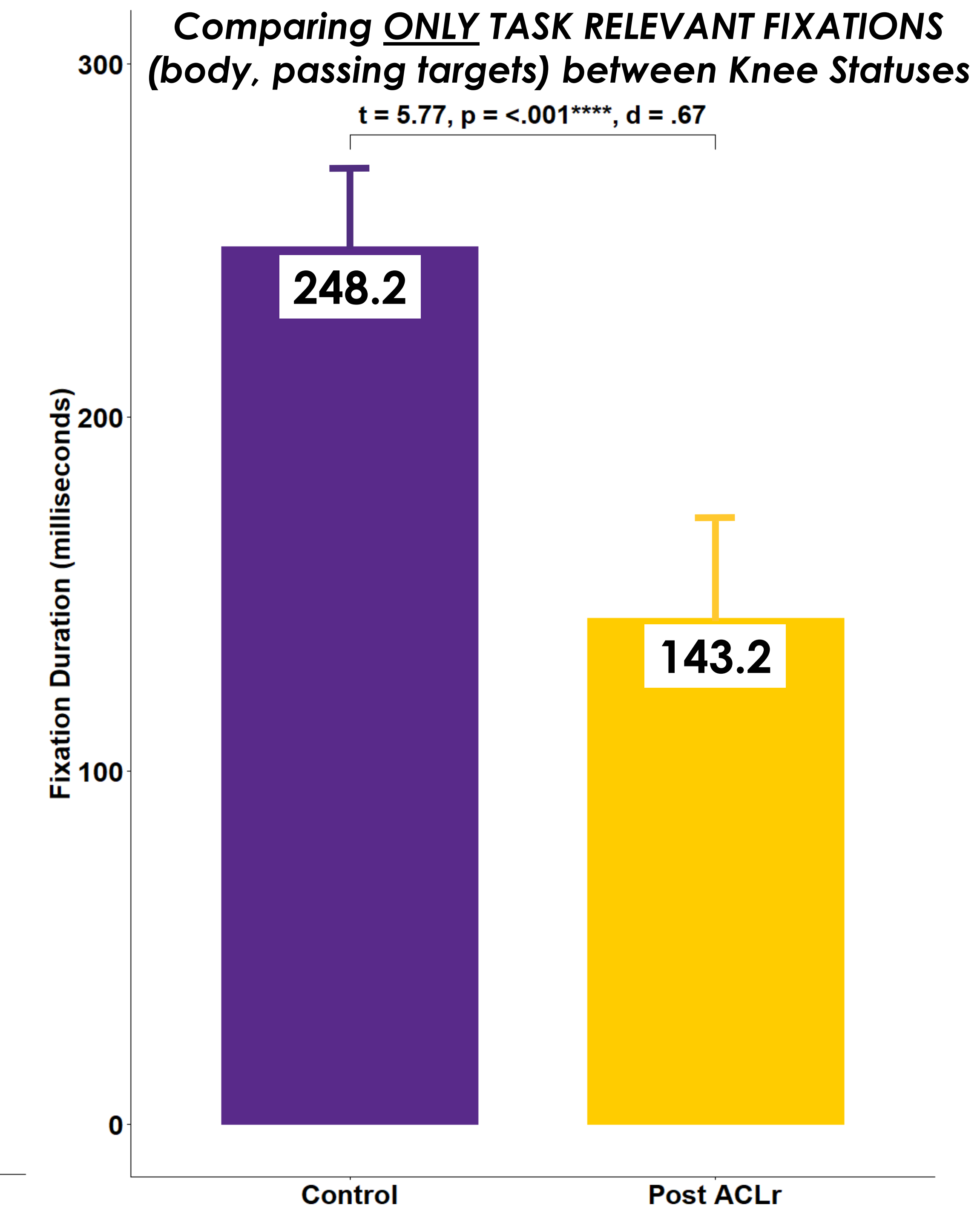
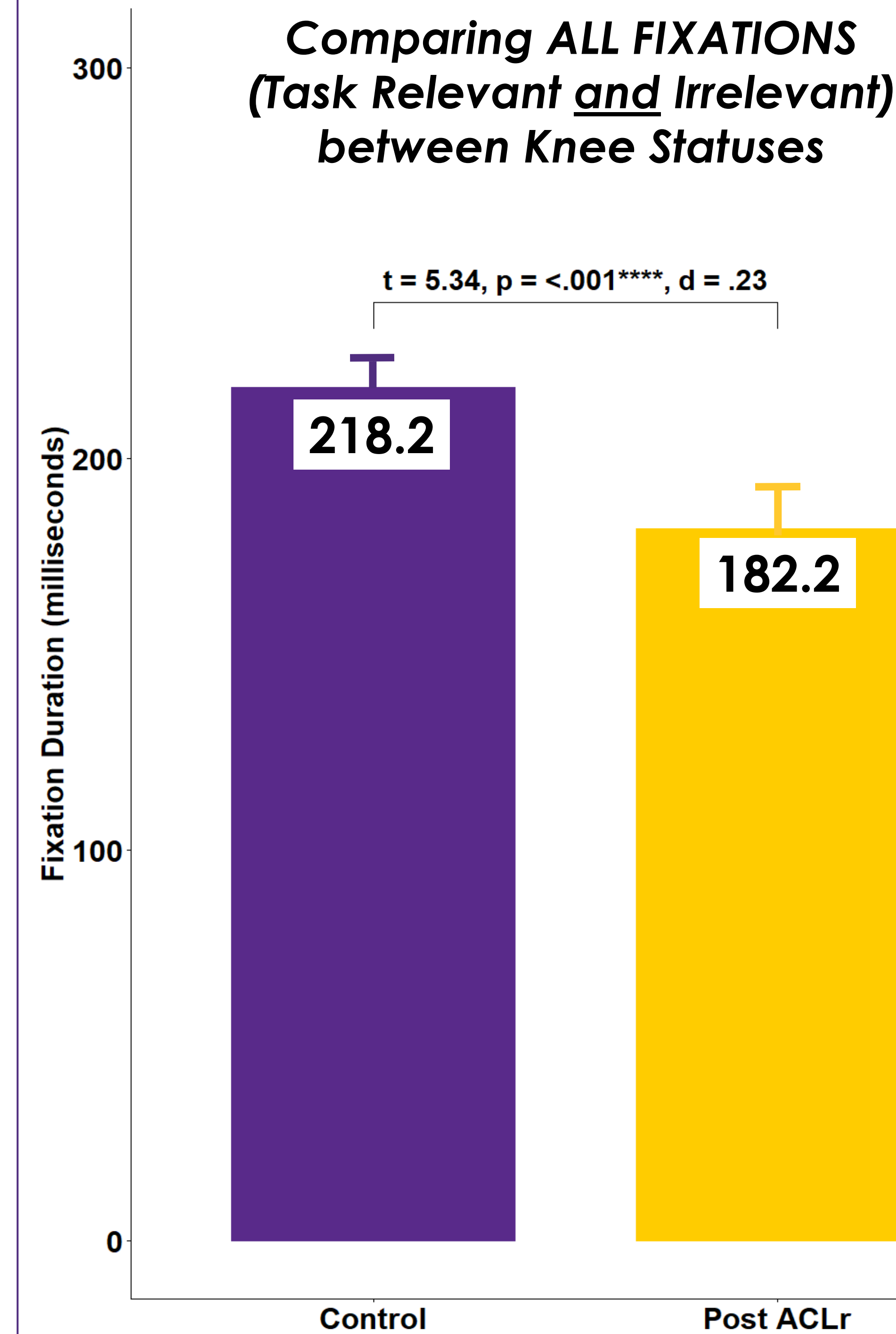
PURPOSE & HYPOTHESIS

When athletes successfully attempt targeting tasks (e.g., passing), research shows they fixate on their target *just prior* to movement execution^{5,7}

The goal of this study was to examine if visual attention differs in collegiate women soccer players post-ACLr, compared to uninjured controls

We hypothesized that visual attention of post-ACLr athletes would be directed away from task-relevant areas.

RESULTS



LSPT Performance Results

Knee Status	Stopwatch Time (s) ± SD	Penalties ± SD	LSPT Score (Time + Penalties) ± SD
Uninjured (n = 5)	43.1 ± 3.8	16.6 ± 8.9	59.7 ± 11.6
Post-ACLr (n = 2)	43.8 ± 2.8	8.7 ± 6.2	52.5 ± 8.2

Exploratory Analysis: Fixations by AOI and Knee Health Status

Variable	Knee Status	Passing targets	"Irrelevant" (non-AOI) fixations	Ball & lower body
Average Fixation Count	Uninjured	33	340	19
	Post-ACLr	12	269	28
Average Fixation Duration (ms)	Uninjured	288.6	213.6	179.7
	Post-ACLr	214.3	187.4	113.5
Search Rate (fixations/second) ⁶	Uninjured	3.5	4.7	5.6
	Post-ACLr	4.7	5.3	8.8

METHODOLOGY

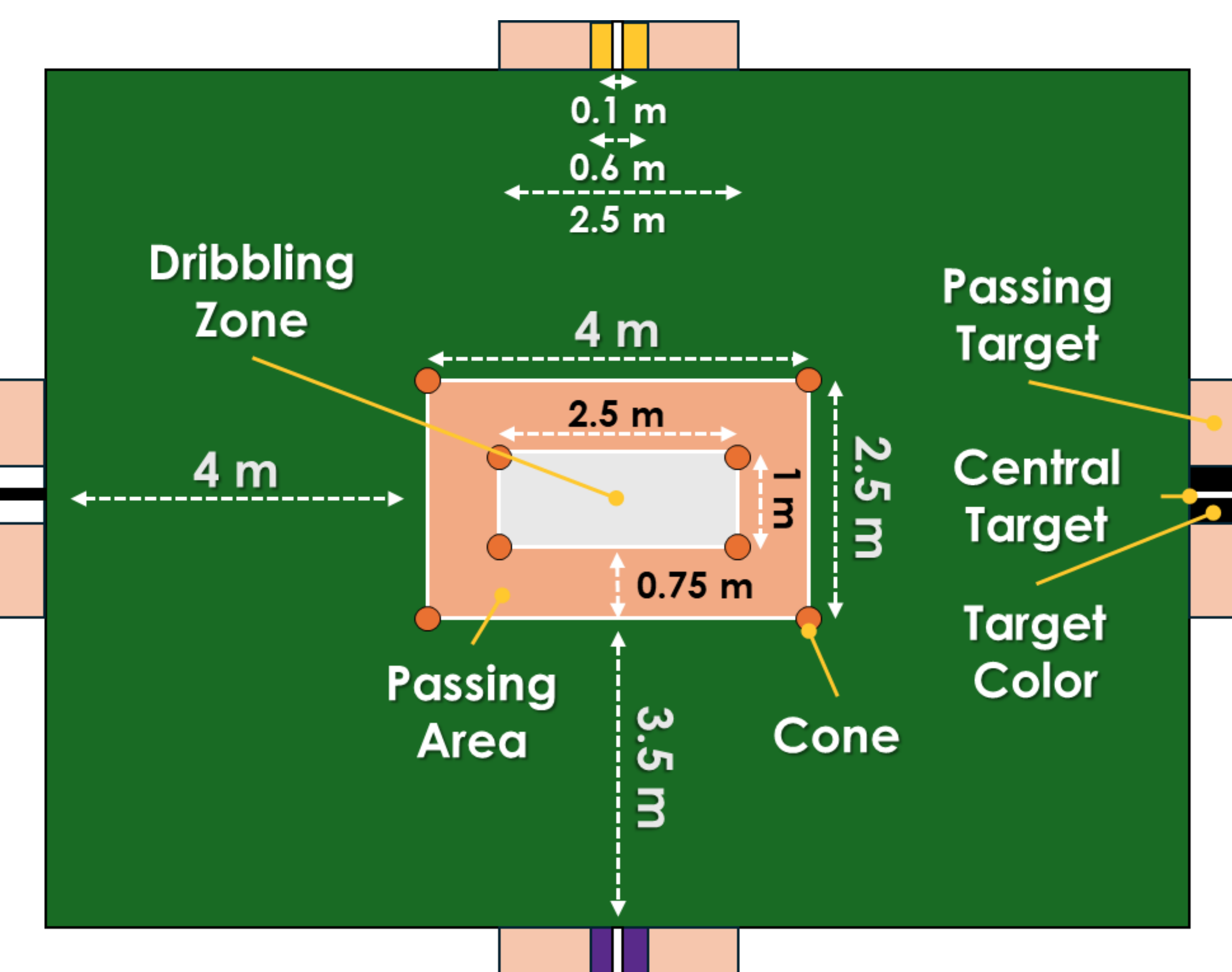
N = 7 collegiate women soccer players; n = 2 post-ACLr completed 3 trials of the Loughborough Soccer Passing Test (LSPT)¹ (16 passes per trial) while wearing a mobile eye-tracker (Tobii Pro Glasses 3)

AOIs manually digitized to capture 4 passing targets, the ball, and athletes' bodies anytime they appeared in the frame

Fixation-based metrics aggregated based on task relevance (relevant: toward AOIs; irrelevant: outside AOI boundaries)

Welch's t-test compared average fixation duration between post-ACLr (n = 2) and uninjured control athletes (n = 5)

Exploratory analysis conducted to analyze performance and fixation behavior toward specific task-(ir)relevant areas



PRACTICAL APPLICATION

Incorporate visual stimuli into footwork/COD drills to train athletes to engage their environment²

Introduce time-pressured scenarios that challenge athletes to quickly identify and act on key visual cues, replicating the perceptual demands of match play

Address post-ACLr kinesiophobia by designing drills that safely shift attention away from the knee toward task-relevant cues, using task/environmental constraints (e.g., moving defenders or a player in possession) to promote an external focus of attention³

CONCLUSION

Visual attention deficits persisted in our post-ACLr sample, even after return to play clearance, supporting prior findings this population relies more on visual feedback for knee control²⁻³

Fixation duration trends were similar across groups (target > irrelevant > ball/body), but post-ACLr athletes showed more searching behaviors⁶, briefly fixating between task irrelevant areas and their body, shifting focus onto the target *just prior* to pass execution

Despite fewer fixations, post ACL-r athletes demonstrated more purposeful targeting compared to uninjured athletes, potentially explaining their heightened accuracy



Sample LSPT



References

