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The Differences Between Flat Sole and Cushioning Sole Footwear on Change-of-Direction Skill Performance Among Futsal Players with Chronic Ankle Injuries

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I. INTRODUCTION

Change of direction (COD) ability is a critical performance component in futsal, requiring rapid acceleration, deceleration, and directional control. Players with chronic ankle instability (CAI) frequently demonstrate impaired proprioception and neuromuscular deficits. Footwear design, particularly sole structure, may influence ankle stability, joint loading and force transmission during COD tasks. However, limited evidence directly compares flat sole and cushioning sole futsal footwear among injured populations in Malaysia. This study aimed to determine whether significant differences exist in COD performance between flat sole and cushioning sole footwear among futsal players with chronic ankle injuries.

II. METHODS

A crossover experimental design was employed. Ten male recreational futsal players (age: 21.6 ± 1.26 years) with confirmed chronic ankle instability (based on the Cumberland Ankle Instability Tool) participated. Each completed the Agility t-test under two footwear conditions: flat sole and cushioning sole futsal shoes. Three trials per condition were performed with two-minute rest intervals and the average completion time was recorded. A 24-hour washout period separated the testing sessions. Data were analysed using paired-samples t-test with significance set at $p < 0.05$.

III. RESULTS AND DISCUSSION

Descriptive analysis indicated faster COD performance in the flat sole condition (9.37 ± 0.13 s) compared with the cushioning sole condition (11.10 ± 0.23 s). Paired-samples t-test revealed a statistically significant difference between footwear conditions, $t(9) = -17.9$, $p < .001$. The results demonstrate that participants completed the Agility t-test significantly faster when wearing flat sole futsal shoes. The improved performance observed in the flat sole condition may be attributed to enhanced proprioceptive feedback and more efficient foot-ground interaction. Reduced midsole cushioning likely enhanced proprioceptive feedback and force transmission during rapid directional movements,

whereas increased cushioning may dampen plantar sensory input and delay mechanical responsiveness. These findings highlight the importance of biomechanical suitability in footwear selection, particularly among athletes managing chronic ankle instability.

TABLE I
MEAN TIME AGILITY TIME

	N	Mean	Sd
Flat Sole (Seconds)	10	9.37	0.130
Cushion Sole (Seconds)	10	11.1	0.233

TABLE II
PAIRED SAMPLE T-TEST

	t	df	p
Time (Flat) - Time (Cushion)	-17.9	9.00	<.001

IV. CONCLUSIONS

Flat sole futsal shoes significantly improved change-of-direction performance compared with cushioning sole shoes among players with chronic ankle instability. Sole structure plays a critical role in agility execution, particularly among populations with compromised ankle stability.

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