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The Differences Between Flat Sole and Cushioning Sole Footwear on Shielding Skill Performance Among Futsal Players with Chronic Ankle Instability

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I. INTRODUCTION

Chronic ankle instability (CAI) is a common condition among futsal players due to repetitive ankle sprains and inadequate rehabilitation. CAI is associated with impaired proprioception, reduced neuromuscular control, and decreased postural stability, which may negatively affect sport-specific performance. In futsal, shielding is a critical skill that requires dynamic balance, lower-limb coordination, and the ability to maintain stability under pressure. Footwear is a controllable external factor that may influence balance performance. Flat sole footwear is believed to enhance proprioceptive feedback due to minimal cushioning, whereas cushioning sole footwear provides shock absorption but may reduce sensory input from the playing surface. Despite the growing interest in footwear design, limited research has examined its effect on dynamic balance performance among futsal players with CAI. Therefore, this study aimed to compare the effects of flat sole and cushioning sole footwear on dynamic balance performance among recreational futsal players with chronic ankle instability.

II. METHODS

Ten male recreational futsal players aged between 20 and 24 years with a history of chronic ankle instability participated in this study. Participants were recruited using purposive sampling. All participants were physically active, free from acute lower-limb injuries, and provided informed consent prior to participation. Dynamic balance was assessed using the Y-Balance Test (YBT). Participants performed reach tasks in three directions: anterior, posteromedial, and posterolateral. Reach distances were measured in centimeters and normalized to leg length. The YBT is a reliable and valid tool for assessing dynamic postural control in individuals with ankle instability.

A crossover design was employed. Each participant completed the Y-Balance Test under two footwear conditions: flat sole and cushioning sole. The order of testing was randomised to minimise learning effects. A 24-hour washout period was provided between sessions. Participants performed three trials in each direction for both conditions, and the mean scores were used for analysis. Data were

analysed using JAMOV software. Descriptive statistics (mean and standard deviation) were calculated for all variables. Normality was assessed using the Shapiro–Wilk test. A paired-samples t-test was conducted to compare dynamic balance performance between flat sole and cushioning sole conditions. The significance level was set at $p < 0.05$.

III. RESULTS AND DISCUSSION

The results demonstrated significant differences in dynamic balance performance between the footwear conditions. Participants achieved significantly greater reach distances when wearing flat sole footwear compared with cushioning sole footwear in all three directions. Significant differences were observed in the anterior direction ($p < 0.001$), posteromedial direction ($p < 0.001$), and posterolateral direction ($p < 0.001$). These findings indicate that flat sole footwear provided superior dynamic balance performance among futsal players with chronic ankle instability

TABLE I
COMPARISON BETWEEN FLAT AND CUSHIONING ANTERIOR

		statistic	df	p
Flat	Cushioning	26.3	9	<.001

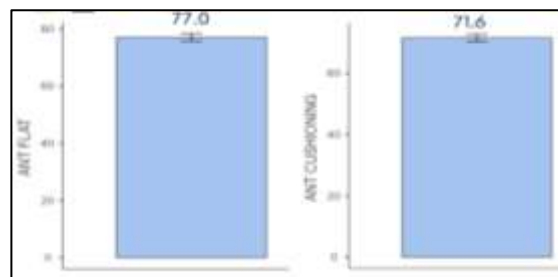


Fig. 1 Mean Value of Flat and Cushioning on Anterior

Figure 1 showed an independent-samples t-test was conducted to compare the anterior (ANT) Y-Balance Test scores between the cushioning sole and flat sole conditions. The results showed a statistically significant difference between the two conditions, t

(18) = -3.20 , $p = 0.005$. The mean difference between groups was -5.47 , indicating that participants wearing flat sole footwear achieved higher anterior reach scores compared to those wearing cushioning sole footwear. Therefore, the null hypothesis was rejected.

TABLE II
COMPARISON BETWEEN FLAT AND CUSHIONING ON
POSTEROMEDIAL

		statistic	df	p
Flat	Cushioning	12.3	9	<.001

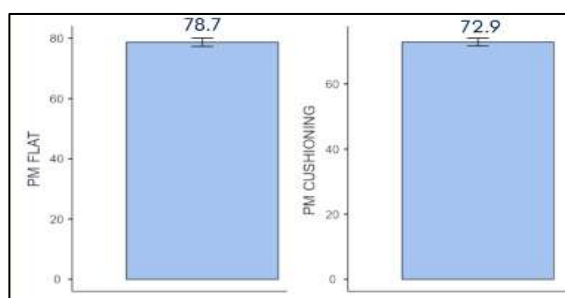


Fig. 2 Mean Value of Flat and Cushioning on Posteromedial

Figure 2 showed an independent-samples t-test was conducted to compare the posteromedial (PM) Y-Balance Test scores between the cushioning sole and flat sole conditions. The analysis revealed a statistically significant difference between the two conditions, $t(18) = -3.19$, $p = 0.005$. The mean difference was -5.85 , indicating that participants wearing flat sole footwear demonstrated higher posteromedial reach performance compared to those wearing cushioning sole footwear. Hence, the null hypothesis was rejected.

TABLE III
COMPARISON BETWEEN FLAT AND CUSHIONING ON
POSTEROLATERAL

		statistic	df	p
Flat	Cushioning	20.2	9	<.001

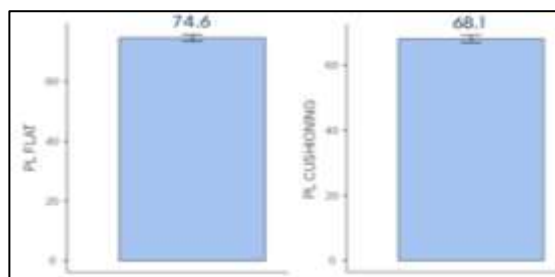


Fig. 3 Mean Value of Flat and Cushioning on Posterolateral

Figure 3 showed an independent-samples t-test was conducted to compare the posterolateral (PL) Y-Balance Test scores between the cushioning sole and flat sole conditions. The results demonstrated a statistically significant difference between the two conditions, $t(18) = -4.17$, $p < 0.001$. The mean difference was -6.52 , indicating that participants wearing flat sole footwear achieved significantly higher posterolateral reach scores compared to those wearing cushioning sole footwear. Therefore, the null hypothesis was rejected.

The findings suggest that flat sole footwear may enhance proprioceptive feedback and improve neuromuscular control, which are essential for maintaining postural stability in individuals with CAI. Minimal cushioning allows greater sensory input from the ground, facilitating joint position awareness and balance control. In contrast, excessive cushioning may dampen sensory feedback, potentially reducing dynamic stability. These results align with previous literature indicating that footwear characteristics influence postural control and functional performance.

IV. CONCLUSIONS

This study concluded that footwear sole design significantly influenced dynamic balance performance among futsal players with chronic ankle instability. Flat sole footwear was found to be more effective in enhancing dynamic balance compared with cushioning sole footwear. These findings provide practical implications for athletes, coaches, and rehabilitation professionals in selecting appropriate footwear during training and return-to-play phases.

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REFERENCES

- [1] Castagna, C., D'Ottavio, S., Granda Vera, J., & Barbero Álvarez, J. C. (2009). Match demands of professional futsal: A case study. *Journal of Science and Medicine in Sport*, 12(4), 490–494. <https://doi.org/10.1016/j.jsams.2008.02.001>
- [2] Delahunt, E., Monaghan, K., & Caulfield, B. (2010). Altered neuromuscular control and ankle joint kinematics during walking in subjects with functional instability of the ankle joint. *American Journal of Sports Medicine*, 34(12), 1970–1976. <https://doi.org/10.1177/0363546506289021>
- [3] Hiller, C. E., Nightingale, E. J., Lin, C. W. C., Coughlan, G. F., Caulfield, B. M., & Delahunt, E. (2011). Characteristics of people with recurrent ankle sprains: A systematic review with meta-analysis. *British Journal of Sports Medicine*, 45(8), 660–672. <https://doi.org/10.1136/bjsm.2010.074278>
- [4] Pizac, D. E., Schussler, E., Wilson, B. R., & Carson, J. (2018). Effects of cleat design on ankle joint laxity and balance in football athletes. *Journal of Sport Rehabilitation*, 27(5), 471–477. <https://doi.org/10.1123/jsr.2016-0084>
- [5] Eils, E., & Rosenbaum, D. (2001). A multi-station proprioceptive exercise programme in patients with ankle instability. *Medicine & Science in Sports & Exercise*, 33(12), 1991–1998. <https://doi.org/10.1097/00005768-200112000-00002>
- [6] Wikstrom, E. A., Tillman, M. D., Chmielewski, T. L., & Borsa, P. A. (2006). Measurement and evaluation of dynamic joint stability of the knee and ankle after injury. *Sports Medicine*, 36(5), 393–410. <https://doi.org/10.2165/00007256-200636050-00004>
- [7] Ge, Q., Zhou, H., Xu, D., Zhang, Z., Qu, X., Yuan, Y., & Gu, Y. (2025). Does shoe cushioning space affect patellofemoral pain risk? A study based on the integrated finite element model. *iScience*, 28(11), 113635. <https://doi.org/10.1016/j.isci.2025.113635>
- [8] Paterson, K., Bennell, K., Wrigley, T., Metcalf, B., Kasza, J., & Hinman, R. (2016). Effects of footwear on the knee adduction moment in medial knee osteoarthritis: classification criteria for flat flexible vs stable supportive shoes. *Osteoarthritis and Cartilage*, 25(2), 234–241. <https://doi.org/10.1016/j.joca.2016.10.001>
- [9] Ginanjar, A., Ramadhan, R., Effendy, F., Kharisma, Y., & Agustin, N. M. (2023). The effect of Sport Education Season futsal on college student sport orientation. *International Journal of Human Movement and Sports Sciences*, 11(4), 914–925. <https://doi.org/10.13189/saj.2023.110428>
- [10] Méndez-Dominguez, C., Nakamura, F. Y., & Travassos, B. (2022). Editorial: Futsal Research and Challenges for Sport Development. *Frontiers in Psychology*, 13, 856563. <https://doi.org/10.3389/fpsyg.2022.856563>
- [11] Ismail, S. I., I., & Tamura, Y. (2020). Footwear And Playing Surface Interaction In Futsal. In Graduate School of Sports and Health Science [Thesis]. Fukuoka University. <https://doi.org/10.1080/19424280.2020.1825534>