

## ORIGINAL RESEARCH

# Comparison of game performance in futsal players based on functional movement screening test results

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## Abstract

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performance.

The objective of this study was to compare the physiological and technical performances of athletes with FMS scores below 14 and above 14 in recreational futsal players. A research was conducted with 16 male recreational futsal players (aged =  $21.50 \pm 1.51$  years; height =  $179.31 \pm 5.71$ ; weight =  $69.63 \pm 7.71$ ). To assess their physical abilities using various evaluation during match. Since that the data is normally distributed, Independent Samples T-test was employed. In the findings of the study, no significant difference was observed in HR, RPE, enjoyment and technical result (successful pass, unsuccessful pass, successful shot, unsuccessful shot, ball win, ball lost and goal) according to FMS scores ( $P > 0.05$ ). In conclusion, although there was no statistically significant difference between match performance and FMS scores in the results of the study. However, it was observed that those with FMS total scores  $> 14$  had lower heart rates, more successful passes, more ball winning, and fewer unsuccessful passes.

## Introduction

Futsal has gained significant popularity among team sports. Futsal is a sport characterized by high-intensity motions, intermittent loads, and short recovery periods. (Berdejo-del-Fresno, 2012). In futsal, due to the high intensity of the load, the need for simultaneous and eccentric muscle strength of the lower extremity is extremely high in order to continue the activities of deceleration, turning, jumping, sprinting, change of direction (Gadziński S. 2016) and technical actions (Pizarro et al., 2019; Moore et al., 2014; Yilmaz, 2024b). While 75% of the actions in the game last 1-18 seconds, 83% of the rest intervals vary between 1-15 seconds (Barbero-Alvarez JC, et al. 2004) and the actions must be performed quickly and with high intensity in small sided. Therefore in high intensity sports such as futsal optimal performance and injury prevention need a substantial level of functional movement capacity, balance, proprioception, neuromuscular control, range of motion, strength, speed, agility and technical skills. (Moore et al., 2014; Naser et al., 2017; Yilmaz et al., 2024; Yilmaz et al., 2023; Huxel & Andersen, 2013).

Coaches and performance specialist use multiple tests to protect athletes from injuries and to evaluate their performance. FMS test is one of them. The FMS test

provides a method for assessing mobility within the musculoskeletal system, aiming to forecast athletic performance, functional impairments, asymmetries, and injuries. (Cook et al., 2006a; 2006b). The Functional Movement Screen (FMS) comprises seven distinct movement assessments: deep squat, hurdle step, inline lunge, shoulder mobility, active straight leg raise, trunk stability push-up, and rotational stability. The combination of these assessments yields a comprehensive evaluation, resulting in a final score that might range from 0 to 21. (Cook et al., 2006a; 2006b). The evaluation of functional movement typically assesses body awareness, joint range of motion, neuromuscular coordination, postural control, stability, flexibility, balance and muscular strength. (Cook et al., 2006a; 2006b; Kuzuhara et al., 2018; Okada et al., 2011; Coven, 2010).

In the literature examining the relationship between FMS and physical performance (Yilmaz, 2024a; Fitton Davies et al., 2022; Girard et al., 2016) However, it has been observed that there is no study evaluating match performance in futsal according to FMS scores. Therefore, the aim of the study was to compare match performance in futsal according to FMS scores.

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## Methods

### Participants

The study involved a sample group of 16 recreational futsal players (aged =  $21.50 \pm 1.51$  years; height =  $179.31 \pm 5.71$ ; weight =  $69.63 \pm 7.71$ ).

### Procedure

The FMS test and futsal game took place on separate days. FMS tests were performed without warming. Before the futsal match, a standard 20-minute warm-up was performed. The ethics committee application of study was approved (E.791708.11.2024) by the Siirt University Ethics Committee.

### Functional Movement Screening Test (FMS)

The FMS test was executed in accordance with the established protocols. The Functional Movement Screen (FMS) comprises seven distinct movement assessments: deep squat, hurdle step, inline lunge, shoulder mobility, active straight leg raise, trunk stability push-up, and rotational stability. Movements are scored between 0 and 3 points. A grade of 3 signifies exceptional condition with typical functional movement. A score of 2 indicated faulty completion or compensatory movements. A score of 1 signified the completion of the exam despite bodily instability. A score of 0 showed the existence of pain during the assessment. The maximum possible total score was 21 points (Cook et al., 2014). The highest possible total score was 21 points (Cook et al., 2014).

### Rated Perceived Exertion (RPE)

The players' perceived exertion was measured using a validated 20-point Borg scale after each session of the SSGs

in order to estimate the internal training intensity. This was done in order to determine how intense the players' training was. (Foster et al., 2021). Prior research has established the reliability and validity of this scale in assessing the degree of effort. (Impellizzeri et al., 2004). A standardized question, "How was and how did you feel the exercise?" was utilized to ensure consistency. Participants were given the scale in advance and asked to offer their replies on an individual basis and participants were given an introduction to the scale in preparation. To eliminate of any potential prejudice, this was done.

### Enjoyment

Participants indicated their level of satisfaction during the exercise regimen utilizing a Likert scale from 1 to 7. This scale assessed their enjoyment after futsal match sets. The enjoyment scale was validated by Raedeke (2007). Soylu et al. (2023) evaluated exercise enjoyment among Turkish adolescents and adult athletes. A high score on the scale shows that the person experiences enjoyment from physical exercise.

### Data Analyses

Before the study, an important assumption test called a normality test was carried out. Given that the data is normally distributed, Independent Samples T-test was employed. The 95% CI was determined. Statistical significance was defined at  $P < 0.05$ . SPSS 26 was used for this study.

## Results

HR, RPE, enjoyment, and technical results of futsal players and comparisons are given in Table 1.

**Table 1**

HR, RPE, Enjoyment, and Technical result of futsal players to FMS scores  $> 14$  and FMS scores  $< 14$  game conditions.

| Variables         | FMS $> 14$        | FMS $< 14$        | Mean Difference | %95 CI |       | <i>p</i> |
|-------------------|-------------------|-------------------|-----------------|--------|-------|----------|
|                   | Mean $\pm$ SD     | Mean $\pm$ SD     |                 | Lower  | Upper |          |
| HR average (bpm)  | 183.65 $\pm$ 3.63 | 185.37 $\pm$ 5.54 | -1.71           | -6.74  | 3.30  | .368     |
| RPE               | 14.18 $\pm$ 1.97  | 12.59 $\pm$ 2.75  | 1.59            | -.97   | 4.16  | .414     |
| Enjoyment         | 20.34 $\pm$ 4.30  | 20.50 $\pm$ 1.96  | -.156           | -3.74  | 3.43  | .258     |
| Successful pass   | 18.50 $\pm$ 5.12  | 15.37 $\pm$ 5.47  | 3.12            | -2.56  | 8.81  | .931     |
| Unsuccessful pass | 6.12 $\pm$ 2.29   | 7.00 $\pm$ 3.02   | -.87            | -3.75  | 2.00  | .629     |
| Ball win          | 2.62 $\pm$ 1.92   | 2.37 $\pm$ 1.68   | .25             | -1.68  | 2.18  | .851     |
| Ball lost         | 4.12 $\pm$ 2.10   | 3.75 $\pm$ 3.69   | .37             | -2.84  | 3.59  | .359     |
| Successful shot   | 2.12 $\pm$ 1.35   | 1.75 $\pm$ .88    | .37             | -.85   | 1.60  | .084     |
| Unsuccessful shot | 2.00 $\pm$ 1.06   | 1.87 $\pm$ 1.35   | .12             | -1.18  | 1.43  | .223     |
| Goal              | 0.62 $\pm$ .74    | 0.37 $\pm$ .51    | .25             | -.43   | .93   | .230     |

HR: Heart Rate; RPE: Rating of perceived exertion; FMS: Functional Movement Screening; bpm: beats per minute.

## Discussion

This research aimed to assess match performance in futsal according to functional movement capacity. No significant difference was observed in HR average, RPE, enjoyment, successful pass, unsuccessful pass, ball win, ball lost, successful shot, unsuccessful shot and goal technical skills (Table 1 ).

The technical performance findings indicate that, although there is no significant difference, those with FMS total scores with FMS total scores > 14 demonstrate greater success in passing and winning balls. Additionally, they performed less unsuccessful passes. Despite the lack of statistical significance, the results indicate that an increase in FMS scores influences the advancement of technical skills in soccer. Literature contains research that correlation the FMS assessment with match performance, physical performance test and technical skill evaluations. Kokstejn and Musalek (2019) stated that higher FMS performance correlates with enhanced performance in players at elevated levels of gross motor skills tests (e.g., shooting accuracy, shooting time, dribbling). Another research indicated that enhanced functional movement capacity improved performance in passing and shooting abilities in both handball and football players (Wibowo et al., 2018). Kokstejn et al. (2019) reported that FMS significantly increases the influence of physical fitness on dribbling ability, a motor skill particular to soccer, thus playing a crucial role in the acquisition of sport-specific motor skills among pre-adolescent elite soccer players.

Besides game performance, research indicates a positive relationship between the FMS test and physical performance. Lee et al. (2019) indicated that those with a total FMS score of  $\geq 14$  exhibited substantially superior 10-20m sprint and agility performance compared to those with a score <14 points. In other studies, FMS has been observed in range of motion, counter movement jump and balance in football players (Yilmaz, 2024a), sprint and jump performance (Parcman & McBride, 2011), balance (Kramer et al., 2019; Sikora & Linek 2022), and 10-20m sprint performance (Santol et al., 2021). The results indicate that the FMS test may assess physical performance, technical ability, and game performance, in addition to predicting injuries (Kiesel et al., 2007).

## Conclusion

In conclusion, although there was no statistically significant difference between match performance and FMS scores in the results of the study. However, it was observed that those with FMS total scores > 14 had lower heart rates, more successful passes, more ball winning, and

fewer unsuccessful passes. Further research is required to attain a conclusive determination on this matter. Research including various genders, age demographics, and league classifications will yield more definitive insights into the impact of FMS scores on match performance.

## Authors' Contribution

Research idea: ÖC, GY; Design of the study: ÖC, GY; Acquisition of data for the study: ÖC; Analysis of data for the study: ÖC; Interpretation of data for the study: ÖC; Drafting the manuscript: ÖC; Revising it critically for important intellectual content: ÖC; Final approval of the version to be published: GY.

## Ethical Approval

The study was approved by the Siirt University of Decisions Ethical Committee (2024/952) and it was carried out in accordance with the Code of Ethics of the World Medical Association also known as a declaration of Helsinki.

## Funding

No.

## Conflict of Interest

No.

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