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Research Article / Araştırma Makalesi

Is quality of movement a factor that affects reaching the professional level in elite young football players?

Elit genç futbolcularda hareket kalitesi profesyonel düzeye ulaşmayı etkileyen bir faktör müdür?

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ABSTRACT

Objective: The aim of the study was to examine whether the proportion of young elite football players with high functional movement screening (FMS) scores and reaching professionalism differs from the proportion of young elite football players with low FMS scores and non-professionals.

Materials and Methods: Fifty-seven players were included in the study. The health files of the participants were retrospectively scanned. Physical information and FMS scores were recorded in the data form. The level of football career of the participants as of March 2022 was assessed on the website of the Turkish Football Federation. FMS scores were compared by dividing the participants into two groups as those with- and without professional football license.

Results: The proportion of participants with a score above the FMS cut-off score and reaching the professional level was higher than the rate of non-professional participants with a score above the FMS cut-off score ($p<0.05$).

Conclusion: The quality of movement in young elite football players may be a determinant for being a professional football player. For this reason, starting from an early age, measuring the quality of movement regularly and trying to improve it may be important in realizing the career goals of elite young football players.

Keywords: *Exercise, football, movement, sport*

ÖZ

Amaç: Çalışmanın amacı, fonksiyonel hareket tarama (FMS) skorları yüksek olan ve profesyonelliğe ulaşan genç elit futbolcuların oranının, FMS skoru düşük olan ve profesyonel olamayan genç elit futbolcuların oranından farklı olup olmadığını incelemekti.

Gereç ve Yöntemler: Elli yedi oyuncu çalışmaya dahil edildi. Katılımcıların sağlık dosyaları geriye dönük olarak tarandı. Demografik bilgiler ve FMS puanları veri formuna kaydedildi. Katılımcıların Mart 2022 itibariyle futbol kariyer düzeyleri Türkiye Futbol Federasyonu'nun internet sitesinde incelendi. Katılımcılar profesyonel futbol lisansı olanlar ve olmayanlar olarak iki gruba ayrılarak FMS puanları karşılaştırıldı.

Bulgular: FMS kesme puanının üzerinde puan alan ve profesyonel düzeye ulaşan katılımcıların oranı, FMS kesme puanının üzerinde puan alan profesyonel olmayan katılımcıların oranından daha yüksekti ($p<0.05$).

Sonuçlar: Elit genç futbolcularda hareket kalitesi profesyonel futbolcu olmak için belirleyici olabilir. Bu nedenle elit genç futbolcuların kariyer hedeflerini gerçekleştirmede erken yaşlardan başlayarak hareket kalitesini düzenli olarak ölçmek ve geliştirmeye çalışmak önemli olabilir.

Anahtar Sözcükler: *Egzersiz, futbol, hareket, spor*

INTRODUCTION

Football academies are units designed to nurture the talents of young athletes and provide conditions that will enable them to reach the professional level (1). Young football players are divided into certain age categories in football academies, and their development is supported. The development of young football players should be monitored in three main categories as the Basic Phase for the U5-U11 age group, the Youth Development Phase for the U12-U16 age group, and the Professional Development Phase for the U17-U21 age group (2). However, there are many factors that will affect the development of young football players (3). Environmental factors such as materials, physical conditions, psychological factors such as coping with pressure, having positive behavior patterns; social factors such as

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culture and family. It is thought that coach-based factors such as training quality, performance analysis, and individual factors such as endurance, flexibility, strength, and technical skills are factors that affect the development of young football players (4).

Movement quality can be defined as the ability to maintain a targeted movement with sufficient mobility and stability (5). In recent years, it has become widespread to evaluate the quality of movement in individuals who are interested in sports for both professional and recreational purposes (6). Functional movement screening (FMS) is a tool developed and widely used to evaluate movement quality. FMS provides valuable information about flexibility, mobility, balance, asymmetry and movement dysfunction. FMS is based on the observation of seven basic movement patterns (7,8). It is known that FMS is effective in predicting musculoskeletal injuries in young football players (9). In addition, it is thought that there is a relationship between physical performance and competition level and FMS (8,10,11). However, there is no research examining the effect of FMS on reaching professional level in elite young football players. Information revealed on this subject will have evidence value if tests measuring movement quality of young football players can be used to predict whether the athletes will reach the professional level or not.

The aim of the present study was to examine whether the proportion of young elite football players with high FMS scores and reaching professionalism differs from the proportion of young elite football players with low FMS scores, and non-professionals. In addition, another aim was to compare the FMS scores of professional and non-professional elite young football players.

MATERIALS and METHODS

Football academy athletes of a Turkish Super League team were included in the study. Applying inclusion and exclusion criteria, 57 (73.1%) elite young male football players with an average age of 21.7±1.5 of 78 elite young male football players were included in the study. Inclusion criteria for the study were: to have received football training at the relevant football academy between 2018-2021. Those who could not undergo FMS for any reason, and therefore did not have FMS scores were excluded from the study. The research was conducted in accordance with the Declaration of Helsinki, and has received ethical compliance (Date:02.03.2022, Decission number:2022/20-173).

In the football academy where the research was carried out, health files of the athletes who received football education in the U17, U19 and U21 elite young male football teams between 2018 and 2021 were scanned retrospectively. The participants' year of birth, height and weight data were recorded. In addition, results of the FMS tests, which are routinely applied at the beginning of each season to measure the quality of movement, and recorded in the health files, were noted. Whether the participants have a professional football player license or not was checked on the Turkish Football Federation's free access website. Thus, as of March 2022, the amateur or professional licenses of the participants were determined. The rate of being professional was compared in those above and below the composite FMS cut off score.

Tests that make up the FMS are as follows: deep squat, hurdle step, inline lunge, shoulder mobility, activated straight leg raise, trunk stability push-up and rotatory stability. Each test pattern is observed and scored between '0' and '3'. A score of '0' and '1' means the test failed, while a score of '2' and '3' indicates the test has been passed. According to the general scoring criteria, a score of '0' is given if the tests cannot be performed due to pain, '1' if they cannot be performed even in simplified positions or even with compensation, '2' if they can be performed with simplified position or compensation, and '3' if they can be performed in the desired position without compensation. Right and left sides are scored separately for five of these tests (hurdle step, inline lunge, shoulder mobility, activated straight leg rise, rotator stability). When calculating the test score for bilateral tests, the lowest of two scores is used. The composite FMS score is obtained by summing the scores of the seven movement patterns (7,8).

The sum of deep squat, hurdle step and inline lunge tests scores is the motor control score (MCS); the sum of shoulder mobility and active straight leg raise tests scores gives the mobility score (MS); the sum of trunk stability push-up and rotatory stability test scores is defined as the stability score (12). As the score of each test can be interpreted separately; functional, mobility, stability and composite scores can also be assessed (5,9). Generally, those with a composite score of 14 or less are defined as having poor movement quality, and those with a composite score above 14 are defined as having good movement quality (12). Scores of ≥6 for motor control, ≥4 for mobility. and ≥4 for stabilization are considered as threshold points (13).

Research data was uploaded into computer environment, and evaluated by means of "SPSS (Statistical Package for Social Sciences) for Windows 22.0 (SPSS Inc, Chicago, IL)". Descriptive statistics were presented as median (interquartile range), frequency distribution, and percentage. The conformity of the variables to normal distribution was examined using visual (histogram and probability graphs) and analytical methods (Shapiro-Wilk test). The Mann-Whitney

U test was used as the method for evaluating statistical significance between two independent groups for variables that were found not to fit the normal distribution. The relationship between FMS cut-off scores and professional status was analyzed with the chi-square test. Statistical significance level was accepted as $p<0.05$.

RESULTS

Physical parameters of the participants, with a mean age of 21.7 ± 1.5, is given in Table 1. All physical characteristics were similar among groups ($p>0.05$).

Table 1. Physical characteristics

Parameter	Professional	Non-professional
Age (yrs)	21.2±1.4	21.0±1.5
Height (m)	1.78±0.06	1.78±0.05
Weight (kg)	71.8±5.5	73.0±5.6

As means ± SD

While 56.1% (n=32) of the participants became professionals, 43.9% (n=25) could not. The proportion of participants who scored above the FMS cut-off score and reached the professional level was different from the proportion of participants who scored above the FMS cut-off score and were not professionals ($p<0.05$, Table 2). The median of composite FMS scores of those who achieved professional status was 16 (13.2-17.0), while the median of composite FMS scores of those who were not professional was 13 (12.0-15.5) (Table 3). Composite FMS and mobility scores of those who achieved professional status were different from those who did not ($p<0.05$, Figure 1). Other FMS scores were similar in both groups ($p>0.05$).

Table 2. Relationships between CFMS, MCS, MS, SS cutoff scores and professionalism

Score levels	Professional	Non-professional	p^{X}
CFMS ≤14	9 (28.1)	15 (60.0)	0.016*
CFMS >14	23 (71.9)	10 (40.0)	
MCS ≤6	19 (59.4)	12 (48.0)	0.392
MCS >6	13 (40.6)	13 (52.0)	
MS ≤4	13 (40.6)	17 (68.0)	0.040*
MS >4	19 (59.4)	8 (32.0)	
SS ≤4	11 (34.4)	10 (40.0)	0.662
SS >4	21 (65.6)	15 (60.0)	

Figures as n (%); ^{X}: chi-square test, *: $p<0.05$. CFMS: composite functional movement score, MCS: motor control score, MS: mobility score, SS: stability score

Table 3. Comparison of CFMS, MCSS, MS and SS TSS scores by professionalism status

Movement scores	Professional (n=32)	Non-professional (n=25)	p
CFMS	16 (13.2-17.0)	13 (12.0-15.5)	0.013*
MCS	6 (6-7)	7 (5.0-7.5)	0.472
MS	5 (4-6)	4 (3-5)	0.023*
SS	5 (4-5)	5 (4-5)	0.623

Figures as medians (QL-QU). QL: lower quartile. QU: upper quartile; *: $p<0.05$, CFMS: composite functional movement score, MCS: motor control score, MS: mobility score, SS: stability score

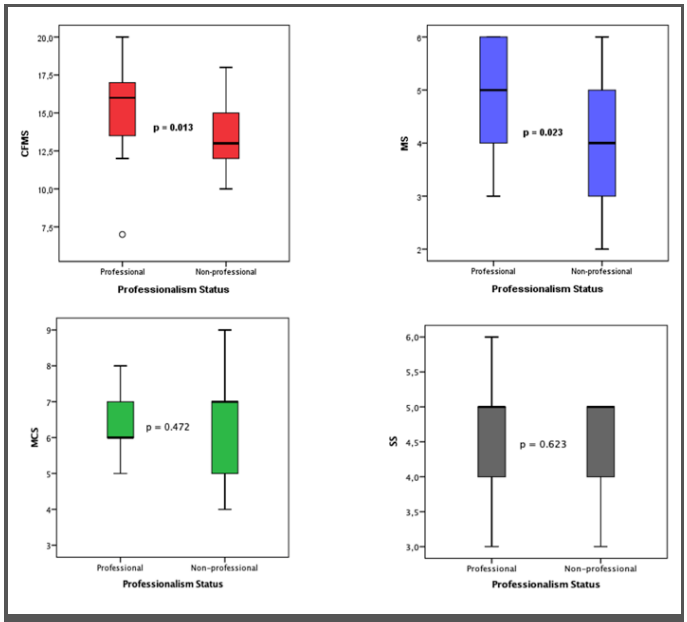

Figure 1. Composite functional movement (CFMS), motor control (MCS), mobility (MS) and stability (SS) scores of professional and non-professional participants

DISCUSSION

The aim of the present study was to examine whether FMS scores of elite male young football academy athletes who reached professionalism and non-professionals were different. According to the results of the study, the rate of young football players with high movement quality and professionalism was higher than the rate of non-professional football players with high movement quality. In addition, composite FMS and mobility scores were better in elite young male football players who reached professional status.

There are many environmental, social, psychological and individual factors that are believed to affect the development of athletes educated in football academies (4). One of the individual factors is basic motor skills. These are defined as basic learned movement patterns that do not occur naturally and are essential for more complex physical and sporting activities. They can be classified into three different categories: movement (e.g. running), object control (catching a ball) and stability (ability to restore balance under changing conditions) (14). Basic motor skills can be sustained by the interaction of components such as balance, strength, range of motion, and can be evaluated by measurements. However, the popularity of movement screening procedures that provide information about the whole of basic motor skills is increasing (6). One of the tools that has become widespread in this field in recent years is FMS. FMS can measure the quality of movement patterns by evaluating dysfunctional movement patterns, asymmetric movement patterns, mobility and stability together (9,10,12,13).

It has been suggested that FMS can be used to help predict injuries, create exercise programs, and predict performance in young football players. There are studies reporting that there is a relationship between FMS and injuries in young football players, and that those who score below a certain level in FMS are more suffer to injuries (9). With exercise programs prepared according to FMS results, it is possible to correct movement patterns and increase overall motor quality (15,16). Evidence regarding the relationships between performance and FMS scores, and whether FMS is a tool to predict performance is more contradictory than other areas of use. While some studies emphasize that the composite FMS score is insufficient to predict performance, fewer studies mention the correlation between composite FMS score and performance (17,18).

However, the possible relationship between athletes' long-term career goals, such as reaching professional status, and FMS scores has not been investigated. In addition, as far as we know, there is no research examining the relationship between other methods and tools that evaluate basic motor skills and the realization of long-term career goals. The most important and previously underrecognized result of the present study in the literature is the finding that there may be a link between the quality of movement and reaching professional level in young football players. This result suggests that the quality of movement can also be a determinant in the realization of these goals in elite young male football players who have reached professional level.

Sports-related movement patterns include dynamic balance, contralateral coordinated functionality of the extremities, perceptual motor integration, high angular velocity involving multiple joints, segmental interaction occurring at optimal time, optimal intermuscular and intramuscular coordination, and optimal energy transfer through the kinetic chain and they require control (19). The quality of basic motor skills reflects high coordination and control. How well basic motor skills can be maintained, and whether they can be successfully transferred to movement patterns required by sports are among the criteria that determine success in sports (20). This information suggests that athletes with good basic motor skills may be more likely to be successful. At the beginning of the study, based on the above information, the hypothesis that young football players with high quality of movement are more likely to achieve success seems to be supported by the results of the study.

The use of data from a single football academy is the strength of the study. Thus, the effect of variables such as training methods, physical conditions, health services on reaching professional level might have been reduced. However, the study has some limitations. The fact that the participants are male will prevent commenting on the relationship between the FMS scores of young female football players and their professionalization status. In addition, athletes in the professional development phase were included in present study, and the effect of movement quality on reaching the next phase was investigated. For this reason, it will not be possible to comment on the effect of movement quality on the progress of the athletes in the basic phase and youth development phase to the next phase. Extending the study by adding athletes in the basic and youth development phases in future studies will help to better clarify the subject.

CONCLUSION

The results of the study suggest that the quality of movement in elite young male football players may be a determinant for becoming a professional football player. For this reason, starting from an early age, measuring the quality of movement regularly, and trying to improve it may be important in realizing career goals of elite young football players.

Ethics Committee Approval / Etik Komite Onayı

This study was approved by the Necmettin Erbakan University Faculty of Medicine Scientific Research Ethics Committee (approval number 20-173, date: 02.03.2022).

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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Author Contributions / Yazar Katkıları

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