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Original Article

Functional assessment battery for female soccer players: A field-based proposal with reference data from a semi-professional team.

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Abstract
Background: The growing prominence of women's soccer highlights the need to optimize athletic performance and prevent sports-related injuries. However, there is a lack of consensus in the literature regarding appropriate tests and reference values for identifying functional deficits in female athletes. Scientific evidence underscores the importance of assessing both global and analytical movements, with particular emphasis on lower limb alignment and the control of hip musculature. This study aims to present a tailored assessment battery for women's soccer and provide reference data from a semi-professional team. **Methods:** Eighteen healthy female soccer players (mean age = 20.8 ± 4.2 years, mean BMI = 22.4 ± 2.19) from a second division soccer team participated in this study. They performed a battery of tests including three global movement quality tests and four analytical muscle assessment tests: deep squat, single-leg squat, dowel hip-hinge, Copenhagen adduction, Thomas test, hip extensors, and hip rotators. Qualitative analysis was performed on recorded exercises, and descriptive statistics were utilized for data analysis. **Results:** Results indicated optimal performance in global functional evaluation, with scores of 2.77 ± 0.66 for the deep squat, 9.27 ± 0.95 and 9.39 ± 0.91 for the single-leg squat, and successful completion of the hip hinge with dowel test and Copenhagen adductor test by all players except one. Minimal discrepancies were observed between legs in analytical tests. **Conclusion:** This study contributes a practical assessment tool and descriptive insights for female soccer players in professional settings. The battery can help identify key deficits related to lower-limb alignment, lumbopelvic stability, adductor function, and hip mobility and strength, informing individualized preventive and strength-conditioning strategies. Thus, this proposal aims to support the professional practice in an emerging sport such as women's soccer.
Keywords: movement quality; biomechanics; neuromuscular control; injury prevention; performance; football.

Introduction

The popularity of women's soccer has grown to 30 million women in 180 countries worldwide and is expected to reach 60 million by 2026 (FIFA, 2020). Soccer is a sport that demands diverse physical abilities and skills and, as a high-impact, high-intensity sport, entails a high incidence of sports injuries, especially to the lower limbs (Hägglund et al., 2009). Contemporary epidemiological syntheses report that, in senior women's soccer, match injury incidence is markedly higher than training incidence, with lower-limb injuries predominating (Horan et al., 2023). Moreover, injury burden is substantial— anterior cruciate ligament (ACL) injuries are the most burdensome category in elite club cohorts—and women's international match injury burden has been estimated at ~506.7 days lost per 1000 h, compared with ~454.0 days per 1000 h in men from the same dataset (Hallén et al., 2024; Sprouse et al., 2024). In order to improve sport performance and injury prevention, pre-participation and periodic evaluation of players represent a crucial aspect of sport practice in general, and soccer in particular.

Physical assessment helps sport professionals to identify deficits in athletes that may pose a threat, individualize injury prevention strategies, and set sport-specific performance goals (Hughes et al., 2018). Moreover, longitudinal evaluations across the season have shown relevant adaptations in professional soccer players, including changes in body composition, aerobic capacity, and explosive strength (Poerio et al., 2024),

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highlighting the value of continuous monitoring protocols. Beyond risk appraisal, assessment informs the design of individualized exercise programs and establishes a framework for objectively monitoring short- and long-term progress following exercise prescription (American College of Sports Medicine [ACSM], 2025). Consistent with this performance-plus-prevention rationale, recent studies in women's soccer indicate that assessment-informed neuromuscular and strength interventions improve key physical capacities and reduce injury incidence (Beato et al., 2021; Belamjahad et al., 2024).

Many studies have addressed what tests should be performed to detect deficits that threaten athlete performance and increase the risk of injury (McCall et al., 2015). In men's soccer, the most commonly used tests to identify injury risk were isolated muscle assessments, generally using isokinetic tests, and more global movement assessments such as the Functional Movement Screen (FMS) (Cook et al., 2014), in addition to subjective assessment questionnaires (McCall et al., 2015). Among the relevant muscle groups for evaluation in soccer, the adductors (Serner et al., 2014) and the hamstrings were highlighted due to their high incidence of injury. In addition, gluteal-ischiosural synergy was crucial to prevent overload and possible injury of the latter. The gluteus maximus also prevented hip, knee and ankle collapse during sports movements, and in women prevented excessive knee valgus (Hollman et al., 2014; Marotta et al., 2020), as well as hip external rotators (Cashman, 2012).

In women's soccer it has been observed that knee valgus predisposes to injury and that both the deep squat (DS) and the single-leg squat (SLS) help to detect it (Ugalde et al., 2015). The DS is a movement that is transferable to most sporting actions. It constitutes part of the FMS battery, a method that arises to detect risk of musculoskeletal injuries through fundamental movement patterns that require mobility and stability. Regarding single-leg loading tasks, frontal deviations were associated with an increased risk of injury, especially anterior cruciate ligament (ACL) in female athletes (Herrington et al., 2013).

In this regard, the SLS represents a tool of simple application to detect lower limb injury risk (Ugalde et al., 2015). Moreover, given that low back pain has been reported among young female soccer players (Faude et al., 2005), performance on the hip-hinge with dowel (HHD)—a qualitative screen of lumbopelvic control using three-point contact at the occiput, thoracic spine, and sacrum—can help identify suboptimal hip-hinge mechanics linked to increased lumbar flexion demands; maintaining a neutral spine during hip-hinge tasks reduces lumbar loading (Liebenson, 2003; Michaud et al., 2021). Finally, adductor activation along the full range of motion is fundamental in soccer, due to their solicitation in technical actions such as changes of direction and shooting. Thus, the Copenhagen Adduction Test (CAT) emerged as a test designed to assess the function of this musculature (Serner et al., 2014).

The risk of injury in female professional soccer players is multifactorial, complex, and associated with various intrinsic and extrinsic factors, presenting certain differences compared with male players. Therefore, it is necessary to continue investigating the different risk factors to determine effective evaluation systems for female athletes to detect their risk of injury (Tahani et al., 2020). To our knowledge, there is no consensus in the scientific evidence on which screening tests should be used and what standard values are common in women's soccer. Although some studies have begun to identify physical determinants such as lower-limb power, jump performance, and maximal sprint speed in female players (González-Fernandez et al., 2022), consensus is still lacking regarding functional screening tests and normative values specific to women's soccer. Addressing this gap, the present study proposes a specific test battery for women's soccer aimed at detecting deficits that threaten performance and increase injury risk, and to show reference data from a women's second-division team.

Materials & Methods

Subjects

Eighteen healthy female soccer players from a Spanish second-division soccer team participated in this study. The training schedule consisted of three weekly training sessions and one match every weekend. Inclusion criteria were: (a) female players ≥18 years old, (b) registered and actively competing in the second division, (c) regular training participation for at least the previous six months, and (d) absence of musculoskeletal injury or illness at the time of testing. Exclusion criteria were: (a) history of musculoskeletal injury within the past six months, (b) diagnosis of any chronic medical condition that could interfere with performance, (c) pregnancy, or (d) failure to provide informed consent.

Before participation in the study, each player received an information sheet outlining the study objectives and procedures, and signed a written informed consent. The study was approved by the Ethics Committee of Comillas Pontifical University (code: 2021/65).

The anthropometric assessment followed the standard GREC-FEMEDE and International Society for the Advancement of Kinanthropometry (ISAK) criteria. Variables included: weight and height, fat and muscle percentages, skinfolds (subscapular, tricipital, bicipital, ileocrestal, supraspinal, abdominal, medial thigh and medial leg), circumferences (relaxed arm, contracted arm, waist, abdominal, hip, medial thigh, calf), and bone diameters (humerus and femur) (see Table 1).

Table 1. Age and anthropometric data of the players

Variable	Mean ± SD
Age (years)	20.8 ± 4.2
Body mass (kg)	61.7 ± 8.2
Stature (cm)	165.6 ± 6.5
BMI ($kg \cdot m^{-2}$)	22.4 ± 2.1
Body fat (%)	29.6 ± 4.3
Skeletal muscle (%)	30.3 ± 1.9
Σ6 skinfolds (mm)	109.0 ± 27.1
Σ8 skinfolds (mm)	137.1 ± 35.0

Note. BMI = body mass index; Σ6/Σ8 = sum of 6/8 skinfolds.

Instruments

All assessments were conducted using simple, field-feasible equipment. The instruments used for the assessments included a high-definition iPhone camera mounted on a tripod for exercise recording, and Kinovea software for subsequent angle measurements. A plastic dowel was used for the Deep Squat and Hip-Hinge tests. A standard medical examination table was employed for the Thomas test, hip-extension assessments, and hip-rotation evaluations. The Copenhagen Adduction Test required the assistance of an experienced evaluator for proper limb support.

Procedure

Addressing this gap, the present study proposes a specific test battery for women's soccer aimed at detecting deficits that threaten performance and increase injury risk, and to provide reference data from a women's second-division team. All tests were performed in the university's laboratory during a single session conducted in the week before the season started.

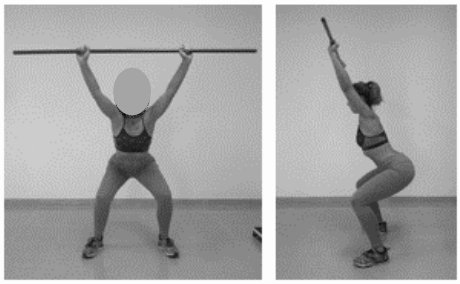
Warm-up.

The warm-up consisted of general joint mobility, 5 minutes of running at a moderate speed and the following bodyweight exercises: 10 squats including heel raises at the end of the movement, 10 pelvic anteversion-retroversion movements, 10 hip external-internal rotation movements in standing position, 10 single-leg deadlifts.

Global functional assessment

Deep Squat test (DS)

The FMS instructions (Cook et al., 2014) were used. Following the aforementioned protocol, the execution was scored from 0 to 3 points by observing the frontal and sagittal planes to evaluate the following aspects: alignment of the feet, knees, balanced weight distribution, position of the tibia with respect to the trunk, position of the femur with respect to the horizontal, plantar contact, maintenance of lumbar lordosis, and the position of the dowel over the head (see Figures 1A and 1B).



Figures 1A and 1B. Execution of the deep squat test in the frontal (1A) and sagittal (1B) planes.

Single-leg squat test (SLS)

The instructions for the test were: "stand in a single-leg position, flex the supporting limb as much as possible while maintaining balance and single-leg support, hold the position for one second and return to the initial position. You can use your arms to maintain balance." Two repetitions per leg were completed.

Following the aforementioned protocol, a score was assigned to the test performance from 1 to 10 points, based on the observation of the following variables in the frontal plane: arm strategy to maintain balance, trunk alignment, pelvic horizontality, neutral hip position of the supporting limb, knee position, and maintenance of single-leg balance (Herrington et al, 2013) (see Figure 2).

Figure 2. Execution of the single-leg squat test.

Hip-hinge with dowel test (HHD)

The instructions for the test were: "Stand upright while holding a dowel behind the back in contact with the sacrum, between the scapulae and behind the head. Perform a deep hip flexion with minimal knee flexion while holding the dowel in contact as explained". Two repetitions were completed. The ability to achieve a 90° degree of movement of the dowel relative to the femur in the sagittal plane while maintaining lumbar curvature and continuous three-point contact with the dowel was observed (Liebenson, 2003) (see Figure 3).

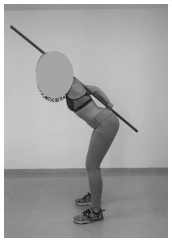


Figure 3. Execution of the hip-hinge with dowel test.

Copenhagen adduction test (CAT)

The instructions for performing the test were the same as in the study by Serner et al. (2014) (see Figure 4). The ability to perform a valid complete repetition for each limb was observed.

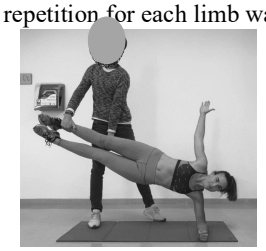


Figure 4. Execution of the Copenhagen adduction test.

Analytical functional evaluation

Thomas test (TT)

The instructions for performing the test were those proposed by Magee (2013). During the exercise, the maintenance of the neutral position of the lumbar spine was ensured. Two repetitions were completed with each leg. The angle formed between the femur and the horizontal, as well as the knee flexion angle between the femur and the tibia were measured using Kinovea software.

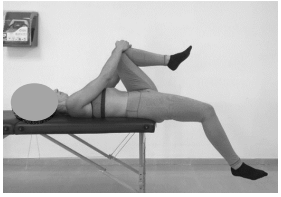
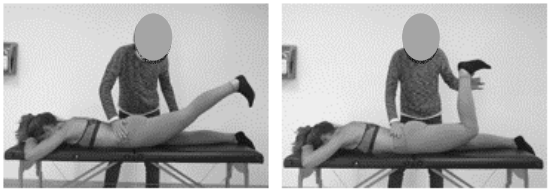


Figure 5. Execution of the Thomas test

Hip extension (with knee extension and knee flexion) (HEKE and HEKF)

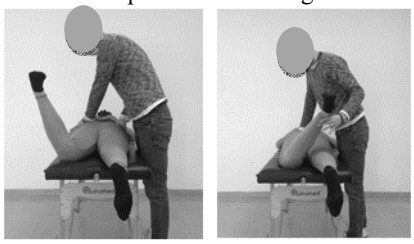
The instructions for the test were those proposed by Magee (2013). The test was performed in prone position, with both arms relaxed and hands resting under the forehead. No compensatory movements such as lumbar extension or pushing the stretcher with the arms were allowed during the action. The evaluator controlled the pelvis posteriorly to stabilize it during the test. The test was performed with the knee extended (see Figure 6A) and with the knee flexed (see Figure 6B), for each leg. The angle formed by the femur with respect to the stretcher was measured with Kinovea Software. Two repetitions of both tests were completed for each limb (Magee, 2013).



Figures 6A and 6B. Execution of the hip extension tests with the knee extended (6A) and with the knee flexed (6B).

Internal and external hip rotators (IHR and EHR)

The instructions for the test were those proposed by Magee (2013). The test was performed in prone position with both arms relaxed and hands resting under the forehead. The evaluator stabilized the pelvis at the posterior superior iliac spine. The landmarks used to measure the angle were the medial point of the ankle and patella, using the Kinovea software. Two tests were completed for each leg and each movement.



Figures 7A and 7B. Performance of the internal hip rotators (7A) and external hip rotators (7B) tests.

Results

As for the global functional assessment tests, in the DS test the players obtained a score out of 3 of 2.77 ± 0.66. For the SLS (DL) a score out of 10 of 9.27 ± 0.95 was obtained, being in the case of the SLS (NDL) 9.39 ± 0.91. Almost all participants successfully completed the HHD test, except for one player who lost control of the neutral pelvis during its performance. Almost all the players passed the CAT test for both legs, with the exception of one player who had knee discomfort during the test, and the test was interrupted.

In the analytical functional evaluation tests, in the hip flexor test, 2.9 ± 6.6 degrees were obtained in the TT (HDL) and 4.6 ± 5.8 degrees in the TT (NDL), with a bilateral difference of -1.7 degrees. In this same test, the results for knee range, in the TT (KDL) were 97.2 ± 6.1 and in the TT (KDNL) 103.2 ± 8.4, with a difference between legs of -6 degrees. In the case of the hip extension tests, the HEKE (DL) recorded 35.9 ± 7.0 degrees and the HEKE (NDL) 36.3 ± 9.5 degrees, obtaining a difference between legs of -0.4 degrees. The HEKF (DL) test recorded 28.3 ± 8.5 degrees and the HEKF (NDL) 30.9 ± 7.0 degrees, with a difference between limbs of -2.6 degrees. Finally, regarding hip rotator musculature, the EHR (DL) test obtained a result of 42.8 ± 7.2 degrees and the EHR (NDL) of 44.2 ± 8.0 degrees, with a difference between limbs of -1.4 degrees. On the other hand, in relation to the internal rotator muscles, the IHR (DL) recorded 38.3 ± 7.5 degrees and the IHR (NDL) 34.9 ± 9.0 degrees, showing a bilateral difference of 3.4 degrees.

Table 2. Global functional and analytical test results.

Global functional tests								
DS		**SLS**			**HHD**			
Score		DL	NDL		Adequate	Not Adequate		
2.77 ± 0.66		9.27 ± 0.95	9.39 ± 0.91		17	1		
Analytical Functional Tests								
CAT		**TT**			**HEKE**			
Adequate	Not Adequate	HDL	HNDL	*Dif.*	DL	NDL	*Dif.*	
17	1	2.9 ± 6.6	4.6 ± 5.8	-1.7	35.9 ± 7.0	36.3 ± 9.5	-0.4	
		KDL	KNDL	*Dif.*				
		97.2 ± 6.1	103.2 ± 8.4	-6				
HEKF			**EHR**			**IHR**		
DL	NDL	*Dif.*	DL	NDL	*Dif.*	DL	NDL	*Dif.*
28.3 ± 8.5	30.9 ± 7.0	-2.6	42.8 ± 7.2	44.2 ± 8.0	-1.4	38.3 ± 7.5	34.9 ± 9.0	3.4

Note. DS: deep squat; SLS: single-leg squat; HHD: hip-hinge with dowel test, CAT: Copenhagen adduction test, TT: Thomas test; HEKE: hip extension with knee extended; HEKF: hip extension with knee flexed; EHR: external hip rotators; IHR: internal hip rotators; DL: dominant limb; NDL: non-dominant limb; HDL: hip dominant limb; HNDL: hip non-dominant dominant limb; KDL: knee dominant limb; KNDL: knee non-dominant limb; Dif: bilateral difference.

Discussion

Traditionally, it has been considered highly relevant that professionals in their activity use different movement tests to evaluate the condition of their athletes for performance and injury prevention. In contrast to isolated tests of range of motion and muscle-activation tests (Magee, 2013), new proposals arise based on a global concept of movement, suggesting a comprehensive assessment of kinetic chains (Ugalde et al., 2015), which provide the qualitative assessment of movement, in addition to the quantitative one. For this reason, this research was designed to address this need and organize the battery into two types of analysis: global functional assessment and analytical functional assessment.

Not only are values provided that address the quantity of range of motion, but also the quality of movements is analyzed, according to certain indicators provided in the different test protocols selected. In addition, the tool must be simple, fast, and economical to apply. Along these lines, evaluation proposals arise through tools such as the FMS or those designed by Herrington et al (2013), with the main objective of assessing how athletes move, as opposed to the classic evaluation reduced to quantitative tests. In fact, the use of the FMS emerges as a test battery proposal that integrates different movement patterns, involving several structures at the same time, representing an integrative concept of movement. In this sense, Chorba et al (2010) have analyzed the FMS tool to identify female soccer players at risk of injury and observed that there is a relationship between poor test performance and the occurrence of injury, so they argue for the inclusion of these tests as a tool for functional movement analysis in women's soccer (Bardenett et al., 2015). Beyond single studies, contemporary syntheses and guidance endorse neuromuscular, field-feasible prevention focusing on landing mechanics, trunk control, and lower-limb strength—an approach that underscores the value of targeted movement assessment to inform program content (Vlachas & Paraskevopoulos, 2022; Arundale et al., 2023).

Among the FMS tests, the DS was selected, as the squat is a necessary movement in most sporting gestures, being necessary for most power and lifting movements involving the lower extremities. The DS is a test that challenges total body mechanics when performed correctly. It is used to assess bilateral, symmetrical and functional mobility of the hips, knees and ankles. Holding the dowel overhead assesses bilateral and symmetrical mobility of the shoulders as well as the thoracic spine (Cook et al, 2014). Therefore, it is a test that reflects motor control, strength, balance, flexibility and symmetry, as well as being a typical sport skill. In addition, the result in the execution in the DS, seems to predict the performance in the rest of the FMS battery (Clifton et al., 2015). All these reasons explain the inclusion of the DS, according to the FMS protocol, in the present functional test battery. It is worth noting the good results obtained in this test in the present study (2.77 ± 0.66), compared to other studies such as that of Marques et al (2017) (1.55 ± 0.59). The authors attribute the poor performance in this test to the maturational factor, considering that it contributes to a deficient stabilization. Nevertheless, as the predictive value of FMS for injuries remains debated, FMS scores should be interpreted as a screening aid rather than a diagnostic endpoint, and paired with convergent measures.

In line with the properties of the bipodal squat, the SLS has been widely used in both scientific and professional settings. It is an optimal and simple-to-apply tool for assessing the potential risk of lower-limb injury. A poor result in this test suggests poor lower limb mechanics, weakness in the core musculature or hip abductors (Ugalde et al., 2015). Herrington et al (2013) propose a qualitative tool to assess performance on this test, which has been included in the battery. In the recent review by Crossley et al. (2020) they conclude that neuromuscular control work in single-leg loading tasks is one of the most used strategies in preventive programs. In addition, this study suggests that future research should consider sport specificity, and in the case of soccer, neuromuscular control in lower limb alignment is important in actions such as running, changes of direction or landings.

The HHD test helps to prevent injuries in the lumbar area, since it evaluates the relationship between hamstring and lumbar extension (Liebenson, 2003). When the extensibility of the hamstrings is limited during sports actions, it can have repercussions in an increase of lumbar flexion, overloading this area, putting the player at risk of suffering a lumbar injury. Maintaining three-point contact and a neutral spine during hip-hinge tasks reduces lumbar loading and provides a practical, qualitative screen of lumbopelvic control (Michaud et al., 2021). As for the inclusion of the CAT, an exercise of a dynamic nature that includes concentric and eccentric activation of the adductor, it is appropriate in soccer since a good function of the muscle-tendon structures is required in the most important technical actions of this sport, such as changes of direction or kicks. Specifically, the eccentric activation phase of the adductor longus is important in prevention since it represents the moment in which the muscle is most prone to injury. In addition, this exercise has been shown to require a high strength demand compared to other adductor-type exercises (Serner et al., 2014). Moreover, the Adductor Strengthening Program centered on the Copenhagen exercise reduced the prevalence of groin problems by ~41% in a cluster-randomized trial in men's football, supporting the adductor-focused rationale; female-specific preventive trials are warranted (Harøy et al., 2019). To our knowledge, incorporation of the CAT as a screening element in women's soccer remains uncommon, which adds applied value to our battery.

Regarding analytical tests aimed at assessing the lower limb, it has been observed that the restricted extensibility of the hip flexors manifested in hip extension represents a risk factor for injury, and therefore has to be included in preventive assessments, as well as the relationship between gluteal and ischiosural activation, or

gluteal and hip flexors. This justifies the inclusion of the Thomas test and hip extension tests with/without knee flexion. Mills et al. (2015) analyzed the Thomas test in female soccer players and assumed restricted range of motion from femur positioning at or above horizontal. Under this criterion, in the present study the mean indicates an optimal result of the players, obtaining results of 2.9 ± 6.6 and 4.6 ± 5.8 degrees below the horizontal, in the dominant and non-dominant limb respectively. Mills et al., (2015) observed that those athletes with restricted hip extension in the Thomas test, presented lower gluteal activation. This suggests a risk for ACL injury and hamstring musculature. Therefore, if these deficits are detected one can tailor the exercise prescription for gluteal strengthening and increase hip extension range of motion, (Reiman et al., 2012) which could reduce the inhibitory effect of hip flexor shortening on gluteal neuromuscular control (Mills et al., 2015).

In soccer, hip rotators are important, having been observed that players with greater strength and range of motion in external rotation presented greater control in changes of direction and frontal plane landing tasks (Malloy et al., 2016). Furthermore, the assessment of this musculature has been recommended for the prevention of ACL injury (Khayambashi et al., 2016), so common in women's soccer.

In the present study, we present the descriptive characteristics of the body composition of female players, as we highlight the importance of monitoring and intervention of these variables. Collings et al. (2021) pointed out several injury risk factors, and among them, BMI as a contributor to increased injury incidence in female players. In addition, it appears that taller players suffer more injuries to the dominant leg (Faude et al., 2005). The BMI obtained (22.4) is similar to studies with similar samples (23.1) (Gil and Verdoy, 2011), indicating a normal weight.

For the selection of tests, some requirements were taken into account, such as operability and maximum transferability to professional realities. Therefore, although the variety of tests available in the literature is immense, priority has been given to the inclusion of key factors in the sport of soccer, while taking into account the limited time a trainer or physical trainer has to dedicate to the individual evaluation of their players. In addition, with the intention that a greater number of professionals can apply this method, we have resorted to tests that do not require sophisticated, expensive equipment or that do not require a great deal of experience to administer. This is an aspect that overcomes the limitations often present in the professional reality (Cassiolato et al., 2020).

Movement limitations and compensatory movements may be due to different reasons such as muscle shortening, muscle weakness or poor neuromuscular patterns. The detection of the origin of the movement limitation is a complex task; however, these tests are intended to alert professionals for further in-depth evaluation. This battery of tests is proposed as a first filter, which can be applied quickly and easily, and once athletes at risk have been detected, it would be necessary to proceed with a more detailed analysis in each case. Therefore, it is important to interpret the test results with caution. Bardenett et al (2015) emphasize that the FMS should not be used as a diagnostic tool, but to detect a movement impairment that requires further analysis, including comparison with the rest of the tests. Therefore, a correlative study of the different tests of the battery could be useful to establish relationships between tests and facilitate the diagnosis of the underlying cause of the problem. This research objective will be addressed in future studies.

The novel contribution of this study consists of providing a reference tool for women's soccer professionals, since, to the best of our knowledge, the scientific evidence published to date does not include which functional tests are appropriate for improving performance and preventing injuries in women's soccer, key objectives taking into account the exponential growth of this sport and the high incidence of lower-limb injuries. Moreover, by clearly linking the screening domains to key evidence-based preventive factors (e.g., trunk control and lower-limb strength), this work supports individualized prescription and monitoring. In addition, another relevant contribution is the description of reference values related to functional evaluations in female soccer players.

Strengths and limitations

This study provides a sport-specific functional screening battery for female second-division soccer players and presents preliminary reference values under standardized anthropometric procedures (GREC–FEMEDE, ISAK), offering immediate field applicability. However, the single-club, small sample (n = 18) limits generalizability; the cross-sectional design precludes causal inference and predictive validity for injuries; and the lack of stratification by playing position, prior injury, and exposure (training/match minutes) may confound comparisons. Some tests involve qualitative judgments that can introduce rater-dependent variability in the absence of video-based scoring criteria and reported inter-rater reliability. Future work should establish test–retest/inter-rater reliability, define minimal detectable change, and prospectively link screening scores to injury incidence to determine meaningful cut-offs.

Conclusions

This women's-soccer-oriented test battery appears to be an appropriate, field-feasible tool for performance enhancement and injury-risk appraisal. Its design is grounded in the literature, time-efficient, and transferable to varied contexts, and it implements a global, interrelated movement perspective. In line with current evidence in women's soccer, the proposed battery targets key modifiable domains linked to performance

and injury risk, such as lower-limb alignment and knee valgus control (deep squat and single-leg squat), lumbopelvic stability during hip-hinge tasks (hip-hinge with dowel), and adductor function under dynamic loading (Copenhagen adduction test). Complementary analytical assessments of hip flexors, extensors, and rotators further address range-of-motion and muscle function deficits that have been associated with altered movement patterns and increased injury susceptibility.

At an empirical level, the present study shows that this cohort of semi-professional players achieved generally favorable scores in global functional tests (deep squat, single-leg squat, hip-hinge with dowel, and Copenhagen adduction), with minimal bilateral differences in analytical measures of hip flexors, extensors and rotators. These findings suggest that, under systematic training and supervision, female players can attain balanced movement profiles across key domains linked to performance and injury risk. A key contribution of this work is to provide a practical, women's-soccer-specific screening tool in a context that has been much less studied than men's football, despite the high incidence and burden of lower-limb injuries reported in female players. Moreover, the descriptive values reported here can serve as preliminary benchmarks for practitioners. The results obtained from applying this battery can inform individualized neuromuscular and strength prescriptions, support longitudinal monitoring to track adaptation and guide load progressions, and help identify outliers or asymmetries that may warrant closer observation or targeted intervention. Future studies should establish reliability metrics, examine predictive validity for injury outcomes, and define position- and age-specific cut-offs to optimize decision-making.

Use of Generative AI Statement

During the preparation of this work, the authors used ChatGPT 5.1 (OpenAI) in order to support minor linguistic editing and refinement of the English language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Conflicts of Interest The authors declare that they have no conflicts of interest related to the conduct, analysis, or reporting of this study.

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