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# The Relationship Between Ankle Range of Motion and Jump and Agility Performance in Adolescent Basketball Players

*Adolesan Basketbol Oyuncularında Ayak Bileği Hareket Açıklığı ile Sıçrama ve Çeviklik Performansı Arasındaki İlişki*

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**Abstract:** The ankle joint, which plays a key role in both sagittal and frontal plane movements, contributes substantially to force production during jumping and directional changes in basketball. Limited ankle mobility has been associated with altered biomechanics, reduced performance, and increased injury risk. However, little is known about the combined role of dorsiflexion, plantar flexion, inversion, and eversion range of motion (ROM) on basketball-specific performance indicators in youth athletes. Therefore, this study investigated the relationship between ankle ROM and jump and agility performance in adolescent female basketball players. A total of 51 adolescent female basketball players (aged 12–18 years) who regularly participated in training and competition volunteered for this correlational study. Measurements were conducted across three sessions, including passive ankle ROM (dorsiflexion, plantar flexion, inversion, eversion), countermovement jump (CMJ), drop jump (DJ), and Lane Agility Test. Pearson correlation coefficients were calculated to examine associations between ankle ROM and performance outcomes. The results revealed significant negative correlations in the dominant limb between inversion ROM and CMJ performance (CMJmean: r=–0.343, p=0.014; CMJmax: r=–0.333, p=0.017), as well as between eversion and agility (r=–0.277, p=0.049) and plantar flexion and agility (r=–0.295, p=0.036). No significant relationships were observed for dorsiflexion ROM or for non-dominant side measures. These findings suggest that ankle ROM, particularly in the frontal plane, is associated with explosive and agility-related performance in adolescent basketball players. Coaches and practitioners should consider monitoring ankle mobility to optimize performance and reduce injury risk.

**Keywords:** Basketball, jumping, agility, plantar flexion, dorsiflexion, inversion, eversion.

***Özet:*** *Hem sagital hem de frontal düzlem hareketlerinde kritik bir rol üstlenen ayak bileği eklemi, basketbolda sıçrama ve yön değiştirme sırasında kuvvet üretimine önemli ölçüde katkı sağlar. Sınırlı ayak bileği hareketliliğinin, değişmiş biyomekanik bileşenlere, performans düşüklüğüne ve artmış yaralanma riskine yol açabileceği bilinmektedir. Bununla birlikte, dorsifleksiyon, plantar fleksiyon, inversiyon ve eversiyon hareket açıklığının (EHA) birlikte basketbola özgü performans göstergeleri üzerindeki etkisi yeterince araştırılmamıştır. Dolayısıyla bu çalışma, adolesan kız basketbol oyuncularında ayak bileği EHA ile sıçrama ve çeviklik performansı arasındaki ilişkiyi incelemiştir. Bu korelasyonel çalışmaya, düzenli olarak antrenman ve müsabakalara katılan 12–18 yaş aralığında toplam 51 adolesan kız basketbol oyuncusu gönüllü olarak katılmıştır. Ölçümler üç oturumda gerçekleştirilmiştir: pasif ayak bileği EHA (dorsifleksiyon, plantar fleksiyon, inversiyon, eversiyon), countermovement sıçrama (CMJ), drop sıçrama (DJ) ve Lane Çeviklik Testi değerlendirilmiştir. Ayak bileği EHA ile performans değişkenleri arasındaki ilişkiler Pearson korelasyon testi ile incelenmiştir. Bulgular, baskın tarafta inversiyon EHA ile CMJ performansı (CMJmean: r=–0.343, p=0.014; CMJmax: r=–0.333, p=0.017) arasında, ayrıca eversiyon EHA ile çeviklik (r=–0.277, p=0.049) ve plantar fleksiyon EHA ile çeviklik (r=–0.295, p=0.036) arasında anlamlı negatif ilişkiler olduğunu göstermiştir. Dorsifleksiyon EHA veya baskın olmayan taraf ölçümleriyle anlamlı bir ilişki bulunmamıştır. Bu bulgular, özellikle frontal düzlem hareketlerindeki ayak bileği EHA'sının adolesan basketbol oyuncularında patlayıcı güç ve çeviklik performansı ile ilişkili olduğunu göstermektedir. Antrenörler ve uygulayıcılar, performansı artırmak ve yaralanma riskini azaltmak için ayak bileği hareketliliğini takip etmelidir.*

***Anahtar Kelimeler:*** *Basketbol, sıçrama, çeviklik, plantar fleksiyon, dorsifleksiyon, inversiyon, eversiyon.*

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## INTRODUCTION

Basketball games involve high-intensity activities such as repeated jumping, sprinting, and full-speed cutting, and are characterized by actions that cause excessive stress on the joints, such as change-of-direction, explosive accelerations, or sudden stops (Begly et al., 2018; Morse et al., 2017). In team sports, players change activities 500 to 3000 times during a match, or every 2-4 seconds, through changes of direction and basketball players perform lateral movements most frequently (up to 450 per game) and jump 42-56 times per game (Taylor et al., 2015, 2017). Additionally, during the game, basketball players perform numerous movements such as shuffling in the frontal plane (Matthew & Delextrat, 2009; Taylor et al., 2017). Long-term athlete development is based on high-level performance, and during this process, coaches should monitor the growth and development of athletes who participate in regular training, as well as certain physical and athletic components (Cengizel et al., 2024). On the other hand, adolescent athletes are at a critical stage of growth and development where the growth rates of bones, muscles, and the nervous system may not be synchronized, and this growth imbalance can lead to differences in strength and motor coordination development between different limbs in adolescent athletes (Ding et al., 2024). This can increase the risk of injury during the adolescent period, along with athletic and physical development (Costa e Silva et al., 2022; Parry et al., 2024).

The ankle is a region where many joints and muscles interact dynamically (Usgu et al., 2023) and is a joint complex whose primary functions are to provide dorsiflexion and plantar flexion of the foot (Adillón et al., 2022). Ankle ROM, which is important in the kinetic chain, can affect joint mobility and consequently the mechanical properties of soft tissue, and can alter athletic performance (Usgu et al., 2023). The kinetic energy generated during the jump ultimately passes through the ankle joint, where plantar flexion contributes approximately 22-23% of the take-off velocity (Hubley & Wells, 1983). On the other hand, restriction of ankle movements leads to undesired alignments and loads in the knee, hip, and even upper body segments (Macrum et al., 2012). Ankle ROM assessment is a procedure commonly used to determine the risk of injury in sports, and limited ankle ROM is associated with potential injury risk factors (Cerrillo-Sanchis et al., 2024; Francia et al., 2023). Additionally, the ankle ligaments and joint capsule are susceptible to injuries and structural alterations during training and competition (Francia et al., 2023).

The demands specific to basketball, which involves high-intensity, multi-directional movements, create significant stress on the ankle joint (Fernández-Galván et al., 2025). The ankle plantar flexor muscle group is the final point of force production in CMJ movements and is crucial for

propelling the body upward during the jump and applying significant force to reach maximum height (Ding et al., 2024). On the other hand, limited dorsiflexion ROM and reduced change-of-direction ability can cause injury by impairing movement efficiency (Fernández-Galván et al., 2025). Furthermore, reduced ankle dorsiflexion ROM limits sprint and jump performance in young athletes (Cerrillo-Sanchis et al., 2024). However, the mechanics of lateral ankle sprains are associated with excessive plantar flexion and inversion while moving or landing from a jump (Mattiussi et al., 2024). While plantar flexion and dorsiflexion at the ankle occur in the sagittal plane, inversion and eversion are executed in the frontal plane. Jumping primarily involves sagittal plane motion at the ankle joint, whereas basketball-specific actions such as shuffling and change of direction are predominantly performed in the frontal plane (Domínguez-Díez et al., 2021). Matthew and Delextrat (2009) reported that basketball players perform more goal-directed movements in the frontal plane (shuffling) than in the sagittal plane (running and jumping).

The most commonly injured location in basketball is the ankle joint, and ankle sprains account for 76.7% of all injuries (Padua et al., 2019). The most frequently injured body part among NBA basketball players is the lower extremity, accounting for 40.7% to 62.4% of injuries (Altıntaş & Cengizel, 2025; Drakos et al., 2010), with lateral ankle sprains (n=1658; 13.2%) being the most common orthopedic injury (Drakos et al., 2010). These injuries can cause significant morbidity, persistent symptoms, and functional instability, highlighting the importance of ankle sprains for basketball players (Shah et al., 2023). Another study found that ankle sprains and anterior cruciate ligament ruptures are frequently encountered in two types of basketball-related injuries, and it was noted that these injuries were observed at a higher rate in female basketball players (Taylor et al., 2015). A study observing basketball players for one season shows that low ankle dorsiflexion is also a risk factor for patellar tendinopathy (Backman & Danielson, 2011). In NBA G-League basketball players, a diminished difference between inversion and eversion has been associated with an increased risk of ankle injuries (Shah et al., 2023). In previous research, investigations on ankle joint ROM have most frequently addressed dorsiflexion (Adillón et al., 2022; Almansoof et al., 2023; Cerrillo-Sanchis et al., 2024; Fernández-Galván et al., 2025; Macrum et al., 2012; Mattiussi et al., 2024; Roso-Moliner et al., 2023; Theoharopoulos & Tsitskaris, 2000; Usgu et al., 2023), with plantar flexion being the next most commonly studied movement (Francia et al., 2023; Theoharopoulos & Tsitskaris, 2000). To the best of the authors' knowledge, there is no previous study that has simultaneously investigated four-directional ankle ROM (dorsiflexion, plantar flexion, inversion, eversion) together with jump and agility performance in adolescent basketball players. Addressing this gap is expected to contribute to early performance enhancement and injury prevention strategies. Accordingly, the present study aimed to investigate the relationship between ankle ROM and jump and agility performance in adolescent female basketball players. It was hypothesized that significant associations would be observed between ankle ROM measures and both jump and agility performance.

## METHODS

**Research Model:** This study was designed using a correlational research model. No experimental intervention was applied within the scope of the study; only the relationships between existing performance variables were analyzed. Assessments were conducted over three separate sessions: ankle ROM was measured on the first day, jump performance on the second day, and agility performance on the third day. This protocol was adopted to minimize potential interaction effects between tests and to ensure the collection of reliable data.

**Purpose of the Research:** The aim of the present study was to examine the relationship between ankle ROM and jump and agility in adolescent female basketball players.

**Research Group:** A total of 51 adolescent female basketball players from different age categories, who were actively engaged in training and official competition within the same club, voluntarily participated in this study (Table 1). Prior to participation, the study protocol was explained to the parents of all players, and written informed consent was obtained. The inclusion criteria required participants to be female basketball players aged between 12 and 18 years, with a minimum of two years of consistent training experience and active involvement in competitions. Exclusion criteria included sustaining a musculoskeletal injury within the previous six months, the use of ankle bandages or external supports, and the inability to fully complete the testing protocol. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approval from the Local Ethics Committee (Research Code: 2023-898).

**Table 1.** Characteristics of participants

| | mean±*SD* [95% CI] |
|---|---|
| Age (year) | 14.4±2.3 [13.8-15.0] |
| AoE (year) | 6.5±1.5 [6.1-6.9] |
| Body height (cm) | 166.5±6.5 [164.7-168.3] |
| Body mass (kg) | 58.7±9.7 [56.0-61.4] |
| BMI ($kg.m^{-2}$) | 21.0±2.0 [20.4-21.6] |

Data are presented as mean±standard deviation (*SD*) and 95% confidence interval [CI]. AoE: Age of experience, BMI: Body mass index.

**Data Collection:** The measurements were completed over three days with 24-hour intervals (Figure 1). In the first session, participants' body height, body weight, and leg length were recorded, followed by the ankle ROM protocol and subsequently the familiarization of the jumping and agility tests. Passive ROM values for both limbs were assessed using the GYKO Inertial System (Microgate, Bolzano, Italy). The device was placed on the dorsal aspect of the ankle. Participants' take-off leg, defined as the leg preferred during single-leg jumping, was classified as the dominant limb (Schiltz et al., 2009) and was evaluated separately as dominant and non-dominant. Ankle ROM was assessed in the following sequence: plantar flexion, dorsiflexion, inversion, and eversion, with the ankle kept in a neutral position before each measurement. One trial was performed for each movement, and the data were recorded in degrees. In the second session, participants performed a 15-minute warm-up (including dynamic and static stretching as well as a self-selected routine), followed by jump performance assessments (CMJ and DJ) using the Optojump system (Microgate, Bolzano, Italy). The jumping protocol consisted of CMJ first, followed by DJ from a 30 cm box. Each jump was performed three times with a rest interval of 120 seconds between trials. Jump heights were evaluated in centimeters as the mean of the three trials ($CMJ_{mean}$ and $DJ_{mean}$) and as the best trial ($CMJ_{max}$ and $DJ_{max}$). In the third session, participants' agility performance was assessed using

the Lane Agility Test. After a standardized 15-minute warm-up, agility times were measured using the Newtest Powertimer photocells (Newtest Oy, Oulu, Finland). Each participant performed three trials, with a rest interval of 120 seconds between attempts, and the best time was recorded in seconds.

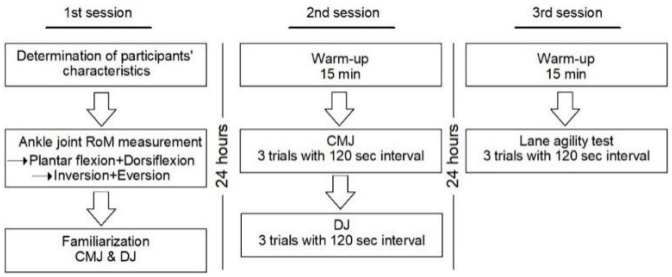



**Figure 1.** Study design

**Analysis of Data:** The Shapiro–Wilk test was used to assess the normality of the data distribution. Descriptive statistics were calculated as means, standard deviations, and 95% confidence intervals for all variables. Pearson's correlation test was employed to determine the relationships between ankle ROM and jump and agility performance. Correlations were classified as "small" 0–0.3, "moderate" 0.31–0.49, "large" 0.5.–0.69, "very large" 0.7–0.89, "nearly perfect" 0.9–1 (Hopkins et al., 2009). Data were analyzed using SigmaPlot 11.0 software (from Systat Software, Inc., San Jose, CA, USA). The level of significance was set at 0.05.

## RESULTS

The data on the ankle ROM, CMJ, DJ, and agility performance of adolescent basketball players are presented in Table 2.

**Table 2.** ROM in the ankle joints of adolescent basketball players

| *Ankle ROM* | Dominant | Non-dominant |
|---|---|---|
| | mean±*SD* [95% CI] | mean±*SD* [95% CI] |
| Plantar flexion (°) | 60.1±11.9 [56.8-63.4] | 60.6±11.1 [57.5-63.7] |
| Dorsiflexion (°) | 22.8±7.4 [20.7-24.9] | 24.4±8.4 [22.0-26.8] |
| Inversion (°) | 47.1±12.1 [43.7-50.5] | 47.1±12.4 [43.6-50.6] |
| Eversion (°) | 27.1±7.7 [24.9-29.3] | 27.3±7.5 [25.2-29.4] |
| *Jump and Agility* | mean±*SD* [95% CI] | |
| $CMJ_{mean}$ (cm) | 24.7±4.8 [23.4-26.1] | |
| $CMJ_{max}$ (cm) | 25.6±4.9 [24.2-27.0] | |
| $DJ_{mean}$ (cm) | 25.5±4.2 [24.3-26.7] | |
| $DJ_{max}$ (cm) | 26.6±4.4 [25.4-27.8] | |
| Agility (sec) | 13.6±0.8 [13.4-13.8] | |

Data are presented as mean±standard deviation (*SD*) and 95% confidence interval [CI]. CMJ: Countermovement jump, DJ: Drop jump.

Among adolescent basketball players, dominant-side ankle inversion ROM demonstrated significant moderate negative correlations with $CMJ_{mean}$ (r=–0.343, p=0.014) and $CMJ_{max}$ (r=–0.333, p=0.017). Additionally, significant small negative correlations were identified between eversion ROM and agility (r=–0.277, p=0.049), as well as between plantar flexion ROM and agility (r=–0.295, p=0.036) (Figure 2a). No significant associations were found between dominant-side dorsiflexion ROM and either jump or agility performance (p>0.05).

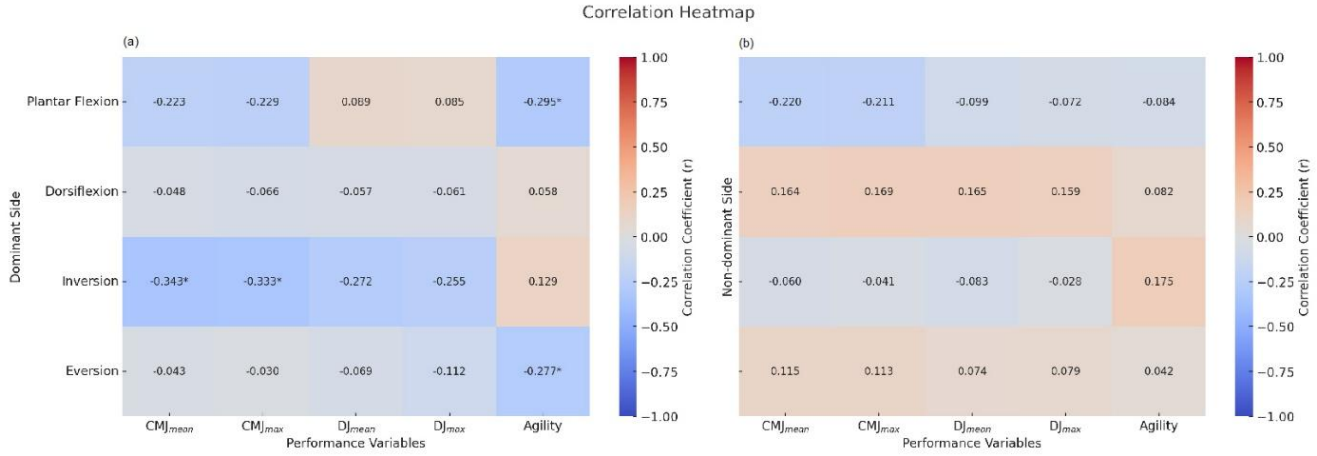



**Figure 2.** Relationships between dominant-side (a) and non-dominant-side (b) ankle joint ROM and jump and agility performance in adolescent basketball players

In adolescent basketball players, non-dominant-side ankle joint ROM variables showed no significant associations with either jump or agility performance ($p>0.05$) (Figure 2b).

## DISCUSSION

The present study examined the relationship between ankle ROM and performance outcomes in adolescent female basketball players. The key findings demonstrated that greater plantar flexion and eversion ROM of the dominant limb were associated with shorter agility times, while increased inversion ROM was negatively correlated with CMJ performance. These results highlight the dual role of ankle mobility, where certain ranges may enhance sport-specific tasks, while others may hinder performance efficiency. The results confirmed the study hypothesis.

The observation that plantar flexion and eversion ROM were beneficial for agility suggests that frontal and sagittal plane mobility of the ankle allows players to perform more efficient cutting, pivoting, and rapid directional changes. Increased mobility in these planes may facilitate quicker foot repositioning and improve push-off mechanics during agility drills (Amiri-Khorasani et al., 2010; Rouissi et al., 2016). This is particularly relevant for basketball, where rapid decelerations and re-accelerations are frequent performance demands. An adequate ankle joint ROM is essential for the optimal execution of sport techniques and, in turn, for maximizing athletic performance (Panoutsakopoulos et al., 2021). Although our results demonstrated a negative correlation between plantar flexion and eversion ROM with agility time, indicating improved performance, to the best of our knowledge, no previous study has directly examined this specific relationship.

In contrast, the negative correlation between inversion ROM and CMJ height suggests that excessive frontal plane mobility may compromise joint stability during vertical force production. Previous studies have linked increased inversion range to mechanical instability and higher risk of ankle sprains, which could reduce jump efficiency (Kaminski et al., 2013; Shah et al., 2023). Thus, while some ankle mobility may support agility tasks, too much frontal plane mobility might undermine vertical jumping capacity.

Interestingly, dorsiflexion ROM did not show significant associations with either agility or jump performance. While prior research has emphasized dorsiflexion as a determinant of landing mechanics and sprinting (Cerrillo-Sanchis et al., 2024; Howe et al., 2019), its lack of association in the present study may reflect the developmental stage of adolescent athletes. Growth-related neuromuscular adaptations and compensatory strategies from proximal joints (hip and knee) may have mitigated the role of isolated dorsiflexion in this population (Panoutsakopoulos et al., 2022).

The absence of significant relationships on the non-dominant side underlines the functional asymmetry in basketball, where the dominant limb is more frequently engaged in explosive and agility-related tasks (Ding et al., 2024; Gonzalo-Skok et al., 2015). This suggests that training and monitoring should emphasize dominant-side mobility, particularly in the frontal and sagittal planes, as they appear more directly linked to basketball-specific performance.

This study has several limitations that should be acknowledged. First, the cross-sectional design does not allow causal inferences between ankle ROM and performance variables. Second, only adolescent female basketball players recruited from a single club and training context were included, which may have introduced training-related and selection biases and limits the generalizability of the findings to male athletes or players from different competitive levels. Third, the study employed passive ROM measurements, which may not fully reflect dynamic joint behavior during sport-specific tasks. Additionally, neuromuscular factors such as strength, proprioception, or movement technique were not assessed and could have influenced the observed relationships. Future research should include longitudinal and intervention-based designs, incorporate both genders, and evaluate complementary biomechanical and neuromuscular parameters to better understand the role of ankle mobility in basketball performance.

### Conclusions

In summary, this study demonstrated that dominant-limb ankle inversion ROM was negatively associated with jump performance, whereas plantar flexion and eversion ROM were negatively associated with agility time (i.e., better agility) in adolescent female basketball players. Dorsiflexion and non-dominant side measures showed no significant relationships. These findings emphasize the functional relevance of frontal plane ankle mobility in basketball and suggest that coaches and practitioners should systematically evaluate ankle ROM to tailor preventive and performance-enhancing training interventions. Early screening and targeted mobility or stability programs may support both athletic development and injury risk management strategies in youth basketball.

***Ethics Statement:*** *In the present article, the ethical rules of the journal were followed in the research process in the current article. The responsibility for any violations that may arise regarding the article belongs to the author. The approval of Gazi University Ethics Committee dated 11.07.2023 and numbered E-77082166-604.01.02-706370 was obtained.*

***Conflict of Interest:*** *There is no personal or financial conflict of interest between the authors in the present study.*

***Author Contribution Rate:*** *In the present study, the contribution rates of all authors are equal.*

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## GENİŞLETİLMİŞ ÖZET

### Çalışmanın Amacı

Basketbol, çok yönlü hareketlerin ve tekrar eden sıçrama ile yön değiştirme eylemlerinin yoğun olarak sergilendiği bir spordur. Özellikle alt ekstremite eklemleri bu yüksek taleplerden doğrudan etkilenmektedir. Ayak bileği eklem hareket açıklığı (EHA), hem sagittal (dorsifleksiyon, plantar fleksiyon) hem de frontal düzlemdeki (inversiyon, eversiyon) hareketlerde performansı ve yaralanma riskini etkileyebilecek kritik bir faktördür. Literatürde dorsifleksiyonun sprint, sıçrama ve iniş mekaniğiyle olan ilişkisi sıkça incelenmiş olsa da, dört yönlü EHA'nın (dorsifleksiyon, plantar fleksiyon, inversiyon, eversiyon) basketbola özgü performans parametreleriyle birlikte değerlendirilmesi oldukça sınırlıdır. Bu nedenle bu araştırmada, adolesan kız basketbol oyuncularında ayak bileği EHA ile sıçrama (countermovement jump, CMJ; drop jump, DJ) ve çeviklik (Lane agility testi) performansı arasındaki ilişkilerin incelenmesi amaçlanmıştır.

### Araştırma Problemleri

1. Adolesan kız basketbol oyuncularında ayak bileği dorsifleksiyon, plantar fleksiyon, inversiyon ve eversiyon EHA'sı ile sıçrama performansı arasında anlamlı ilişkiler var mıdır?

2. Adolesan kız basketbol oyuncularında ayak bileği EHA'sı ile çeviklik performansı arasında anlamlı ilişkiler var mıdır?

### Literatür Araştırması

Mevcut araştırmalar, sınırlı ayak bileği hareketliliğinin değişmiş biyomekanik paternlere, performans düşüklüğüne ve artmış yaralanma riskine yol açtığını göstermektedir. Dorsifleksiyon yetersizliği sprint ve sıçrama performansını sınırlayabilmekte, iniş mekaniğini bozarak patellar tendinopati veya ayak bileği burkulması gibi yaralanma risklerini artırabilmektedir. Öte yandan plantar fleksiyon ve eversiyon gibi hareketler, özellikle çeviklik ve hızlı yön değiştirme sırasında ayağın yeniden konumlanmasına katkı sağlayabilmektedir. Ancak literatürde adolesan basketbol oyuncularında plantar fleksiyon, dorsifleksiyon, inversiyon ve eversiyonun aynı katılımcı grubunda ve tek bir araştırmada sıçrama ve çeviklik ile ilişkisinin incelendiği çalışmaya rastlanmamıştır. Basketbol performansı özelinde ise, oyuncuların maç boyunca defalarca sıçrama, ani hızlanma, durma ve yön değiştirme gibi hareketleri yüksek yoğunlukta tekrarlamaları gerekmektedir. Bu nedenle ayak bileği eklem hareketliliği, hem patlayıcı güç gerektiren sıçramalarda hem de oyun içi çeviklik taleplerinde belirleyici bir rol oynayabilir. Bu bağlamda mevcut araştırma, literatürdeki boşluğu doldurmayı hedeflemektedir.

### Yöntem

Bu çalışma ilişkisel tarama modeliyle tasarlanmış olup deneysel bir müdahale yapılmamıştır. Araştırmaya 12–18 yaş aralığında, düzenli antrenman ve müsabakalara katılan 51 adolesan kız basketbolcu gönüllü olarak dahil edilmiştir. Ölçümler üç ayrı günde yapılmıştır. İlk gün, katılımcıların antropometrik ölçümleri (boy, ağırlık, bacak uzunluğu) ve pasif ayak bileği EHA değerlendirmeleri yapılmıştır. Dorsifleksiyon, plantar fleksiyon, inversiyon ve eversiyon açıları GYKO Inertial System kullanılarak ölçülmüştür. Ardından sıçrama ve çeviklik familarizasyonu gerçekleştirilmiştir. İkinci seansta, ısınma protokolü ardından countermovement sıçrama (CMJ) ve drop sıçrama

(DJ) performansları Optojump sistemi ile ölçülmüştür. Üçüncü seansta, Lane agility testi Newtest Powertimer fotosel sistemiyle kaydedilmiştir. İstatistiksel analizlerde Pearson korelasyon testi kullanılmış, anlamlılık düzeyi $p<0.05$ olarak belirlenmiştir.

**Sonuç ve Değerlendirme**

Bu çalışma, adolesan kız basketbol oyuncularında ayak bileği EHA ile sıçrama ve çeviklik performansı arasındaki ilişkileri ortaya koymuştur. Bulgular, baskın tarafta inversiyon EHA artışının CMJ performansını olumsuz etkilediğini, buna karşın plantar fleksiyon ve eversiyon EHA artışının çeviklik süresini kısaltarak performansı geliştirdiğini göstermiştir. Dorsifleksiyon EHA ile sıçrama ve çeviklik performansı arasında anlamlı bir ilişki bulunmamış, baskın olmayan tarafta ise hiçbir parametrede anlamlı ilişki tespit edilmemiştir. Sonuçlar, basketbolda özellikle frontal düzlem hareketliliğinin hem performans hem de yaralanma risk yönetimi açısından kritik bir faktör olduğunu ortaya koymakta ve antrenörler için ayak bileği hareketliliğinin izlenmesi gerektiğine işaret etmektedir.