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IJSPT

ORIGINAL RESEARCH

# PRESEASON JUMP AND HOP MEASURES IN MALE COLLEGIATE BASKETBALL PLAYERS: AN EPIDEMIOLOGIC REPORT

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## ABSTRACT

***Background:*** Injuries are inherent in basketball with lower extremity (LE) injury rates reported as high as 11.6 per 1000 athletic exposures (AEs); many of these injuries result in time loss from sport participation. A recent trend in sports medicine research has been the attempt to identify athletes who may be at risk for injury based on measures of preseason fitness.

***Hypothesis/Purpose:*** The purpose of this prospective cohort study was to determine if the standing long jump (SLJ) and/or the single-leg hop (SLH) for distance functional performance tests (FPT) are associated with non-contact time loss lower quadrant (LQ, defined as lower extremities or low back) injury in collegiate male basketball players. It was hypothesized that basketball players with shorter SLJ or SLH measures would be at an increased risk for LQ injury.

***Methods:*** Seventy-one male collegiate basketball players from five teams completed a demographic questionnaire and performed three SLJ and six SLH (three per lower extremity) tests. Team athletic trainers tracked non-contact LQ time loss injuries during the season.

***Study Design:*** Prospective cohort

***Results:*** Mean SLJ distance (normalized to height) was 0.99 ($\pm$ 0.11) and mean SLH distances for the right and left were 0.85 $\pm$ 0.11 and 0.87 $\pm$ 0.10, respectively. A total of 29 (18 initial, 11 subsequent) non-contact time loss LQ injuries occurred during the study. At risk athletes (e.g., those with shorter SLJ and/or SLH) were no more likely to experience a non-contact time loss injury than their counterparts [OR associated with each FPT below cut scores = 0.9 (95% CI: 0.2, 4.9)]. The results from this study indicate that preseason performance of the SLJ and the SLH were not associated with future risk of LQ injury in this population.

***Conclusions:*** Preseason SLJ and SLH measures were not associated with non-contact time loss injuries in male collegiate basketball players. However, the descriptive data presented in this study can help sports medicine professionals evaluate athletic readiness prior to discharging an athlete back to sport after a LQ injury.

***Level of Evidence:*** 2

***Keywords:*** College, epidemiology, functional test, single-leg hop, standing long jump

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## INTRODUCTION

Basketball is a popular sport played worldwide both competitively and recreationally by players of all ages.[1-7] Injuries are inherent in basketball with the ankle, knee, lumbar spine, and the thigh cited as the most frequently injured regions in the lower quadrant.[1,2,4-11] Lower extremity (LE) injury rates in basketball players have been reported as high as 11.6 per 1000 athletic exposures (AEs); many of these injuries result in time loss from practice and/or competition.[5-11]

Injury rates (overall, time loss, and non-time loss) have been reported for male basketball players who compete at the NCAA and NAIA collegiate levels.[12] Collegiate male basketball players (consisting of all levels of NCAA and NAIA players) experienced an overall injury rate of 27.8 per 1000 AEs (non-time loss injuries = 21.8 per 1000 AEs; time loss injuries = 6.0 per 1000 AEs).[12] The highest overall (36.6 per 1000 AEs), non-time loss (28.8 per 1000 AEs), and time loss injury (7.8 per 1000 AEs) rates were observed in male basketball players who competed at the NCAA Division I (D I) level.[12] NCAA Division III (D III) male basketball players had the second highest time loss injury rate of 7.0 per 1000 AEs.[12] The overall injury rate for NAIA male basketball players was reported at 18.4 per 1000 AEs with a time loss rate of 4.8 per 1000 AEs.[12] With thousands of male basketball players competing at the NCAA and NAIA collegiate levels there is the potential for time loss injuries impacting team performance and success.

A recent trend in sports medicine research has been the attempt to identify athletes who may be at risk for injury based on measures of preseason fitness. Functional performance tests (FPTs) such as the Star Excursion Balance Test (SEBT), the Functional Movement Screen (FMS)™, the standing long jump (SLJ), and the single-leg hop (SLH) for distance have been administered to basketball players during the preseason to determine if scores are associated with subsequent sports-related injury during the season.[13-19] Poorer preseason performance on the SEBT has been associated with greater risk of lower extremity injury in high school basketball players and D I athletes (a population that included basketball athletes).[15,16] Scores on the FMS™, a series of dynamic and static tests, did not discriminate injury risk in National Basketball Association (NBA) basketball players or in a general population of D I athletes (which included basketball players).[17,18] Preseason performance of the SLJ was not associated with an increased risk of LQ injury in a general population of male D III athletes.[19] Interestingly, greater SLH distances were associated with a greater risk of lower quadrant (LQ) injury in a general population of male D III athletes (a population that included male basketball players).[19]

The aforementioned studies represent FPTs that have been prospectively evaluated for discriminating risk associations in athletes who play basketball (or, in some cases, a general population of athletes that included basketball players). However, the results from these studies leave sports medicine professionals and strength coaches with uncertainty as to which FPT, or combination of FPTs, can best identify male collegiate basketball players who may be at an increased risk for injury. Thus, additional assessment of FPTs in a population of male collegiate basketball players is warranted. The purpose of this prospective cohort study was to determine if the SLJ and/or the SLH for distance FPTs are associated with non-contact time loss lower quadrant (LQ = lower extremities or low back) injury in male collegiate basketball players. It was hypothesized that basketball players with shorter SLJ and/or SLH measures would be at an increased risk for LQ injury.

## METHODS

### Participants

Seventy-one male collegiate basketball players (20.2 ± 1.9 y) were recruited from two NCAA D III and three NAIA teams. An athlete was excluded from study participation if a) he was under the age of 18 or b) restricted from full sport participation by the team's physician. The Institutional Review Board of George Fox University approved this study. Informed consent was obtained from each subject prior to participation.

### Procedures

Off-season training habits, anthropometric measures, and FPT scores were collected for players at the start of the preseason. Prior to performing

the FPTs each basketball player completed a short questionnaire collecting the following demographic information: age, years in university/college, age starting their sport, and average time training per week during the six week period prior to the start of the official preseason. The specific off-season training categories included: weightlifting, cardiovascular exercise, plyometric exercise, and scrimmaging. Height and weight measures were also collected using a cloth tape for height (measured to nearest half inch) and standard medical scale for weight (measured to the nearest half pound).

### *Dynamic Warm-Up*

Each subject participated in a dynamic warm-up after collecting anthropometric and demographic information and prior to performing the FPTs. The dynamic warm-up consisted of five minutes of active movements across the width of the basketball court: forward walking, backward walking, forward lunging, backward lunging, and high knee marching. After completing the dynamic warm-up each athlete performed three submaximal SLJs.

The FPTs were performed in the following order: a) three SLJ, b) three SLH for distance per LE (total of six hops); alternating between sides with testing order determined by a coin flip.

### *Standing Long Jump*

Each basketball player stood with their feet placed shoulder width apart and positioned behind a piece of tape placed on the court. A cloth measuring tape was fixed to the floor to record distance jumped. Each subject performed three maximal effort SLJ with hands clasped behind their back.[20] For a test to count, a basketball player had to maintain hands clasped behind their back and stick the landing holding the position for five seconds.[20,21] A SLJ trial was repeated if the athlete was unable stick the landing. The SLJ distance was measured from the rear-most heel to the starting line. The mean score of the three SLJs, normalized to height, was used for statistical analysis.

### *Single-Leg Hop for Distance*

After completing the three SLJ trials an athlete performed the three SLH tests (performed bilaterally for a total of six SLH trials). A coin flip determined which leg an athlete hopped with first; each trial alternated between legs. For a test to be recorded subjects had to maintain hands clasped behind their back and stick the landing for five seconds. A trial was repeated if the athlete was unable to land successfully. The distance hopped was measured from the heel to the starting line. The mean score hopped for each leg, normalized to height, was used for statistical analysis.

### *Injury Surveillance*

Injury records and daily athletic exposures (one AE = one practice or one game) were collected by each university's/college's athletic training staff. The certified athletic trainers recorded the following features for each injured basketball player: body region, side of the body, and number of days missed from sport participation. The operational definition of an injury was any muscle, joint, or bone problem/injury (mechanism of injury: non-contact) of the low back or the lower extremity (categorized by region: hip, thigh, knee, leg, ankle, or foot) that occurred either during practice or competition that required the athlete to be removed from that day's event or to miss a subsequent practice or competition.[22,23] The primary investigator (PI) collected and reviewed injury records on a weekly basis to ensure accurate data collection.

## Statistical Analyses

A sample size of 67 subjects (based on an *a priori* calculation) was needed to determine statistically significant associations between LQ injury and functional performance test measures.[19] Descriptive statistics (means $\pm$ SD) were calculated for the athlete's demographic characteristics and FPT scores. Mean SLJ and SLH scores were normalized as a percentage of height. Comparison of means between starters/non-starters and forwards/guards were calculated by performing independent *t*-tests. The PI's test-retest reliability ($ICC_{3,3}$) has been previously reported for each FPT: SLJ = 0.96 (95% CI = 0.83, 0.97); R SLH = 0.95 (95% CI = 0.89, 0.98); L SLH = 0.96 (95% CI: 0.89, 0.98).[24] Incidence and rate ratios were analyzed based on starter/non-starter status and player positions (forward (including centers)/guard). Injury rates were calculated per 1000 ath-

letic exposures (AEs) for initial and subsequent injuries. An initial injury was the first non-contact LQ time loss injury sustained by an athlete during the season. A subsequent injury was a non-contact LQ time-loss injury sustained by an athlete after resuming sport participation after the initial injury.

### *Cutoff Scores*

A receiver-operator characteristic (ROC) curve was performed in an attempt to identify cutoff scores for categorizing at risk and referent groups. Analysis of each ROC curve failed to identify a point that maximized sensitivity and specificity. Thus, cutoff scores used in this study were based on clinical recommendations previously reported.[20,21] The cutoff score for the SLJ was 89% of one's height or less [at risk]/ ≥90% [referent]. The cutoff score for the SLH test was 79% of one's height or less [at risk]/ ≥ 80% [referent]. The cutoff score for the limb symmetry index (LSI = side to side differences between SLH measures) was 10% or less [referent]/ ≥ more than 10% [at risk].[19-21] Univariate logistic regression was performed to calculate crude odds ratios (OR) and 95% confidence intervals (CIs). Data analysis was performed using OpenEpi (for incidence rates and rate ratios) and SPSS Statistics 22 (Chicago, IL) with the alpha level set at 0.05.

## RESULTS

Demographic characteristics and normalized FPT measures for this sample are presented in Table 1. Starters were significantly older (20.9 y ± 1.9) and had more collegiate basketball (BB) experience (years in school = 2.9 y ± 1.3) than non-starters (mean age = 19.9 y ± 1.8; years in school = 2.1 y ± 1.1) ($p$ = 0.03; $p$ = 0.01, respectively). Interestingly, there were no other differences between starters and non-starters based on age starting sport, preseason training habits, and anthropometric measures. A significant difference in height and weight was observed when comparing guards (height = 1.84 m ± 0.06; weight = 78.9 kg ± 7.1) to forwards (height = 1.94 m ± 0.04; weight = 90.3 kg ± 8.6) ($p \leq 0.0001$).

FPT measures were normalized to athlete's height and are reported as percentages. Mean (± SD) scores for this sample were 0.99 ± 0.11 for the SLJ, 0.85 ± 0.11 for the (R) SLH, and 0.87 ± 0.10 for the (L) SLH (Table 1). There were no differences in SLJ or SLH distances between starters and non-starters. There were significant differences though in jump and hop measures between guards and forwards. Guards jumped (1.02 ± 0.08) significantly farther than forwards (0.93 ± 0.12) ($p \leq 0.0001$). Guards also hopped (0.88 ± 0.09) significantly farther with their right lower extremity than their forward counterparts (0.81 ± 0.13) ($p$ = 0.005).

Eighteen athletes (25.4 %) experienced a total of 29 non-contact time loss injuries (initial injuries = 18; subsequent injuries = 11). Thirteen of the 18 initial injuries were experienced at the ankle or foot (92.3% of ankle/foot injuries were lateral ankle sprains). The remaining initial injuries were experienced in the following regions: low back = 1; hip = 1; hamstring = 1; knee = 1; leg = 1. Of the 11 subsequent injuries six were lateral ankle sprains; 1 = low back; 1 = thigh; 2 = knee; and 1 = leg.

Tables 2a and 2b presents LQ injury rates for the overall population as well as comparisons based on if one was a starter or non-starter and by position (guard or forward). The incidence of initial time loss non-contact injuries was 2.7/1000 AEs (95% CI = 1.7, 4.3) and subsequent time loss injuries was 1.2/1000 AEs (95% CI = 0.6, 2.1). The overall rate of injury for this population was 3.9/1000 AEs (95% CI = 2.6, 5.5). There were no significant differences in injury rates between starters and non-starters or between guards and forwards.

Table 3 presents odds ratios (OR) associated with injury risk based on individual FPT measures, multiple FPT measures, and limb symmetry index (side-to-side comparison of SLH measures). Risk associations were categorized based on all injuries, thigh/knee injuries, and foot/ankle injuries. Individual SLJ and SLH measures (as a percentage of height) were not associated with time loss injury for any injury category. Limb symmetry index [10% or less (referent) / more than 10%] was also not associated with future injury risk. There was also no difference in risk between BB players who presented with either two or three FPT measures below cut scores and their counterparts in the associated referent groups.

## DISCUSSION

The purpose of this study was to determine if preseason performance on the SLJ and/or the SLH FPTs

**Table 1.** *Demographic Characteristics and Normalized Functional Performance Test Measures (Mean ± SD) of Male Collegiate Basketball Players*

| Characteristic | Total (n = 71) | Starters (n = 25) | Non-Starters (n = 46) | p-value*† | Guards (n = 45) | Forwards (n = 26) | p-value*‡ |
|---|---|---|---|---|---|---|---|
| Age (y) | 20.2 ± 1.9 | 20.9 ± 1.9 | 19.9 ± 1.8 | **0.03** | 20.2 ± 1.9 | 20.4 ± 2.0 | 0.7 |
| Years in School | 2.4 ± 1.2 | 2.9 ± 1.3 | 2.1 ± 1.1 | **0.01** | 2.4 ± 1.2 | 2.4 ± 1.2 | 0.9 |
| Age Starting Sport (y) | 8.7 ± 3.1 | 7.8 ± 3.2 | 9.1 ± 2.9 | 0.1 | 8.7 ± 3.0 | 8.6 ± 3.2 | 0.9 |
| Off-Season Training (hr/wk) | | | | | | | |
| Weightlifting | 4.8 ± 2.5 | 4.6 ± 2.3 | 4.9 ± 2.6 | 0.7 | 4.9 ± 2.6 | 4.6 ± 2.4 | 0.6 |
| Cardiovascular Exercise | 5.8 ± 4.1 | 5.6 ± 3.4 | 5.8 ± 4.4 | 0.9 | 5.9 ± 4.4 | 5.5 ± 3.5 | 0.7 |
| Plyometric Exercise | 2.3 ± 2.1 | 2.7 ± 2.6 | 2.1 ± 1.8 | 0.2 | 2.0 ± 1.7 | 2.9 ± 2.6 | 0.08 |
| Scrimmage | 5.4 ± 3.2 | 5.4 ± 3.1 | 5.4 ± 3.2 | 0.9 | 5.4 ± 3.3 | 5.3 ± 2.9 | 0.9 |
| Height (m) | 1.88 ± .07 | 1.89 ± .08 | 1.88 ± .07 | 0.4 | 1.84 ± .06 | 1.94 ± .04 | **≤0.0001** |
| Weight (kg) | 83.1 ± 9.4 | 83.1 ± 8.7 | 83.1 ± 9.9 | 0.9 | 78.9 ± 7.1 | 90.3 ± 8.6 | **≤0.0001** |
| BMI (kg/m$^2$) | 23.5 ± 2.0 | 23.3 ± 2.1 | 23.7 ± 2.0 | 0.5 | 23.3 ± 1.9 | 23.9 ± 2.3 | 0.2 |
| **Functional Performance Test** | | | | | | | |
| Standing Long Jump | 0.99 ± 0.11 | 0.99 ± 0.10 | 0.99 ± 0.11 | 0.9 | 1.02 ± 0.08 | 0.93 ± 0.12 | **≤0.0001** |
| (R) Single-Leg Hop | 0.85 ± 0.11 | 0.86 ± 0.09 | 0.85 ± 0.12 | 0.7 | 0.88 ± 0.09 | 0.81 ± 0.13 | **0.005** |
| (L) Single-Leg Hop | 0.87 ± 0.10 | 0.89 ± 0.08 | 0.86 ± 0.12 | 0.2 | 0.88 ± 0.09 | 0.85 ± 0.13 | 0.2 |

*Independent *t*-tests
†Comparison of means between starters vs. non-starters
‡Comparison of means between guards vs. forwards
p-values in bold illustrate statistically significant differences at the 0.05 level.

**Table 2a.** *Non-Contact Lower Quadrant Injury Rates in Male Collegiate Basketball Players, Starters vs. Non-Starters.*

| Injury Category | Total | | | Starters | | | Non-Starters | | | Rate Ratio† |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | AEs | Rate | No. | AEs | Rate | No. | AEs | Rate | (95% Confidence Interval) |
| Onset | | | | | | | | | | |
| Initial | 18 | 6558 | 2.7 (1.7, 4.3) | 8 | 2247 | 3.6 (1.7, 6.8) | 10 | 4311 | 2.3 (1.2, 4.1) | 1.5 (0.6, 4.0) $p = 0.4$ |
| Subsequent | 11 | 917 | 1.2 (0.6, 2.1) | 4 | 372 | 1.1 (0.3, 2.6) | 7 | 545 | 1.3 (0.6, 2.5) | 0.8 (0.2, 2.9) $p = 0.8$ |
| Total | 29 | 7475 | 3.9 (2.6, 5.5) | 12 | 2619 | 4.6 (2.5, 7.8) | 17 | 4856 | 3.5 (2.1, 5.5) | 1.3 (0.6, 2.8) $p = 0.5$ |

Rate: Injury rate per 1000 AEs
† Rate Ratio between starters and non-starters

**Table 2b.** *Non-Contact Lower Quadrant Injury Rates in Male Collegiate Basketball Players, Guards vs. Forwards*

| Injury Category | Guards | | | Forwards | | | Rate Ratio†† |
|---|---|---|---|---|---|---|---|
| | No. | AEs | Rate | No. | AEs | Rate | (95% Confidence Interval) |
| Onset | | | | | | | |
| Initial | 13 | 4191 | 3.1 (1.7, 5.2) | 5 | 2367 | 2.1 (0.8, 4.7) | 1.5 (0.5, 4.6) $p = 0.5$ |
| Subsequent | 9 | 652 | 1.4 (0.7, 2.5) | 2 | 265 | 7.5 (1.3, 24.9) | 1.8 (0.4, 12.4) $p = 0.5$ |
| Total | 22 | 4843 | 4.5 (2.9, 6.8) | 7 | 2632 | 2.7 (1.2, 5.3) | 1.7 (0.8, 4.3) $p = 0.2$ |

Rate: Injury rate per 1000 AEs
††Rate Ratio between guards and forwards

**Table 3.** *Odds Ratios for Normalized Standing Long Jump (SLJ) and Single-Leg Hop (SLH) Scores for Male Collegiate Basketball Players*

| | N at risk | All Injuries (%) | Odds Ratio | 95% CI | Thigh/Knee Injuries (%) | Odds Ratio | 95% CI | Ankle/Foot Injuries | Odds Ratio | 95% CI |
|---|---|---|---|---|---|---|---|---|---|---|
| N = 71 | | | | | | | | | | |
| SLJ as a % of one's height | | | | | | | | | | |
| 90% or more | 59 | (25) | 1.0 | Referent | (3) | 1.0 | Referent | (17) | 1.0 | Referent |
| 89% or less | 12 | (27) | 0.9 | (0.2, 3.7) | (8) | 2.6 | (0.2, 31.1) | (22) | 0.7 | (0.1, 3.6) |
| (R) SLH as a % of one's height | | | | | | | | | | |
| 80% or more | 48 | (33) | 1.0 | Referent | (6) | 1.0 | Referent | (25) | 1.0 | Referent |
| 79% or less | 23 | (13) | 0.3 | (0.1, 1.2) | (0) | * | * | (13) | 0.5 | (0.1, 1.8) |
| (L) SLH as a % of one' height | | | | | | | | | | |
| 80% or more | 53 | (30) | 1.0 | Referent | (4) | 1.0 | Referent | (25) | 1.0 | Referent |
| 79% or less | 18 | (17) | 0.5 | (0.1, 1.8) | (6) | 1.5 | (0.1, 17.6) | (11) | 0.4 | (0.1, 1.9) |
| Limb Symmetry Index (LSI) | | | | | | | | | | |
| 10% or less | 56 | (29) | 1.0 | Referent | (5) | 1.0 | Referent | (21) | 1.0 | Referent |
| More than 10% | 15 | (20) | 0.6 | (0.2, 2.5) | (0) | * | * | (20) | 0.9 | (0.2, 3.8) |
| At least 2 FPT scores below CR | | | | | | | | | | |
| Yes (2 or more) | 18 | (11) | 0.3 | (0.1, 1.3) | (0) | * | * | (11) | 0.4 | (0.1, 1.9) |
| No (1 or less) | 53 | (32) | 1.0 | Referent | (6) | 1.0 | Referent | (25) | 1.0 | Referent |
| All 3 FPT scores below CR | | | | | | | | | | |
| Yes (All 3 below) | 8 | (25) | 0.9 | (0.2, 4.9) | (0) | * | * | (25) | 1.3 | (0.2, 7.1) |
| No (2 or less) | 63 | (27) | 1.0 | Referent | (3) | 1.0 | Referent | (21) | 1.0 | Referent |

*No injuries in at risk group
FPT = Functional Performance Test (e.g., SLJ, SLH)
CR = Clinical Recommendation[20,21]

were associated with time loss non-contact injury in male collegiate BB players. A previous study indicated that the SLH test may discriminate athletes at risk for time loss LQ injury.[19] In that study a general population of D III male athletes (a population that included male BB players) who hopped for a distance at least 75% of their height had a three-fold increased risk of "all injuries" (e.g., injury to the LQ).[19] Interestingly, the further one hopped, the greater their risk of experiencing a time loss injury. For example, D III male athletes who hopped for a distance at least 85% of their height had a seven-fold increased risk of "all injuries" and a seven-fold increased risk of injury to the thigh/knee region.[19] A limitation with that prior study[19] was that it included a heterogeneous population of Division III male athletes and thus, that risk profile may not be generalizable to a homogeneous population. These results suggest that the former risk profile[19] is not appropriate for discriminating injury risk in male collegiate basketball players.

The majority of injuries experienced in this population of BB players were at the ankle. Lateral ankle sprains are common in basketball; this finding is consistent with reports from other epidemiologic studies.[6-11] However, the overall injury rate in this population was lower than what has been previously reported.[6-11] There are three potential reasons for this finding. First, in this study the focus was on injuries to the LQ only. Most studies report injury rates that include musculoskeletal injuries experienced throughout the body. It is possible that the overall time loss injury rate of 3.9 per 1000 AEs observed in this study, which is below previously reported time loss injury rates of 4.8 (NAIA BB players)[12] to 7.0 per 1000 AEs (Division III BB players)[12], was due to the exclusion of injuries to the head and upper quadrant. Second, many studies present rates that include both contact and non-contact injuries.[4,6-11] Deitch et al reported a LE injury rate of 11.6 per 1000 AEs in NBA basketball players; however,

this rate also included all injury mechanisms (e.g., contact and non-contact mechanisms).[6] For the purposes of this study the authors chose to only analyze risk associations between non-contact injury mechanisms and preseason FPT scores. Finally, it is possible that a lower overall rate observed was the result of fewer injuries sustained during the study period.

The descriptive data presented may also help sports medicine professionals appreciate functional performance requirements for injured basketball players. Return to sport clinical guidelines recommend male athletes with a LE injury should be able to jump at least 90 percent of their height and hop for distance at least 80% of their height.[20,21] Collegiate male BB players jumped on average almost 100 percent of their height (0.99 $\pm$ 0.11) and hopped on average over 85 percent of their height (range 0.85 $\pm$ 0.11 – 0.87 $\pm$ 0.10). Sports medicine professionals should consider requiring injured collegiate male BB players to jump and hop greater distances than those currently recommended before discharging the athlete back to full sport participation.

### *Limitations*

A few limitations in this current study are noted. First, even though more basketball players were recruited than necessary based on the *a priori* power analysis, analysis of risk per body region was limited to "all injuries" and "foot/ankle region". Analysis of risk was not possible at the "thigh/knee region" due to a lack of total number of reported injuries. Second, athletes were asked to self-report their training habits prior to the start of the season; it is possible that some athletes under or over-reported their weekly training habits (e.g., recall bias).

## CONCLUSION

Preseason measures on the SLJ and the SLH for distance are not associated with an increased risk for a lower quadrant (e.g., low back or lower extremity) injury in collegiate male BB players. However, the descriptive data presented in this study can help sports medicine professionals evaluate athletic readiness prior to discharging an athlete back to sport after a LQ injury.

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