USE OF THE FUNCTIONAL MOVEMENT SCREENING IN DIVISION III COLLEGIATE ATHLETES

Kathy Armstrong, Bailey McDevitt, Kaitlin Baumann, Liam O'Reilly, Yasmeen Ramos, Cisco Reyes | Linfield College – McMinnville, OR, Health & Human Performance Lab
Email: karmstro@linfield.edu, bmcdevitt@linfield.edu, kbaumann@linfield.edu, loreilly@linfield.edu, yramos@linfield.edu, greyes@linfield.edu

ABSTRACT

While much data is available regarding Functional Movement Screen (FMS) scores in corrective exercise programs and injury prevention, limited data exists regarding comparisons between movement patterns in various sports. Having normative data on a variety of functional movement patterns can allow coaches to properly assess their team's strengths and weaknesses in movement to tailor training programs accordingly. PURPOSE: the purpose of this study was to review FMS scores to find any mobility and stability differences between several NCAA Division III sports. METHODS: 83 healthy student-athletes (63 males: 20.04 ± 1.4 years, 81.7 ± 14.9 kg, 179.2 ± 26.6 cm; 20 females: 19.4 ± 1.3 years, 64.1 ± 13.7 kg, 167.8 ± 19.1 cm) from 4 different sports teams (men's and women's basketball, women's lacrosse, and baseball) performed a battery of tests to measure physical capabilities prior to the beginning of their competitive season. All players were injury free during the time of testing. All participating student-athletes performed the FMS, which is a tool used to gauge fundamental movement patterns including range of motion, stability, and balance, to measure movement asymmetries and limitations. Participants were required to complete seven low-intense bodyweight tests along with three clearing exams. Scores for individual tests were recorded, and statistical analyses were conducted to determine differences between teams, as well as performance differences between genders. RESULTS: Between genders, male student-athletes scored significantly greater than females in the average composite scores ($p < 0.01$); Both women's teams scored higher in the ASLR than men's basketball. Between the male teams only, baseball displayed the greatest overall movement (DS, ILL, HS, SM, ASLR, TSPU, ROTS; $p < 0.01$), baseball displayed the highest HS, ILL, & ASLR ($p < 0.01$). Between the female teams, one significant difference existed in the ROTS where women's lacrosse scored statistically greater than the women's basketball team ($p = 0.01$). CONCLUSIONS: this study provides normative data within the male teams, however, the data comparing the men's and women's teams was atypical when using NCAA DIII athletes. PRACTICAL APPLCATIONS: the data presented can provide coaches with standards for movement to guide individualized exercise programs as well as general knowledge regarding movement patterns between different sports teams.

INTRODUCTION

Proficient movement is essential in all aspects of life, including daily activities, workplace duties, and athletic participation (Bonazza, Smuin, Onks, SIlvis & Dhawan, 2016). With athlete participation in sport increasing each year, exposure to injury is more likely to occur (Yang, Tibbetts, Covassin, Cheng, Mayar, & Heiden, 2012). Limitations in movement quality, which varies across different sports (Malinzak, Kirkendall, & Garrett, 2001), may hinder the ability to perform tasks or participate in athletic activities (Hatchett, Allen, Hilaire & LaRochelle, 2017), which also may lead to increased incidence of injury (Kerr, Marshall, Dompier, Corlette, Klossner, & Gilchrist, 2015). A mechanism for injury may be due to poor quality movement patterns, which suggests the importance of pre-screening movement exams (Zalai, Panics, Bobak, Csaki, & Hamar, 2015) used to indicate areas of weakness (Moran, Schneiders, Major, & Sullivan, 2016). Movement asymmetries and limitations can be assessed through the Functional Movement Screen (FMS), which is a tool used to gauge fundamental movement patterns including range of motion, stability, and balance (Kiesel, Plisky, & Voight, 2007). Few studies have been conducted that compare individual FMS scores between different sports teams at the collegiate level. The objective of our study is to review FMS scores to find any mobility and stability differences between several varsity sports.

PURPOSE

The purpose of this study was to find any differences between the seven Function Movement Screening tests across four different NCAA Division III teams.

METHODS

SUBJECTS:

- 83 healthy, student Division III athletes, 63 males and 20 females
- Subjects were recruited from 4 different varsity teams: Men's and Women's basketball, Women's Lacrosse, and Baseball.
- 20 ± 1.4 (males) and 19.4 ± 1.3 (females) years old; 81.7 ± 14.9 (males) and 64.1 ± 13.7 kg body mass; 179.2 ± 26.2 (males) and 167.8 ± 19.1 (females) cm tall.
- All subjects read and signed an informed consent, approved by the Linfield IRB, prior to participation.
- Approval of utilizing humans as subjects was approved by the Linfield IRB prior to any data being collected.

TESTING SESSION:

- Each athlete completed a full Functional Movement Screening prior to their competitive season.
- Each screen was administered by an FMS-trained student and/or FMS-certified professor.
- Each screen followed FMS protocol of delivery of instruction and scoring criteria.

STATISTICAL ANALYSIS:

An analysis of variance (ANOVA) was used to examine statistical significant differences. If significant main effects were present, a Tukey post hoc analysis was utilized to determine specific individual differences. All statistical significance was set at $p \leq 0.05$. Cohen's D effect size was also calculated during any calculated statistical differences.

RESULTS

Statistical analysis revealed significant differences between scores for various sports teams. In the HS, the score for Men's Basketball (1.5221±0.4372) was significantly lower than Baseball (2. 2162 ± 0. 4350; p= ___, Figure 1). Between Men's Basketball (1. 765 ± 0. 4372) and Baseball (2. 369 ± 0.5694) there is a significant difference in scores for the ILL (p=_____, Figure 2). For the ASLR, Women's Basketball (2. 035 ± 0. 4629) was significantly greater than Men's Basketball (1 .250 ± 0. 5879; p=_____) along with Women's Lacrosse (2. 3626 ± 0. 5547; p=_____) and Baseball (1. 802 ± 0.5851; p=____, Figure 3). Women's Lacrosse (1. 8079 ± 0. 6157) scored significantly lower than Baseball (1. 8784 ± 0. 5205; p=____) and Men's Basketball (2. 477 ± 0. 6674; p=_____, Figure 4) for the TSPU. In RS, Women's Basketball (1. 000 ± 0. 5345) scored significantly lower than Men's Basketball (1. 882 ± 0. 4850; p=____), Women's Lacrosse (1. 500 ± 0.5189; p=_____), and Baseball (1. 9736 ± 0.1622; p=_____), whereas also Men's Basketball and Baseball scored significantly greater than Women's Lacrosse (p=_____, Figure 5). With overall FMS score, Baseball (14. 342 ± 1. 667) scored significantly greater than Men's Basketball (12. 632 ± 1. 5624; p=_____) and Women's Lacrosse (12. 8571 ± 1. 8337; p=_____, Figure 6).

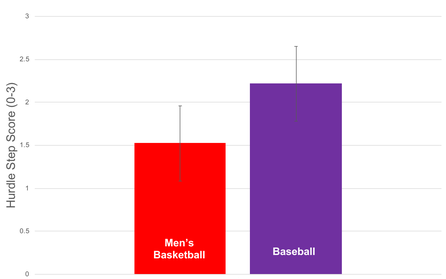

Figure 1: Hurdle Step scores between Men's Basketball and Baseball

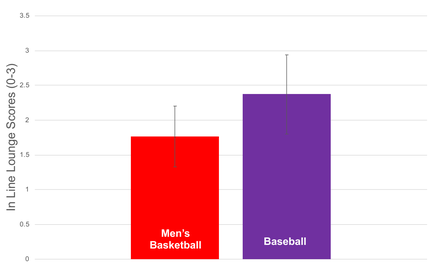

Fig. 2 In-line Lunge scores between Men's Basketball and Baseball

RESULTS

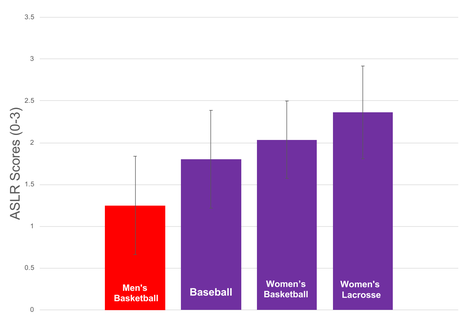

Fig. 3 Active straight leg raise scores for Men's Basketball, Baseball, Women's Basketball, and Women's Lacrosse

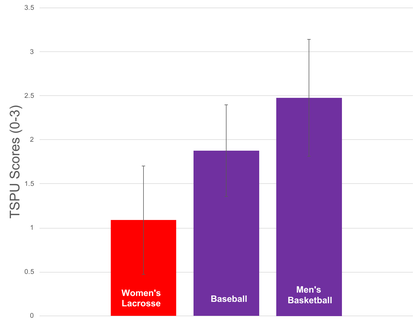

Fig. 4 Trunk stability push up scores between Women's Lacrosse, Baseball, and Men's Basketball

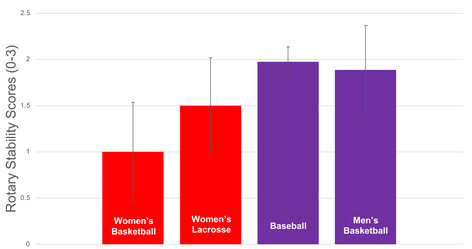

Figure 5: Rotary Stability scores between Women's Basketball, Women's Lacrosse, Baseball, and Men's Basketball

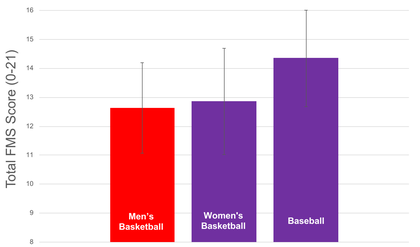

Figure 6: Total FMS score between Men's Basketball, Women's Lacrosse, and Baseball

CONCLUSIONS

This study provides normative data within the male teams, however, the data comparing the men's and women's teams was atypical when using NCAA DIII athletes. Male student-athletes scored significantly greater than females in the average composite scores ($p < 0.01$). Between the male teams, baseball displayed the greatest overall movement ($p < 0.01$). Between female teams, one significant difference existed in the ROTS where women's lacrosse scored statistically greater than the women's basketball team ($p = 0.01$).

PRACTICAL APPLICATIONS

The data presented can provide coaches with standards for movement to guide the creation of individualized exercise programs as well as provide general knowledge regarding movement patterns between various sports teams. Individualized FMS scores can be used to implement detailed training programs for individuals and teams tailored to specific movement patterns. Based off of FMS scores, improved personalized programs could maximize training and potentially reduce the risk of injury development in athletes.

REFERENCES

1. Bonazza, N., Smuin, D., Onks, C., Silvis, M., & Dhawan, A., (2016). Reliability, validity, and injury predictive value of the functional movement screen. *The American Journal of Sports Medicine, 45*(3), 725-732.
2. Hatchett, A., Allen, C., Hilaire, J., & LaRochelle, A., (2017). Functional movement screening and paddle-sport performance. *Sports, 5*(2), 37.
3. Kerr, Z.Y., Marshall, S.W., Dompier, T.P., Corlette, J., Klossner, D.A., & Gilchrist, J. (2015). College sports-related injuries - United states, 2009-10 through 2013-14 academic years. *Centers for Disease Control and Prevention, 64*(48), 1330-6.
4. Kiesel, K., Plisky, P.J., & Voight, M.L. (2007). Can serious injury in professional football be predicted by a preseason functional movement screen? *North American Journal of Sports Physical Therapy, 2*(3), 147-158.
5. Malinzak, R.A., Colby, S.M., Kirkendall, D.T., Yu, B., & Garrett W.E. (2001) A comparison of knee joint motion patterns between men and women in selected athletic tasks. *Clinical Biomechanics (Bristol, Avon), 16*(5), 438-445.
6. Moran, R., Schneiders, A., Major, K., & Sullivan, J., (2016). How reliable are functional movement screening scores?: A systematic review of rater reliability. *British Journal of Sports Medicine, 50*(9), 527-536.
7. Yang, J., Tibbetts, A.S., Covassin, T., Cheng, G., Nayar, S., & Heiden, E. (2012). Epidemiology of overuse and acute injuries among competitive collegiate athletes. *Journal of Athletic Training, 47*(2), 198-204.
8. Zalai, D., Panics, G., Bobak, P., Csaki, I., & Hamar, P. (2015). Quality of functional movement patterns and injury examination in elite-level male professional football players. *Acta Physiologica Hungarica, 102*(1), 34-42.