LESS is More

An Investigation of Biomechanical Diagnosis Methods in Division II Women's Basketball Players

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Advised by Dr. Mick Lynch

Abstract

This is a thesis on the application of the Landing Error Scoring System (LESS) for a Division II women's basketball team. The LESS is designed to identify biomechanical deficiencies in athletes by analyzing several different stages of a box jump. The jumps were videotaped as a drop from a 12-inch box. Using the scores obtained from the LESS, both Athletic Training and Strength and Conditioning staff collaborated to help design individual plans for each athlete to optimize athletic performance and reduce injury risk. The data obtained for this thesis was gathered from a Division II women's basketball team. LESS scores were compared to each individual's Power Index, and injury records throughout the season.

Introduction

This project was designed to identify and lessen injury risk in NCAA Division II women basketball players and improve performance on relevant test measures for the sport. The purpose of the initial stage was to be descriptive, collecting data from standardized performance tests which were routinely performed on the team. Literature on the performance characteristics of female basketball players in the second division of the NCAA is scarce, and this project sought to expand that amount of data. During the second stage, individual risk factors were identified from this descriptive data and modifications for each athlete were implemented within the standard conditioning program of the women's basketball team. These individual modifications were designed and implemented under the supervision of the strength coach and the athletic trainer responsible for the women's basketball team. Longitudinal testing of the team members was accomplished throughout the school year to monitor effects of the conditioning program and the individual modifications. Reports were filed within the team injury reporting software to monitor the incidence of injury on the team. The goals of this project were to lessen the injury

rate and improve performance of the women's basketball team through improvement of their biomechanics, strength and agility.

Methods

All members of the women's basketball team (13 subjects) were invited to participate. The head coach of the team gave permission for her team to participate. The athletic trainer and strength coach for the team invited the members to participate during the first team meeting the staff had with the team in early September 2017. (Appendix A) The subjects were involved with the project throughout the school year, each year of participation on the basketball team. The physical performance battery of testing was done 5 times during the academic year. A standard medical clearance mandated by the NCAA for all intercollegiate athletes was performed before the first testing session. A subjective muscle activation assessment was also done before this initial testing session. An additional injury risk assessment tool (the LESS) was done during three of these testing sessions. A subject consent form was filled out by each participant prior to the first LESS testing. (Appendix B) There are risks for injury with the performance testing but no more than normal daily participation in the sport of basketball. Testing was done under the supervision of the strength coach and athletic trainer. Any injuries incurred during testing or the normal participation in basketball were treated by the team athletic trainer. Each participant was tested five times during the academic year. The testing was a battery of standard performance measures utilized in many sports. Testing occurred on return to campus, at the start of the official practice season, during Christmas break practice sessions, at the start of post-season play and just prior to the end of the spring semester. Testing sessions occurred during regularly scheduled team sessions, so that there would not be additional time required of subjects over the normal basketball and academic schedules. Testing sessions lasted 60-90 minutes and occurred

during one of these regularly scheduled sessions. The performance testing consisted of a vertical jump, a standing broad jump, power factor (PF), a 10-yard sprint, a change of direction shuttle run, a total body strength measure with a trapezius bar d eadlift (TDBL) for all participants and a hang power clean (HPC) for returners trained in the proper technique, body weight and a calculation of average watt production. (Lockie et al. 2016)

- **Vertical jump** is measured from a standing position with both feet shoulder width apart. Standing reach height is measured and then the subject is asked to leap as high as possible using arm swing without shifting the feet prior to leaving the ground. The highest of three attempts is recorded and the difference between reach height and leap height is calculated.
- **Standing broad jump** is measured from a line drawn on the ground. The subject stands behind the line with both feet flat on the ground. The jump utilizes arm swing without shuffling the feet prior to the jump. The subject leaps forward as far as possible. The jump distance is measured from the line to the closest heel. The best of three attempts is recorded.
- **Power factor** is a calculation of air time divided by ground time obtained from a device named the *Just Jump Mat*. Each athlete steps onto the rubber mat, stands with feet shoulder width apart, and jumps as high as they can 4 times consecutively. After landing the fourth jump, the device calculates the PF to be recorded into the data.
- **10-yard sprint** is timed electronically.
- **Change of direction shuttle run** is timed manually. Athletes have a 20-foot space to perform this test. Starting behind the line, athletes sprint 20 ft, decelerate, shuffle sideways to start line, shuffle back 20 ft farther and finally sprint the remaining 20 ft

towards the starting line. Athletes perform this test once on each side and the average of the two is recorded. This is used to measure average ability to change direction.

- **Total body strength measure** is assessed using a hex bar deadlift (Trap Bar Deadlift – TBDL). Subjects step inside the hexagonal bar, grab the bar and stand with good technique. Athletes are given up to 4 sets to work towards an 8RM-the maximum weight that the subject can lift 8 times with proper technique.
- **Hang power clean** (HPC) is performed before the TBDL test to assess power. Athletes are given 6 sets to work up to their technical 1RM of HPC. Technical 1RM meaning the highest weight with which they could perform the movement proficiently. (for returning athletes only)
- **Body weight** is measured in kilograms with a standard scale and body composition is measured with the BodPod in the Exercise Science laboratory. Subject involvement in the BodPod is sitting in an enclosed capsule while the device measures temperature and air displacement, lasting approximately 5 minutes.
- **Average wattage** is calculated using an *OpenBarbell*, a tracking device used to measure bar velocity and power produced. Athletes place a PVC pipe on the back of their shoulders, with a tracker attached to PVC pipe, and perform 3 counter movement jumps. An average is taken from these jumps and recorded for reference during the playing season. (Bonato et al. 2018)

The individualized conditioning sessions occurred in the team setting. The above performance testing was analyzed to identify areas that need corrective exercise. The framework is a triad of core strength, hip strength and balance. The core exercises were standard variations of the plank in supine, prone and side positions. The hip exercises were standard variations

bringing the knees toward the center of the body from a position extended away or behind the body in supine, prone and a position on all fours. The balance exercises were variations of single leg hops and simple standing maneuvers. (Hegedus, 2017)

- **Orthopedic screens** were conducted upon arrival to campus. The screen consisted of an evaluation of the stability, mobility, strength and flexibility of the joints. This is a standard procedure that is mandated by the NCAA for intercollegiate athletes. The screen was conducted by the athletic trainer. Any abnormalities noted were referred to the FSC team orthopedist for further evaluation. Participation in this project would have been suspended if the orthopedist limited the player's activity due to a medical problem.
- **Firing pattern sequence** was also evaluated upon the return to campus during the initial testing period. The assessment was conducted by the athletic trainer. The aim of this evaluation was to determine which muscle groups activate first with a straight leg raise. The subject was asked to lie on an examination table in the prone position, and perform a straight leg raise. The athletic trainer manually palpated the gluteus maximus, gluteus medius and hamstring muscles to determine which activated first when the straight leg raise is initiated
- **Landing Error Scoring System** (LESS) was done during three of these testing sessions: on return to campus, at the start of the season and at the end of the school year. Each subject was prompted the same way before performing their jump. (Appendix C) This standardized jump task consisted of two segments. The first was a two-legged jump down from a 12-inch box to

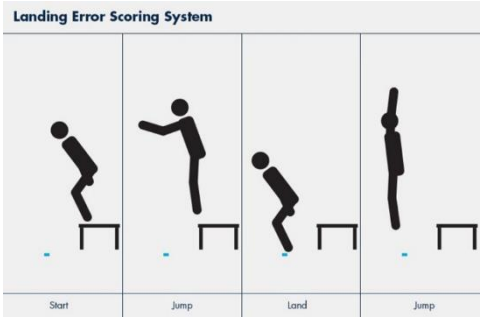

Figure 1 – Landing Error Scoring System (LESS)

the floor past a line drawn on the floor, half the body height from the box. The second was an immediate jump vertically off the floor as high as possible. Each trial was videotaped until three were successful. The trials were then scored with the rubric contained in Appendix D. The LESS has been shown to be associated with injury risk. (Teyhen et al. 2014) The goal was to show an improvement (lower score) in the LESS over the duration of this project.

The LESS was scored and evaluated by 4 different evaluators to determine the ratio of exercises to be done during conditioning sessions. Scores given were averaged for each individual. Subjects scoring 8 or higher on the LESS were classified as high injury risk, and had a larger number of auxiliary exercises incorporated within conditioning sessions. Subjects with a score of 3-7.9 had auxiliary exercises targeting the areas of greatest need. Subjects scoring below 3 on the LESS had decreased injury risk, so conditioning concentrated on increasing power production. At the end of the academic year once all data was collected and analyzed, LESS scores were compared to injury rates and power index scores for each individual athlete.

Discussion

The significance of this study is strongly based off the risk involved with participation in women's basketball, and lack of research in the division II field. Women's basketball has significantly higher injury rates compared to their male counterparts. Risk of tearing an anterior cruciate ligament (ACL) increases by almost 3 times for females, as their ACL injury rate is 1.95 per 10,000 athlete exposures vs. 0.70 for males. (Stanley et al. 2016) This discrepancy can be attributed to a number of differences between the male and female sexes, such as decreased muscle activation and activity, larger Q-angle, and hormonal differences. (Thompson et al. 2018) (Omi et al.2018) In addition, the sport of basketball provides high risk for injury simply through

the nature of the game. Repetitive jumping, landing, cutting, and pivoting are all major culprits in many injuries including ACL tears. (Arundale, 2018). Demands of the sport cannot be changed, so treatment in prevention of these injuries is necessary. The LESS is a reliable and valid predictive tool for basketball, involving quick, powerful movements, and of course, jumping. Other movement screenings such as Functional Movement Screening (FMS) are proven to be effective in predicting and diagnosing musculoskeletal injures (Dorrel et al. 2018), but the LESS has aspects specific to sports such as basketball that make it of greater use to such particular situations such as this. (Teyhen et al. 2014) One factor in further researching these screening tools would be to continue supporting the established status of the screens as effective and work to implement them in more sports settings at younger ages. Biomechanical screenings and prevention programs may be more effective if applied to athletes earlier. The younger the athlete, the more likely they are to adapt more efficient and safe biomechanical movement patterns. (Thompson-Kolesar et al. 2018) What is important to note, however, is that in the vast majority of research done on these screening tools, the subjects data is gathered from are all elite athletes- usually Division I college athletes or professionals. Part of what this project aims to do is provide data for the Division II demographic of athletes. While our Division II athletes are still far above the average for human performance, they provide significant data that can be applied to other athletes at any of the 312 Division II universities under the NCAA, as well as institutions in the NAIA, junior colleges, and even high schools. Most athletes cannot compare to the capabilities of elite athletes at the highest level of their game. The acquisition of data that helps a more general demographic is of incredible importance, especially in a sport that claims several victims through injury.

Results

	1	2	3	4	Average	Standard Deviation	Group
1	10	8	11	6	8.75	2.22	3
2	6	7	3	5	5.25	1.71	2
3	3.5	11	2	3	4.88	4.13	2
4	12	8	6	7	8.25	2.63	3
5	7	8	11	8	8.50	1.73	3
6	9	10	9	7	8.75	1.26	3
7	7	11	9	9	9.00	1.63	3
8	4	6	10	7	6.75	2.50	2
9	9	6	9	5	7.25	2.06	2
10	0	8	2	1	2.75	3.59	1
11	6	8	5	4	5.75	1.71	2
12	12	9	10	8	9.75	1.71	3

Figure 2 – LESS scoring conducted August 2018

Data gathered was compiled as seen in **figure 2.** All LESS scores were complied across the 4 evaluators' scores and calculated for average. Based on their average LESS score, they were placed in group 1, 2, or 3 classifying their injury risk. From the March testing selection, 12 athletes were able to participate. From August 2017 to the end of the season in March of 2018, 7 of the individuals tested showed improvement in their LESS scores, and only 2 showed a decline in their scoring. The average difference amongst the subjects between the LESS tests was an improvement of -2.56. 1 subject was only able to test in March due to injury leading into the season, 2 subjects were only able to test in August due to injuries obtained during the season, and 1 subject only tested in August as she was removed from the team's roster during the season and did not wish to participate in the study any further. Of the 13 participants, only 9 were able to partake in both testing periods.

Subject	Group	Differences
1	2	-3.08
2	3	3.75
3	2	0.13
4	2	-3.25
5	3	-0.5
6	1	-6.08
7	2	-4.33
8	1	-5.42
9	1	-4.25
10	1	
11	3	
12	3	
13	2	

Figure 3 – LESS Score Differences with group

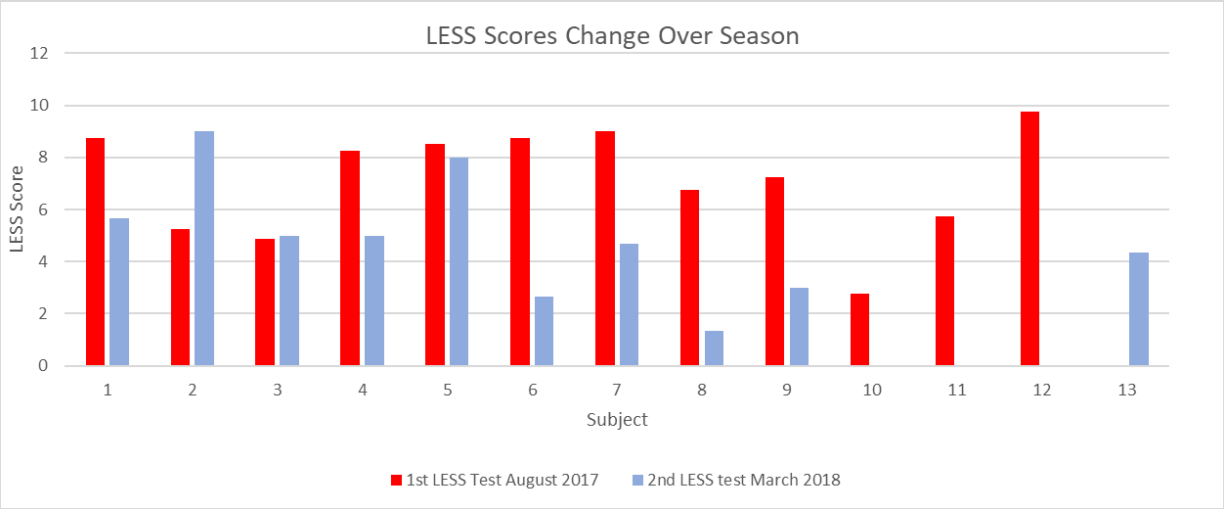

Figure 4 – LESS Scores Change Over Season

BW	YEAR	PQ	LEVEL	VERT	PF	BROAD	10 YD	R	L	C.O.D.
163.0	JR	21.19	WHITE	18	1.03	73.5	1.74	7.22	7..01	7.22
132.2	SO	20.87	WHITE	18.8	0.68	76.5	1.77	7.55	7.03	7.29
134.0	JR	27.70	WHITE	25	0.85	75.5	1.82	6.64	6.99	6.815
151.4	SO	#DIV/0!	BLUE				1.94			#DIV/0!
144.8	SR	25.66	WHITE	20	0.76	72.5	1.61	6.72	6.61	6.665
145.0	JR	34.89	GRAY	23	1.51	88.5	1.74	7.19	6.90	7.045
129.8	FR	33.80	GRAY	24.7	0.9	86	1.6	6.79	6.65	6.72
197.2	FR	6.54	GRAY	13.7	0.57		2.15	8.75	8.77	8.76
126.0	FR	31.38	GRAY	19.8	1.2	71.5	1.74	7.44	7.02	7.23
189.6	FR	#DIV/0!	GRAY							#DIV/0!
156.0	JR	20.78	GRAY	21.1	1.14	79	1.65	7.03	6.86	6.945
155.8	SO	#DIV/0!	GRAY							#DIV/0!
179.8	FR	17.61	GRAY	19.9	1.14	84	1.74	7.48	7.27	7.375
138.4	FR	22.23	GRAY	16.7	0.9	67	1.6	7.16	6.95	7.055
125.0	FR	27.26	GRAY	16.8	0.94	66	1.82	7.42	6.95	7.185

Figure 5 – Athletic Performance Evaluations Conducted August 2018

Data gathered in the weight room was compiled as seen in **Figure 5.** Using the measurements of each athlete's vertical jump (VJ), broad jump (BJ), power factor (PF), hang power clean 1 repetition max (HPC), body weight (BW), change of direction (C.O.D) and 10-yard dash times (10yd), power quotient (PQ) was calculated.

$$\frac{(VJ \times PF) + (BJ \times PF) + HPC}{BW \times (C.O.D - 10\text{yd})} X100 = PQ$$

Power is the rate at which work is done, or (Force x Velocity). Power is important in athletics as driving force at high velocity is essential to athletic movement. An athlete's ability to move their body (Force) as quick as possible (Velocity) determines how fast they run, how high they can

jump, how quickly they can swing a bat, or how hard they can pass a ball. Power quotient is a measure of each individual's power and can translate to their athletic abilities.

The results of the power quotient measures over the course of the season were varied. Similar to the LESS testing, only 9 subjects were able to test at both the beginning and end of the season. Amongst those 9, 4 showed positive results, while 5 declined in their athletic performance. The average difference between power quotient scores was -.015. However, the range of this data was significant, at 18.45 (9.86 to -8.59). Many factors surround the athletic performance of the subjects of this study, including fatigue from the season as well as the added stress of academics to fulfill their student-athlete status. So, while it cannot be stated that the addition of the LESS benefitted all participants in terms of athletic performance, some did benefit and had the focus of rehabilitative exercises improve their operation.

Differences	
1	0
2	1.92
3	-3.07
4	-2.29
5	9.86
6	5.37
7	3.04
8	-4.01
9	-3.64
10	0
11	-8.59
12	0
13	0

Figure 6 – Power Quotient Differences

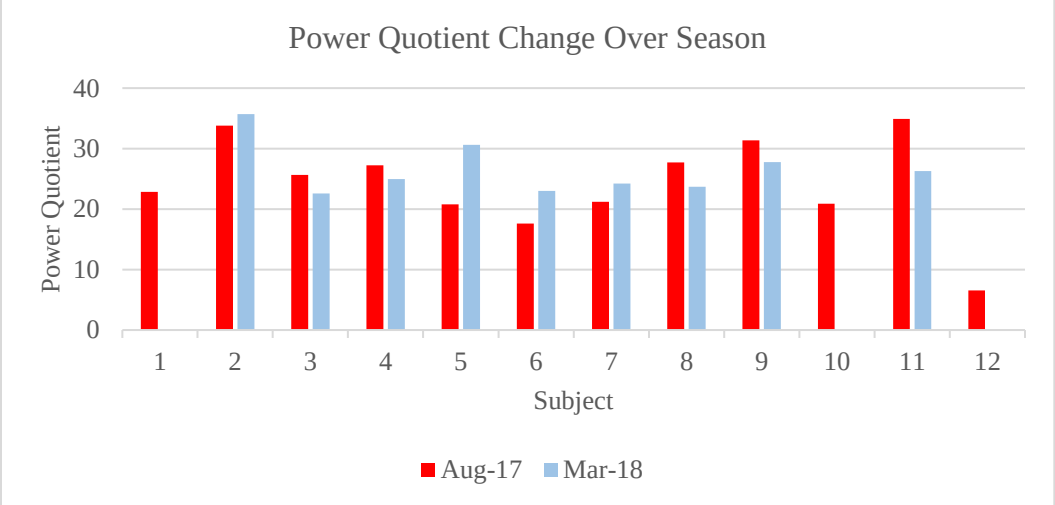

Figure 7 – Power Quotient Change Over Season

Through the course of the season, injuries and treatments were tracked and documented through *Sportsware*, an electronic medical record keeping program. Using this program, statistics were compiled from the 2018-2019 season for the team that this study followed. Through the course of the season, this team had a total of 34 injuries. Of the 34 injuries, 22 fell within the parameters of what the LESS's intervention can affect. This includes injuries to the lower extremity, through the feet, ankles, knees, and hips, as well as through the core and back. Injuries excluded involved medical conditions such as skin diseases or sickness, concussions, or injuries to the upper extremities including the shoulders, elbows, wrists, and fingers. Of the 22 injuries that fell within the LESS's evaluation, 13 were muscular injuries and 9 were structural (fractures, joint sprains). From these 22 injuries, a total of 77 days of participation were missed across the entire team. This does not include days where athletes participated in limited drills or played limited minutes.

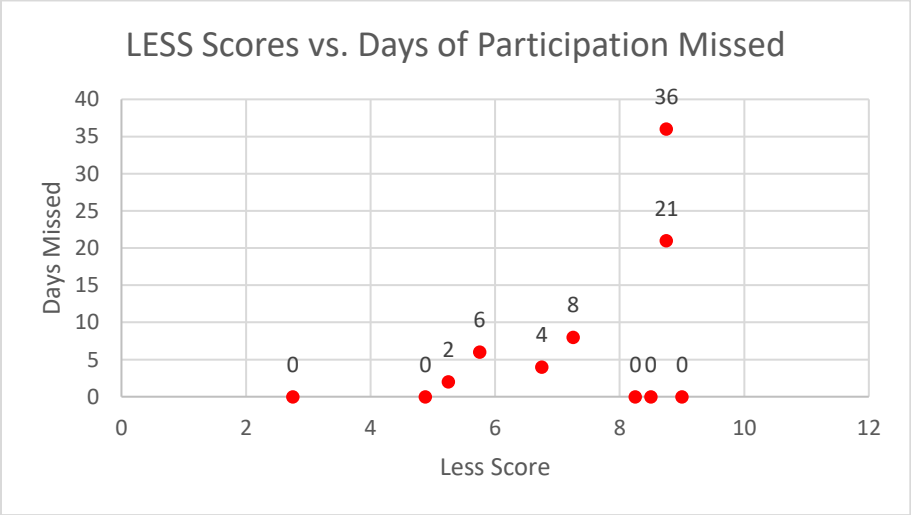

Figure 8 – LESS scores vs Days of Participation Missed

Figure 8 shows the relationship between LESS scores and days of participation missed across the season. The two subjects with the highest time out of participation missed 36 and 21 days respectively. These two subjects also had some of the higher LESS scores of the group,

both scoring an 8.75. This helps to show the correlation between high LESS scores and injury rates. As the total days of participation missed decreases, LESS scores improve. Additionally, the subjects with better LESS scores, even if they did suffer an injury, only missed between 2-8 days rather than entire months to recover from injury.

In conclusion, for our subject group participating in LESS testing, improvements were seen in LESS scores over the duration of the year. Along with improvements in LESS scoring, a positive correlation was found between high LESS scores and injuries limiting participation. While athletic performance evaluation through power quotient showed varied results, the application of the LESS test to this team was surely beneficial, and aided in the prevention of injury, if not the identification of the athletes more predisposed to incident. Data collection will continue into next year with both returning subjects, allowing for a longitudinal perspective, as well as with new subjects, both with freshmen and transfers, allowing for new interventions.

Appendix

Appendix A – Introductory script for Women's Basketball LESS study

We are planning to do a research project over the next few years to decrease injuries and improve conditioning for your team.

The project will last through the entire school year for 3 years but won't take more time than you normally commit to basketball. We will do the normal testing that will be done for injury prevention and conditioning during basketball season. But we will put all the data together this year and make adjustments to improve you as individuals.

Since we are trying to be more inclusive with the all of your data, we thought we should formally ask permission of each of you.

Everything that we will do is standard and usual for basketball. You will be tested 5 times throughout the year to be sure that your fitness is improving and you are remaining healthy.

The testing will consist of vertical jumps (on the Just Jump mat, with an OpenBarbell and with the Vertec), a standing broad jump, a 10 yard sprint, a 20 yard agility drill, a hex bar deadlift for everybody, with a hang power clean for the returning athletes, and jumps with a bar. We will also videotape a drop jump off a 12 inch box to see how you land. These will be done during regularly scheduled team conditioning sessions.

Your participation with the team won't change whether or not you agree to be a part of this project.

Appendix B – LESS subject consent form

An exercise intervention to identify and lessen injury risk in Division II collegiate women basketball players

Andy Gonzalez, ATC, CCP
Agonzalez2@flsouthern.edu
863-680-6205

Zachary Wallace, MBA, CSCS
zwallace@flsouthern.edu
863-680-4563

1. This is a research effort to assess the impact of a long term injury prevention and conditioning program on collegiate women basketball players.
2. Your participation is voluntary.
3. Your participation will require you to participate performance testing during team conditioning sessions 5 times per year.
4. Your participation will last 60-90 minutes during each testing session.
5. Testing will consist of:
    a. Vertical jump
    b. Standing broad jump
    c. Power ratings from a measure from the Just Jump Mat and an OpenBarbell
    d. A timed 10 yard sprint
    e. A 20 feet agility test
    f. A hex bar deadlift and for returners, a hang power clean
    g. A videotaped Landing Error Scoring System measure from a drop jump off a 30 cm (12 in) box
    h. An orthopedic screen and a muscle activation evaluation
6. Your participation will require you to work with the research team of the athletic trainer and strength coach at Florida Southern College.
7. Your participation will require you to perform several jumps, lifts and sprints during each testing session.
8. Your participation will require you to have basic anthropometric tests completed before the treatment, which include: Height, weight, body composition, and body mass index.
9. You can maintain your normal eating and exercise schedule throughout the project.
10. You may withdraw from participating in this research at any time without negative consequences or penalties; likewise, refusal to participate will not result in any penalty to you or loss of your athletic scholarship.
11. Participation presents minimal risks to you.
12. Public dissemination will occur in academic research journals and presentations with results of the research presented in summary form only with no individual identification in the analysis.

13. You will not receive financial compensation for your participation in this research study.
14. Your signature at the bottom of this form indicates that you have given voluntary consent to participate in this study.
15. Please contact **Dr. Mick Lynch at 863-680-6205 or at jlynch@flsouthern.edu** if you have questions regarding your rights as a subject in this study.
16. You may also contact Kyle Fedler, PhD, who is the Provost and Chief Academic Officer of Florida Southern College at 863-680-4124, if you have questions regarding your rights as a subject in this study.
17. This research protocol and informed consent has been reviewed and approved by the Florida Southern College Human Subjects Review Committee (HSRC) for use from September 2017 to September 2018.

☐ ***By checking this box, you acknowledge that you have read and understand the above material and that you understand what this research involves.***

By signing below, you are agreeing and consenting to participate in the research.

_____

Participant PRINTED Name

_____

Participant Signature Date

Appendix C – LESS jumping prompt

L.E.S.S. Prompt

English Instructions:

Participants will start with an athletic stance on top of box. Will then jump forward off the box just past the mark indicated on the floor and then immediately perform a jump vertically upward as high as possible.

Spanish Instructions:

Las participantes comenzarán con una póstura atlética en la parte superior de la caja. A continuación, saltará hacia adelante de la caja justo después de la marca indicada en el piso y luego realizar inmediatamente un salto verticalmente hacia arriba lo más posible.

Swedish Instructions:

Deltagarna kommer att börja i en atletisk ställning uppe på boxen. Du kommer hoppa framåt precis förbi markeringen som anges på golvet, och så fort du landat vill du omedelbart hoppa uppåt så högt som möjligt.

Appendix D – LES scoring rubric

Frontal-Plane Motion	Sagittal-Plane Motion
1. Stance width	**6. Initial landing of feet**
☐ Normal (0) ☐ Wide (1) ☐ Narrow (1)	☐ Toe to heel (0) ☐ Heel to toe (1) ☐ Flat (1)
2. Maximum foot-rotation position	**7. Amount of knee-flexion displacement**
☐ Normal (0) ☐ Externally rotated (1) ☐ Internally rotated (1)	☐ Large (0) ☐ Average (1) ☐ Small (2)
3. Initial foot contact	**8. Amount of trunk-flexion displacement**
☐ Symmetric (0) ☐ Not symmetric (1)	☐ Large (0) ☐ Average (1) ☐ Small (2)
4. Maximum knee-valgus angle	**9. Total joint displacement in the sagittal plane**
☐ None (0) ☐ Small (1) ☐ Large (2)	☐ Soft (0) ☐ Average (1) ☐ Stiff (2)
5. Amount of lateral trunk flexion	**10. Overall impression**
☐ None (0) ☐ Small to moderate (1)	☐ Excellent (0) ☐ Average (1) ☐ Poor (2)

Figure 1 –Landing Error Scoring System (LESS)

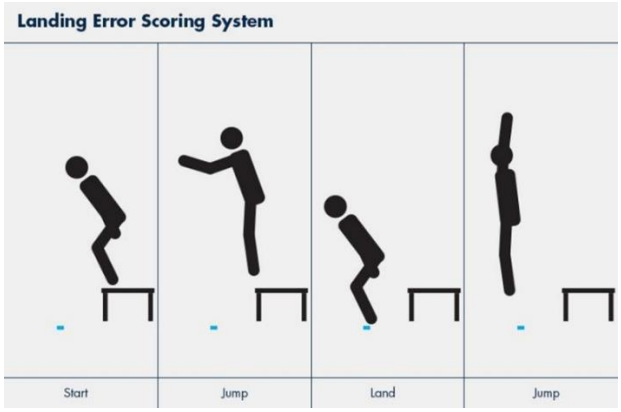

Figure 2- LESS scoring conducted August 2018

	1	2	3	4	Average	Standard Deviation	Group
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6	9	10	9	7	8.75	1.26	3
7	7	11	9	9	9.00	1.63	3
8	4	6	10	7	6.75	2.50	2
9	9	6	9	5	7.25	2.06	2
10	0	8	2	1	2.75	3.59	1
11	6	8	5	4	5.75	1.71	2
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Figure 3 – LESS Score Differences with group

Subject	Group	Differences
1	2	-3.08
2	3	3.75
3	2	0.13
4	2	-3.25
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6	1	-6.08
7	2	-4.33
8	1	-5.42
9	1	-4.25
10	1	
11	3	
12	3	
13	2	

Figure 4 - LESS Scores Change Over Season

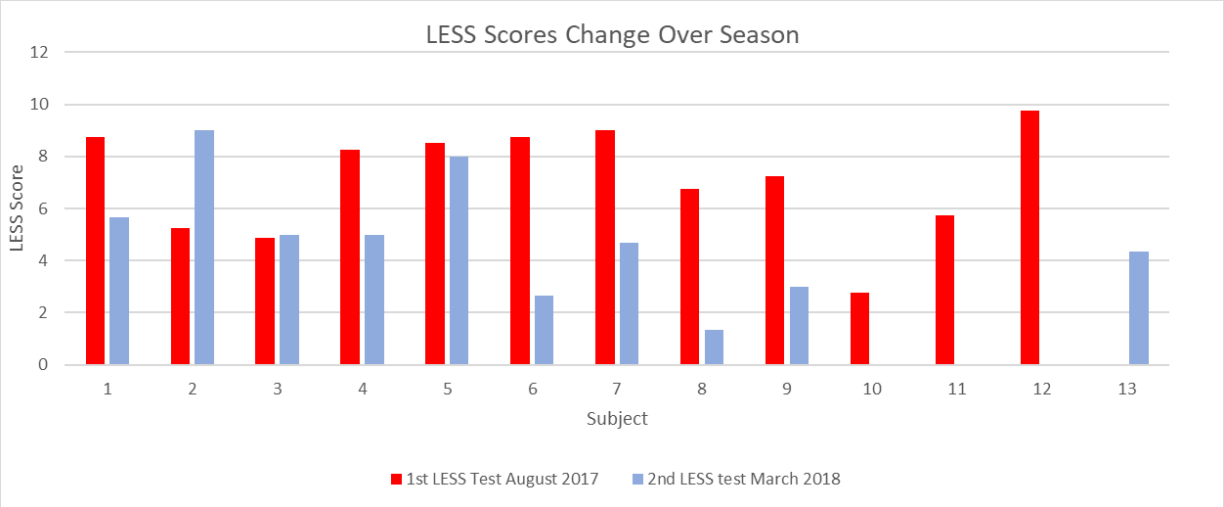

Figure 5 – Athletic Performance Evaluations Conducted August 2018

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144.8	SR	25.66	WHITE	20	0.76	72.5	1.61	6.72	6.61	6.665
145.0	JR	34.89	GRAY	23	1.51	88.5	1.74	7.19	6.90	7.045
129.8	FR	33.80	GRAY	24.7	0.9	86	1.6	6.79	6.65	6.72
197.2	FR	6.54	GRAY	13.7	0.57		2.15	8.75	8.77	8.76
126.0	FR	31.38	GRAY	19.8	1.2	71.5	1.74	7.44	7.02	7.23
189.6	FR	#DIV/0!	GRAY							#DIV/0!
156.0	JR	20.78	GRAY	21.1	1.14	79	1.65	7.03	6.86	6.945
155.8	SO	#DIV/0!	GRAY							#DIV/0!
179.8	FR	17.61	GRAY	19.9	1.14	84	1.74	7.48	7.27	7.375
138.4	FR	22.23	GRAY	16.7	0.9	67	1.6	7.16	6.95	7.055
125.0	FR	27.26	GRAY	16.8	0.94	66	1.82	7.42	6.95	7.185

Figure 6 - Power Quotient Differences

Differences	
1	0
2	1.92
3	-3.07
4	-2.29
5	9.86
6	5.37
7	3.04
8	-4.01
9	-3.64
10	0
11	-8.59
12	0
13	0

Figure 7 - Power Quotient Change Over Season

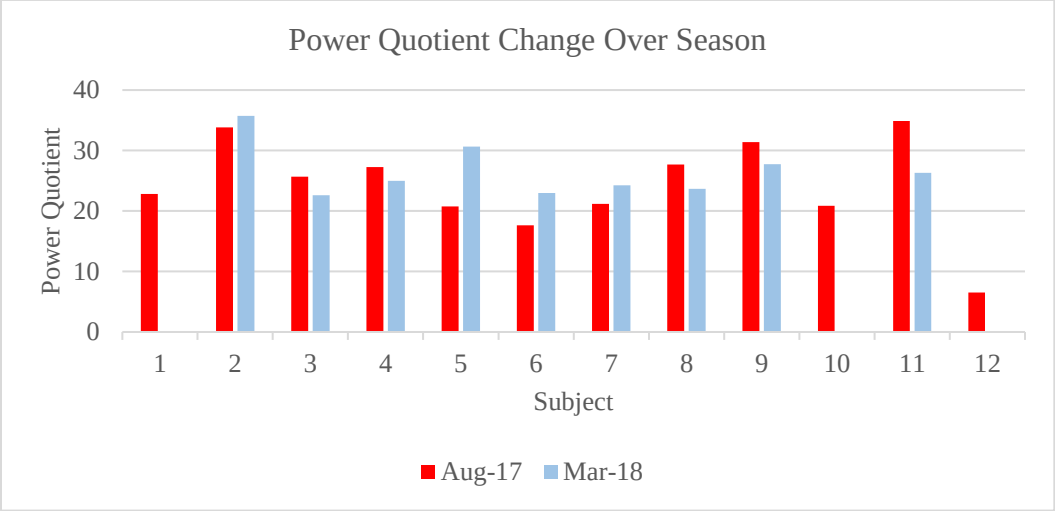
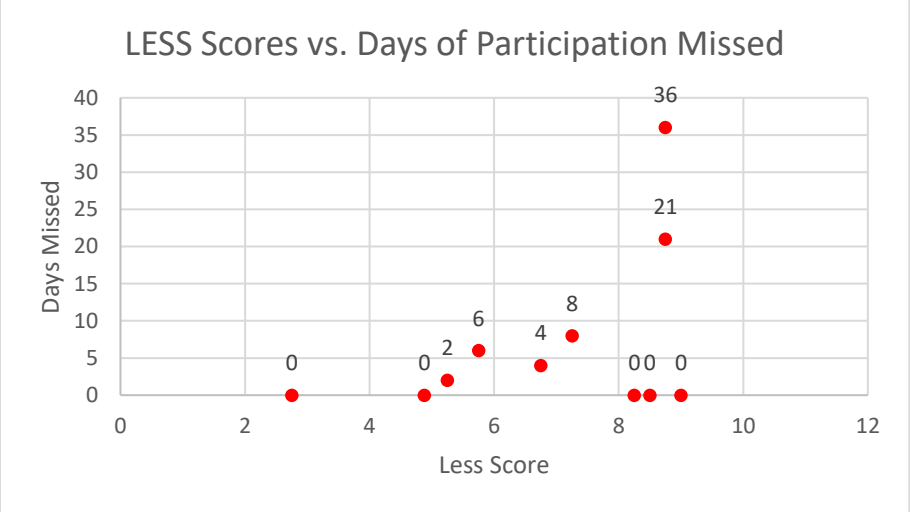


Figure 8 - LESS scores vs Days of Participation Missed



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