

CHAPTER V DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

A significant difference in FMS scores between the line-of-scrimmage group and the skill group, as well as between the line-of-scrimmage group and the combo group, was demonstrated. There was no significant difference between the combo group and the skill group tested. For the correlation analyses, significant negative relationships were demonstrated between FMS scores, and player height, player body weight, and player relative body weight (BMI). The results of this study established that variables other than deficiencies in mobility and stability affect scores on the FMS.

Interpretation of Results

All but one of the variables investigated demonstrated a significant difference or relationship. The skill and combo groups' average score on the FMS was significantly higher than the line-of-scrimmage group. If the FMS is able to identify athletes who are at risk of becoming injured, the skill group should have lower injury rates than the line-of-scrimmage group because they scored higher on the test. The results of this hypothesis agree with the literature in that offensive and defensive linemen suffer the most injuries on a football team (Meisehimer, 1997; Mueller et al., 1996). However, not all of the literature drew the same conclusions as the findings in this study.

Zemper (1989) found that flankers/wide receivers, and running backs had the highest injury rate. He also found that of all defensive players, linebackers and halfback/cornerbacks, were injured the most, not defensive linemen. This is in contrast with the results of this study.

The literature did report that "there appears to be a direct relationship between the amount of contact a player gives or receives and the incidence of injury" (Mueller, Zemper & Peters, 1996, p. 18). In the same study, they found that the highest number of injuries occurred to offensive and defensive linemen. This is because the players in those positions are engaged in direct contact with other players on every play (Mueller et al., 1996, p. 18). Other positions do not experience as much contact as linemen. The results of this study concur with this statement. If linemen get lower scores on the FMS, they should theoretically suffer more injuries than other position players.

However, based upon the results of this study, it is not possible to conclude that the lower FMS scores or potential higher injury rates are the result of mobility and stability deficiencies. As Mueller and his colleagues stated, the higher injury rate in linemen is related to the amount of physical contact, not mobility and stability.

The results of the study found that taller players scored lower on the FMS. This means that they should be more likely to become injured as compared to shorter athletes. The findings of this hypothesis coincide with the research that found taller athletes are predisposed to a higher chance of injury than shorter athletes (Taimela, 1990; Watson, 1999). However, there is not conclusive evidence to show that the scores on the FMS were the result of mobility and stability deficits, or rather the increased height of the athlete. In football, linemen are usually the tallest players on the team. As discussed above, linemen are injured more often. Also, the FMS may be biased to taller individuals because “longer extremity length contributes to greater leverage” (Taimela, 1990, p. 209). The increased leverage can have a negative effect on the taller athletes’ ability to perform the tests of the FMS as compared to shorter individuals. An example of this would be with the tests that stress core stability, such as the trunk stability push-up. In a taller person, the center of gravity is farther away from the base of support. This places more stress on the muscles and supporting structures around the joints, making the test more difficult.

This study also demonstrated that heavier players scored lower on the FMS. Based upon the premise of the FMS, heavier athletes should have a greater chance of suffering more injuries than the lighter players suffer. The findings of this study concur with the literature that found heavier athletes suffer more injuries than lighter players (Bird, 1992; Kaplan et al., 1995; Pfeiffer & Mangus, 1998; Taimela, 1990). If a heavier athlete scores lower on the FMS, there is no conclusive evidence to claim that the lower score is the result of deficient mobility and stability. This is because heavier football players are usually linemen and, as discussed in the literature, they have higher injury rates because of the amount of physical contact they are exposed to. Also, with the increased mass of the athletes, there is greater force created during a collision, as compared to the impact with lighter players. This places greater force and stress the body parts as compared to a lighter player. It can also be argued that lineman have greater body fat percentages than other position players. This also places additional stress on the body and can predispose someone to an injury. Another assumption that can be made about heavier athletes is that they are not as physically fit as lighter players. As discussed in the literature, athletes who

are less physically fit are at a greater risk of injury (Pfeiffer & Mangus, 1998). As with the taller athletes, the FMS may be biased against heavier athletes. The heavier athletes tended to be the taller players. If they are taller, they are being exposed to the additional leverage stresses discussed previously.

It was found that athletes who had higher relative body weights scored lower on the FMS. Therefore, athletes who have higher relative body weights have a greater chance of suffering more injuries than players with lower Body Mass Indexes suffer. Since there is minimal research examining how relative body weight relates to the incidence of athletic injuries, no baseline exists to compare whether the findings of this study agree with the current literature. The findings in this study coincide with the literature that reported that in the National Football League (NFL) offensive and defensive linemen have the highest relative body weights (McArdle et al., 1999, p. 382). And, as mentioned, offensive and defensive linemen suffer more injuries than any other position. Therefore, it can be stated that a high relative body weight may predispose Division I-A football players to injury because athletes at this level are comparable to the players in the NFL in both height and weight. In view of the fact that taller and heavier athletes scored lower on the FMS, it is not surprising that athletes who had higher relative body weights scored lower on the test. Again, one would have to question whether the lower scores on the FMS were due to a lack of mobility and stability or rather an inherent unfairness of the FMS toward the individuals with higher relative body weights.

Conclusions

Prior to conducting this study, it was felt that the FMS could identify athletes who are at risk of sustaining injuries by evaluating deficits in mobility and stability. However, the findings of the study would question whether the scores achieved by the athletes on the FMS actually mirror mobility and stability. Results of this study show that lower scores on the FMS are seen in certain positions over other positions, and may not be necessarily exclusively connected to mobility and stability deficiencies. It was also found that taller, heavier, and higher relative body weight players achieved lower FMS scores than shorter, lighter, and lower BMI athletes. Therefore, it is difficult to determine if the lower scores attained by the athletes were due to insufficient mobility and stability or rather that the FMS is prejudiced towards those individuals. This would then make the FMS an invalid tool for locating high-risk athletes solely on the merits of mobility and stability. Prior to this study, it was declared that scores attained on this

assessment tool were directly related to an individual's mobility and stability. Now it can be said that this is not the case. The promoters of the FMS must recognize that other factors may also affect scores on the FMS, and not just deficits in flexibility and strength.

It can be concluded that athletic training professionals should not utilize the FMS as the sole means of identifying individuals who are at risk of sustaining injuries. The findings of this study discovered that additional factors could have an effect on the outcomes of this test. Also, some of the tests in the FMS may be inherently biased toward some of the athletes based upon their position and size. If athletic training professionals only address, and attempt to correct, the mobility and stability deficits identified in the test, they may not find and rectify the true potential risk factors that contribute to injuries in their athletes.

Based upon this study, it can be concluded that coaching staffs should not rely heavily upon the results of the FMS. If one of their athletes scores low on this test, a coach may feel that a particular athlete should not make the team, start, or get a lot of playing time because he is only going to get hurt during the course of the season. This can have a negative effect on a season because the coach may not play an athlete that could have positively contributed to the team's entire success.

Recommendations

It is recommended that other studies be conducted that examine other risk factors when developing "passing" scores for the FMS. Since player position, body height, body weight, and relative body weight were demonstrated to have a relationship to FMS scores, additional variables should also be considered as they relate to the outcomes of the FMS. If additional factors, such as playing surface, weather, aerobic fitness, and psychological variables are considered when developing norms, the outcomes of the test will likely be more reflective of an individual's mobility and stability deficits, as well as his potential likelihood of becoming injured. If other variables are utilized, individualized "passing" scores can be developed that are more indicative of mobility and stability deficits.

Conducting a study with a larger number of subjects is also recommended to determine if lower FMS scores coincide with higher injury rates. If it is found that athletes who score lower suffer more injuries, a follow-up study should be conducted to determine if the recommended, prescribed exercise progressions provided by the FMS do decrease the number of injuries in athletes. The purpose of this proposed experiment would be to demonstrate if following the

recommendations of the FMS aides in decreasing the likelihood of athletes getting injured from non-contact injuries.

A third recommendation is to employ the FMS as an additional screening tool to discover deficiencies in stability and mobility in athletes without making it the only approach for locating potential at risk athletes. It is at this approach that the FMS, at its current design, is an effective assessment tool. This is proposed because tests, such as manual muscle testing and goniometry measurements, do not assess multiple and bilateral body segments at one time in functional patterns like many of the tests in the FMS. They are non-functional because they are purely monoplane, non-weight bearing movements which is not how the human body moves for most sports, particularly football. Therefore, athletes who perform the FMS are screened in multiplane, weight-bearing movements that replicate how they move during activity.

Implications for the Athletic Trainer

As previously stated, injury prevention needs to be a primary goal of any athletic trainer, especially within Division I-A college football. Many risk factors contribute to the likelihood of athletes becoming injured during the course of an athletic season. If athletes get injured, they are unable to participate at their optimal level, or even worse, are not able to play at all. The current environment in Division I-A football is one that demands that the best players be on the field at all times in order to win. Continuous efforts should be made to study the methods designed to identify athletes who are at a greater risk to injury. By developing and implementing evaluative tools intended to identify weaknesses and deficiencies that can predispose athletes to injuries, sports medicine professionals can be one step closer to decreasing the incidence of injuries within athletic programs.

Based on this study, the athletic training professional might best spend his or her time utilizing additional assessment methods, and not solely the FMS, as an approach for identifying additional variables that may help the athletic trainer develop a more comprehensive profile of the individual athlete.