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Predicting Athletic Success: Factors Contributing to the Success of NCAA Division I AA Collegiate Football Players

*Martin Spieler, Daniel R. Czech, A. Barry Joyner, Barry Munkasy
Georgia Southern University*

*Noah Gentner & J. Long
Ithaca College*

ABSTRACT

The recruiting process within the United States collegiate football culture calls for coaches to identify prospective student-athletes who would be most successful at their institution. Humara (2005) argues that while coaches are experts in the identification of physical attributes needed for success, they may lack the ability to identify psychological skills. In addition, Niednagel (2004) would contend that environmental factors also contribute to the athletes' likelihood of success in sport. Participants were 108 male football players (35 linemen, 18 tight ends/linebackers, 47 skill players, 8 special teams) from 6 teams in a NCAA Division I Southeastern conference. Using multivariate analysis of variance and discriminant analysis, the current research attempted to determine factors from demographic information, the Ten-Item Personality Inventory, and the Athletic Coping Skills Inventory-28, that most accurately predicts starting status in United States collegiate football players. Results showed that there was a significant difference between starters and non-starters for age, high school size, and coping with adversity, that predicted starting status 79.6% of the time.

Introduction

Every year, college football coaches in the United States embark on the monumental task of trying to select athletes that will be successful at the Division I level. Coaches may examine an athlete from many perspectives in order to determine if they will be successful in their program. This initial assessment most often includes an examination of physical ability as coaches often attribute athletic success to talent and physical characteristics (Hyllegard, Radlo, & Early, 2001).

The field of sports psychology is based on the idea that psychological attributes and mental skills also contribute to athletic success (Laguna & Ravizza, 2003; Smith, Schultz, Smoll, & Ptacek, 1995). Still, many question how much of an athlete's success stems from physical attributes, and how much stems from psychological attributes. Coaches have often relied on informal judgments of psychological factors to determine potential to succeed (Humara, 2000). Can athletic success at the collegiate level be predicted using psychological traits in conjunction with their physical abilities?

During the recruiting process, contact between a college football coach and a prospective student-athlete is limited. National Collegiate Athletic Association (NCAA) regulations call for specific periods in which coaches can evaluate or make contact with an athlete or their family (NCAA, 2004). Due to the limited contact, coaches may rely on demographic questionnaires that highlights an athlete's physical attributes (height, weight), academic qualifications (QPA and SAT or ACT results) and physical ability (40 yard dash, bench press maximum, squat maximum) to develop an initial contact list (NCAA, 2004). School visits, along with game attendance, allow coaches to evaluate athletic play and speculate about an athlete's psychological characteristics. During an evaluation period, off-campus contact is not permitted with the athlete or their families. Therefore, coaches may rely on high school coaches, guidance counselors, and/or teachers to gain further perspective on the athlete's personality. While coaches are skilled in identifying the physical characteristics needed to succeed athletically, they may lack the skills to make a psychological assessment (Humara, 2000).

The lack of psychological assessments may result in two types of recruiting errors in collegiate football (similar to those made in statistical analysis). The first error may occur when a coach accepts an athlete into their program that does not have the ability to contribute at the Division I level. This error could result in a monetary loss for athlete support, expenditure of a scholarship spot, and exclusion of another prospective athlete. The second error may occur when an athlete is rejected because the recruiter does not think they have the ability, but in actuality the athlete does have the ability to play. To compound the result of this error, the athlete may play for another team, possibly a rival or conference competitor. Psychological skills assessment in conjunction with physical attributes may have a significant impact on the identification of those athletes that may have future athletic success (Humara, 2000).

Griffith (1928), the father of modern sport psychology noted that athletes and coaches cited mental alertness, headiness, psychological moment, jinx, break in the game, and overconfidence as factors contributing to athletic proficiency. More specifically, Griffith used the terms 'fight,' 'super-human effort,' and 'mental resolve' as key qualities of successful football players. In Humara's (2000) examination of successful collegiate athletes, he found that vigor, aggression, leadership, ability to cope with stress, coachability, confidence, social support, and positive self-concept as the most likely contributors to high performance. Differences between athletes and non-athletes on various psychological attributes have been shown using a variety of personality models and scales (Schendel, 1965; Slusher, 1964; Werner, 1960). Furthermore, research has been presented that shows significant differences between elite and less-successful athletes, as defined by success at national championship competitions, results of the Edwards Personal Preference Schedule (EPPS; Williams, Hoepner, Moody, & Ogilvie, 1970) and the Eysenck Personality Inventory (EPI; Morgan, 1968). More recent research has identified motivation as an

important component of athletic success (Duda & Treasure, 2006; Gould, Dieffenbach, & Moffatt, 2002). Along with motivation, research has also identified significant differences between elite and less successful athletes in confidence, concentration, task orientation, anxiety management, and coping skills (Elferink, Visscher, Lemmink, & Mulder, 2004; Gould, Eklund, & Jackson, 1992; Reilly, Williams, Nevill, & Franks, 2000). More specifically, elite athletes in these studies were found to possess higher levels of confidence and concentration, have more of a task orientation, and to perceive anxiety as facilitative. Furthermore, research has identified the ability to cope effectively with unforeseen events and distractions as a significant difference between successful and less successful athletes (Gould, Eklund, & Jackson, 1992; Gould, Guinan, Greenleaf, Medbury, & Peterson, 1999). Despite these findings, Williams and Reilly (2000) have suggested that it is still difficult to determine strong psychological differences between elite athletes and their less successful counterparts. Taken together this research provides justification for further research that examines the differences between successful and less-successful athletes at the collegiate level.

In 1992, Niednagel developed “brain typing” as a tool for identifying which athletes are most likely to be elite. Based on a measure of personality factors similar to Catell’s (1949) 16 PF, Niednagel utilized Meyers-Briggs 16 distinct brain types with each type predicting success with one sport more than others. Correlation between brain type and success, according to Niednagel, are due to inborn mental, physical, and spatial characteristics of each brain type. For example, the ESTP (Extraverted, Sensing, Thinking, Perceiving) brain types are historically the NFL’s best quarterback prospects, including Johnny Unitas, Dan Marino, Terry Bradshaw, and Peyton Manning. Niednagel also prescribes ideal brain types positionally including running back (ISFP; Introverted, Sensing, Feeling, Perceiving), offensive lineman (ISFP; Introverted, Sensing, Feeling, Perceiving), and those who are successful on defensive (ESTP; Extraverted, Sensing, Thinking, Perceiving). While the applications of Niednagel’s principles have yet to sustain an academic review, the applied value of his work in the field and the anecdotal evidence of success shows advantageous predictive qualities.

Niednagel’s most publicized brain typing successes were the assessment of Indianapolis Colt, Peyton Manning, and former San Diego Charger, Ryan Leaf. Niednagel consulted with the Indianapolis Colts, who consequently decided to pick Manning over Leaf as the first round draft pick. Manning has gone on to produce some of the top quarterback statistics in the NFL while Leaf retired after a brief career.

While there is anecdotal evidence of brain typing, Manning’s environment may have played a significant role in his development. Niednagel acknowledges that while 60% of athletic ability stems from brain typing, 40% results from environmental factors including how an athlete was reared and coached (Niednagel, 2004). Similarly, research has suggested that environmental factors such as team cohesion, effective coach-athlete communication, and positive support from significant others can be important factors in helping an athlete meet their full athletic potential (Gould Greenleaf, Chung, & Guinan, 2002; Gould, Greenleaf, Guinan, & Chung, 2002; Gould, Guinan, Greenleaf, Medbery, & Peterson, 1999). In other words, Manning may have reached his full potential and his successful personality through the modeling he had from his father, former NFL Quarterback Archie Manning. Therefore, the past, the person, or situation alone cannot

predict the behavior of a person, all facets need to be considered.

Although research has suggested that psychological factors may play an important role in athletic development (Morgan, 1968; Schendel, 1965; Slusher, 1964; Werner, 1960), psychology alone does not determine the collegiate success of a football player (Humara, 2000; Niednagel, 2004). Therefore, the purpose of this study was to determine what factors predict starting status of a collegiate football player. Through predictive discriminant analysis, the purpose of the research was to provide a physical, psychological, and environmental framework that is effective in predicting the starting status of a collegiate football player.

Method

Participants

Participants consisted of 108 collegiate varsity football players from five teams in a NCAA Division I conference in the Southeastern United States. All athletes had participated in intercollegiate football during the prior football season. Contact was made with each institution and they were informed of the purpose and procedures of the current study. Each athlete was informed that their participation was completely voluntary and completed an informed consent form prior to participation.

Instrumentation

The first portion of the questionnaire consisted of several demographic questions including age, athletic class, position, height, weight, athletic test results (i.e. bench press maximum, back squat maximum, 40 yard dash), high school academic information (i.e. QPA, standardized test results, high school size - large high school participation was represented by a one, and small high school participation was represented by a zero, state of competition), and parental information (i.e. parental education level, with whom the participant resided), and personal athletic accomplishments of the previous season (i.e. starting status and post-season accolades).

Athletic Coping Skills Inventory - The ACSI-28 (Smith et al. 1995) is a sport-specific scale consisting of 28 items. It measures the psychological processes of athletes on seven subscales; coping with adversity, peaking under pressure, goal setting/mental preparation, concentration, freedom from worry, confidence and achievement motivation, and coachability. The internal consistency for the total ACSI-28 score was high for both males (.84) and females (.88) (Smith et al., 1995). Test-retest reliability coefficients were high for the total score and all of the subscales (.55-.77) (Smith et al., 1995). Interscale scale correlations and correlations with other scales exhibited acceptable validity for each subscale, although they may be sport specific (Smith et al., 1995).

Ten-Item Personality Inventory (TIPI). The TIPI (Gosling, Rentfrow, & Swann, 2003) is a 10-item brief scale consisting of two descriptors designed to measure each pole of the Big Five Personality model; neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (Gosling, Rentfrow, & Swann, 2003). Each item is preceded by the statement, "I see myself as..." Statements are scored on a 7-point Likert Scale ranging from "Strongly

Disagree” to “*Strongly Agree*.” Scores of opposite poles (e.g. extroversion and reverse scored introversion) were combined to represent a cumulative score for each component of the Big Five Model. Test-retest reliability ($r = .72$) and external correlations ($r > .90$) have been established (Gosling et al., 2003). The TIPI exhibited identical convergent and discriminant validity as the full Big Five Inventory ($r = .77$) (Gosling, Rentfrow, & Swann). With similar reliability and validity measurements as the full inventory, the TIPI was chosen as a participant-friendly instrument that would limit tediousness (Gosling, Rentfrow, & Swann).

Procedures

Prior to initializing this study, ethical clearance and research approval was granted by the Georgia Southern University Institutional Review Board. All eight collegiate football teams in the conference were contacted by telephone. At that time, the purpose of the study and the extent of the athletes’ participation was explained. Of the contacted teams, five agreed to participation in the study.

The surveys were administered through an online site. An e-mail was sent to a contact at the participating school in which the purpose of the study was explained along with the extent of participation. In the e-mail, each participant was informed that their participation was completely voluntary and that participation in the study could be discontinued at any time without penalty. Participants were given the primary investigator’s e-mail address, an opportunity to ask any questions, and then read and electronically accepted the terms of the informed consent form. The participants were told that the total administration of the surveys would take approximately 10 - 15 minutes. Responses were submitted online and compiled in a Microsoft Excel document. All data were saved to a disk that was placed in a secured area. E-mail participation reminders were sent out the following two weeks, for a total of three e-mails.

Data Analysis

Factors from the demographic questionnaire, and subscales from the ACSI-28 were compiled for each athlete utilizing SPSS 11.0. In order to determine the variables needed to predict athletic success, the differences between the groups were determined. A multivariate analysis of variance (MANOVA) was utilized to determine if success groups (non-starters, starters, or All-Conference) differed on the provided dependent variables. Following a significant difference between groups, stepwise discriminant analysis was used to describe the group differences and to determine how accurately success could be predicted. Stepwise discriminant analysis was used because of the exploratory nature of the study. The structure matrix was used to describe the underlying structure differentiating the groups. The linear discriminant function showed the subset of variables that were most useful in predicting the success group of an athlete.

Results

The sample included 44 freshman, 26 sophomores, 19 juniors, and 19 seniors with a mean age of 20.13 years. There were 23 starters and 11 who reported earning All-Conference honors the previous season. There were 35 linemen, 47 backs and receivers, 18 tight ends and linebackers, and 8 special teams. Due to the limited number of participants, several factors were

not included in the analysis including, All-Conference status and TIPI scores, as the remaining factors still provided a reliable measure of psychological, physical, and environmental contributions. Additionally, the small number of participants did not allow for an analysis to be performed for each position group. A one-way MANOVA was conducted on a limited number of physical, environmental, and psychological responses. The assumption of multivariate normality was not tested specifically, however, the skewness and kurtosis values for each variable were within acceptable ranges. Also, Stevens (2002) states that the multivariate test appears to be robust to violations of this assumption and Type I error is not affected greatly. From a physical standpoint, variables included were those that may appear on a collegiate football questionnaire including height in inches, weight in pounds, back squat maximum, bench press maximum, and forty yard dash. The psychological variables included each subset of the ASCI-28 while environmental factors were age, high school size, state of competition, mother's education level, father's education level, parental presence while living at home, high school GPA, and SAT total. The results of the MANOVA showed significant main effect for Starting Status, $F(20,82) = 2.08$, $p = .011$, $\eta^2 = .336$. These significant results were followed by a stepwise discriminant analysis. Three variables emerged from the discriminant analysis: age, high school size, and coping with adversity. Table 1 shows the mean differences between starters and non-starters on the significant variables. Starters were older, played in larger high schools, and had higher coping with adversity scores than non-starters. The structure matrix supports the combination of these three variables as being responsible for the separation of the groups (see Table 2). When examining the predictive ability, 79.6% of the participants were accurately classified into their success group using the combination of age, high school size, and coping with adversity.

Discussion

How much of an athlete's success is contingent upon physical, psychological, and environmental factors? The results of the current study supported the hypothesis that psychological and environmental factors contribute to the starting status of collegiate football players. While observation would tell you that physical factors are able to discriminate between position groups, an underlying structure characterized by age, high school enrollment, and coping with adversity was able to determine starting status. The emergence of age and high school level of competition as predictors of starting status in Division I collegiate football may be explained by the concept of experience.

Researchers have contended that the level of mastery of an athletic movement is directly related to the number of practice hours (Baker, Cote, & Abernathy, 2003; Helsen et. al, 2000). On average, athletes do not reach full mastery until they have logged 10,000 hours of practice (Helsen et. al, 2000). Simon and Chase (1973) use the "10-year rule" as the minimum amount of practice time associated with expertise in team sports. While Pop Warner football is offered beginning at age six, optimal motor performance of boys is related to skeletal and cognitive maturity, which occurs between the ages of 10 - 12 (Clark, 1971). Additionally, Abernathy, Cote and Baker (2000) found that expert performers accumulate more hours of sport-specific practice after the age of 12 than nonexpert performers. Consequently, boys may be most likely to reach task mastery in a team sport between the ages of 20 - 22.

Côté (1999) also state that the “10-year rule” is in effect when only learning one skill. This is pertinent when considering the implementation of high school size in recruiting. High school size was considered large if it participated in a classification of 4A or above based on student body size. Small schools were classifications of 3A and below. While smaller schools may be playing both sides of the ball, or “Ironman Football,” larger school athletes may be able to hone their abilities at one position. Furthermore, large high school programs may have the advantage of implementing a more collegiate style of football with a more elaborate playbook due to the number of players on their roster.

A large school athlete may spend more time with coaches because of the importance of sport at that level and thus may learn a more in-depth football philosophy as well as more position specific techniques. This concept may decrease the number of years needed to obtain skill mastery as it increases the number of focused, directed practice hours an individual obtains in a given season. This is consistent with Bloom’s (1985) statement that coaching is central to the development of expertise in sport. As such, the opportunity that athletes at larger schools have to spend time with coaches may contribute to their future success.

Coping with adversity as a predictor of success in elite athletes is also a substrate of experience and is consistent with previous research (Gould, Eklund, & Jackson, 1992a, Gould, Guinan, Greenleaf, Medbury, & Peterson, 1999.) Coping with adversity is the ability to remain emotionally stable and positive during competition no matter the situation (Weinberg & Gould, 2003). An athlete who has experienced adversity in previous endeavors may be more likely to be able to adequately cope with the adversity associated with being a collegiate student-athlete.

Mahoney, Gabriel, and Perkins (1987), in their development of the Psychological Skills Inventory Survey (PSIS R-5), argue that athletic coping is the overarching concept that includes other psychological skills that are contained in the ACSI-28 utilized in the current research. Consequently, the ability to cope with adversity allows for athletes to continue the utilization of other psychological skills. Researchers have stated that athletes utilize a wide array of coping strategies including mental imagery, task focus, thought control, and positive focus and orientation (Dale, 2000; Gould, Eklund & Jackson, 1992; Hardy, Jones, & Gould, 1996). These coping strategies correlate with the ACSI-28 subscales of goal setting/mental preparation, concentration, freedom from worry, and confidence and achievement motivation. Consequently, although coping with adversity may be the overarching concept that predicts starting status in collegiate football players, it may be masking the other psychological skills implemented in coping.

The implications of these findings for coaches, recruiters, and sport psychologists are positive. Unlike Niednagel who contends that a majority of an athlete’s ability is contingent on predetermined factors, this research shows that success may be influenced by adaptable factors. However, a recruiter, faced with a decision of choosing between two similar athletes, may want to consider the athlete’s level of competition as the determining factor as this experience is constant. Conversely, a coach or sport psychologist can teach an athlete how to effectively cope with adversity. Weinberg and Gould (2003) state that implementing pressure situations in a

practice context as a coping strategy is often utilized by elite athletes. They state that as you become more acclimated to deal with the adversity in practice, you may be less likely to be affected by it in performance situations. This strategy is most effective when the practice situation accurately resembles the performance stressors. However, athletes who have actually experienced these situations may be best prepared to cope with the adversity.

The use of pressure situations in practice can be supplemented by the teaching of other coping strategies in sport psychology consulting sessions. Some strategies that have been shown to be effective are negative thought stopping and implementation of positive focus and positive orientation, concentration exercises, mental imagery of an athlete performing well in adverse situations, and task focus (Dale, 2000; Gould, Eklund & Jackson, 1992; Hardy, Jones, & Gould, 1996). Consequently their ability to concentrate and maintain positive self-efficacy allows for them to perform in adverse game situations.

The analysis, however, did not indicate that physical factors included in collegiate questionnaires were able to contribute to the prediction of starting status. This is most likely due to the inclusion of all position groups in the analysis. There is a large amount of variance of physical factors between position groups. For example, a non-starter that is a back or receiver may have the same 40-yard dash time as a starter at linebacker or tight end, and be faster than a starting lineman. Therefore, the analysis was not able to distinguish between what physical factors were needed to start in collegiate football. Future research that includes a larger population and individual analysis on position groups may reveal a clearer distinction regarding physical factors that contribute to starting status.

Additionally, the participant pool limits that generalization of this research. The majority of the participants (81%) were members of one institution. The coaching and playing style of this team may bias the results of the current research. Further research needs to be conducted in which a more varied participant pool allows for application across Division I football.

In addition to population needs for future research, the results lend itself to a variety of directions for future investigation on success in collegiate football. Lazarus and Folkman (1984) defined coping as a process of constantly changing cognitive and behavioral efforts to manage internal or external demands that are considering as exceeding one's own abilities. Modifications in coping strategies may be susceptible during the early collegiate career. Therefore, further research on the construct of coping with adversity may include investigations of changes in coping strategies over time, specifically as a collegiate athlete progresses from their freshman to sophomore year. Furthermore, a longitudinal study that examines changes in psychological skills from high school through their college career and how they correlate with starting status and success may allow for a more thorough understanding of the phenomena.

Athletic coping strategies can be developed through adverse athletic situations or adverse life situations. A qualitative analysis of the implications of adverse situations on an athlete's ability to cope with adversity could help describe the phenomenon more fully. Furthering this research, there is a need for an examination of the types of coping strategies, task-focused versus emotion-focused, that correlate most with success. Lazarus and Folkman (1984) suggest that problem-focused coping is more effective in situations that are susceptible to change while emotion-

focused coping is utilized in unchangeable situations. As a situation specific paradigm, a qualitative examination of the use of problem-focused and emotion-focused coping during athletics would allow for further extrapolation of their correlation with success.

Future research could also include variables that were not included in the current research that may also contribute to success in collegiate football such as scholarship status, transfer status, number of high school sports participated, total years of participation (number of practice hours), parental relationships, parental personal athletic participation, parental level of athletic involvement, socioeconomic status, number of siblings, birth order, sibling's athletic participation, sibling's athletic success, competitiveness, win-orientation, and goal-orientation.

In conclusion, this research showed that age, high school size, and coping with adversity may be predictors of starting status in collegiate football. The prevalence of experiential factors as descriptors of athletic success may be a result of the amount and intensity of practice, as illustrated by the "10-year rule," (Simon & Chase, 2003). The concept of coping with adversity as an overarching psychological skill is also plausible. However, further research needs to be conducted to determine the extent of this relationship and to examine other possible contributors to starting status in collegiate football.

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