

Literature Review for Problem Statement: The problem of the study is to investigate factors contributing to the physical development of National Collegiate Athletic Association Division I collegiate athletes.

A review of the literature in the area of physical development of athletes revealed several key categories of research that have relevance and impact on the problem being studied. These categories include factors such as nutrition and supplementation, societal, cultural, and media pressures, steroids, and strength and conditioning programs. All of these topical areas were researched and were found to have an impact on the physical development of athletes at the Division I collegiate level.

Nutrition and Supplementation

Improved nutrition is often cited as a reason why athletes at the Division I level are more physically developed than their counterparts from years past. The growing use of nutritional supplements has also contributed to this line of thinking as well. A variety of studies were reviewed within the relevant literature on this topic and a number of insights and conclusions were revealed. The literature revealed key topical areas of protein, supplement, carbohydrate, and fat intake, all of which had profound effects in body composition and physical development for athletes.

Campbell (2007) evaluated whether protein intake by food or supplement above the recommended daily intake value would have an effect on muscle quantity or body composition. Although this research focused on older adults, Campbell (2007) admits “The foundation for how resistance training and dietary protein might work synergistically to promote increased whole-body fat-free mass” is primarily studied in “younger adults” and some of the studies he makes use of in his comparison used participants in the same age range as Division I athletes (p. 416). Campbell (2007) found that meeting the recommended daily value for protein did not increase muscle mass and body composition as much as a diet exceeding the value when

combined with resistance training. Campbell (2007) also found that the use of protein supplements did not have a significant impact on the muscle quantity or body composition gains made from resistance training.

Another study, done by Phillips (2004), shows that adequate protein intake is necessary for athletes to gain muscle mass and improve body composition. However, Phillips (2004) points out “it is abundantly clear that any protein requirement set for strength-training athletes is of little relevance, considering that these athletes habitually consume protein far in excess of any recommended level” (p. 694). This clearly shows that while protein intake is a vital factor in the physical development of athletes, it is a moot point, due to the typical over-consumption of protein by athletes. This trend may represent a shift in thinking of how protein affects muscle growth, and suggests that past athletes may have not consumed enough protein to achieve maximum muscle growth. The results of Phillip’s study also stand in stark contrast to those of Campbell’s study, and suggest that the focus on older individuals in Campbell’s study potentially limits the study’s applicability to only older individuals and not Division I athletes.

The results of the studies previously mentioned suggest that simply meeting the requirements of “1.6 to 1.7 g/kg body weight per day” for “resistance and strength-trained athletes” put forth by the American College of Sports Medicine, the American Dietetic Association, and the Dieticians of Canada (2000) is all that is required for optimal physical development of players. This in turn suggests that protein intake is not a large factor in the physical development of Division I athletes.

Carbohydrate and fat intake was also indicated as an important factor in physical development. Boshier, et al. (2004) noted that “individuals are likely to consume meals of mixed

macronutrient content following a resistance-training exercise workout” (p. 218). Boshier, et al. (2004) looked at carbohydrate and fat intake after resistance training had occurred and measured how varying levels of each of these macronutrients affected muscle generation and fat loss. Boshier, et al. (2004) found that consuming meals with a large amount of carbohydrates resulted in “greater carbohydrate uptake and subsequent use of carbohydrate for oxidation or muscle glycogen synthesis” (p. 218). Conversely Boshier et al. found that meals with high fat content had negative effects on the body.

Froiland, et al. (2004) found that a major of college athletes take supplements and among the most common reasons for taking supplements are “to improve strength and power (42.5%)” and “weight or muscle gain (41.5%)” (p. 112). Froiland, et al. (2004) also concluded that most athletes did not have a firm grasp of correct and appropriate dietary supplement usage and that fully 14.5% of athletes admitted to using substances found on the NCAA’s banned substance list. These statistics indicate that supplements both allowed and banned are widely used among college athletes. These findings clearly show the need for further study of supplements and their effects on physical development of athletes.

Overall, nutrition should be considered an important factor in the physical development of Division I athletes. However the literature suggests that improvements could be made in the diets of most of these athletes. This is reflected by Clark, et al. (2003) when they state “athletes require awareness of the interrelationship between physical activity and diet in that optimal adaptation to the stress of exercise training requires a diet that is likewise optimal in all nutrients” (p. 316-317). In order to optimize physical development, athletes must become educated the effects of the food and supplements. Athletes must strive to create a balance in what

substances they take in, so that they get optimal efficiency, energy, and muscle growth from why they put in their bodies.

Societal, Cultural, and Media Pressures

There are many reasons why athletes have increased in size, power, and speed over the past couple of generations. Today, more than ever, an athlete's top priority is being in top physical condition. Unlike athletes of past generations, today's athletes start at an earlier age developing their skills, many have access to private one-on-one training, invitations to special training camps, the ability to hire nutritional specialists, and the option of intense training year-round. Why is this so important to a growing athlete? The roles and influence of the media, parents, peers, and society play is very important in why athletes are bigger, stronger, and faster. When a growing athlete sees professional athletes signing multi-million dollar contracts, non-stop media coverage, and a celebrity lifestyle they ask themselves how that athlete achieved their fame and how they too can live like the professional athletes they see in the media.

In the journal article "Big, Bigger, Biggest: Why Do Boys Beef-up" researchers consistently found that many adolescent boys were concerned with their body image and wanted to become bigger and more muscular (Smolak, Murnen, and Thompson, 2005). To test their hypothesis, the researchers used an interval survey based method which included the measures: muscle building techniques, media, peer pressure, pressure from parents, body esteem, depression and social comparison. The survey was given to 383 boys, ages 11–16, from a Midwestern middle school in the U.S. On a 1 to 5 scale (1=never, 5=always), the participants were asked a range of questions from: How frequently during the past year they had exercised,

weight lifted, eating more, taken vitamins or supplements? When I watch sports on TV, I compare my body to the bodies of the athletes? How often do your friends and classmates encourage each other to lift weights? In social situations, I sometimes compare my body to the bodies of other people (Smolak, Murnen, and Thompson, 2005)? The results showed boys using food supplements with or without the use of steroids reported greater parental and peer pressure, as well as elevated levels of social comparison with others' physiques (Smolak, Murnen, and Thompson, 2005).

Additional research shows that a driving factor in why athletes are changing their bodies in such dramatic fashions is parental influence. In a similar study conducted by Jacqueline N. Stanford and Marita P. McCabe the participants included 362 adolescent boys. These boys were also surveyed on measures dealing with societal messages about shape, food, exercise, losing weight and increasing muscles from parents, peers, and the media. Results showed that the parental messages were the strongest influence on body image and the strongest predictors of body change strategies; followed by messages from peers and the media (Stanford & McCabe, 2005).

With parental and societal influence being such big factors in why athletes are changing the way they look and train, the attitudes of the athletes affected are bound to change as well. In a study by David Larimore and George Chitiyo, research was done to measure the effect of society on intercollegiate athletics. In this study an athlete stated "As much as we have to be physically in shape...we definitely also need an attitude which enhances our performance. This is an inner attitude of confidence in your ability, determination to see what you can do, and delight in what may be possible. The positive vibes that surround a person with an attitude like this can

spread” (Larimore & Chitiyo, 2006). This shows that not only do athletes recognize they must be bigger and stronger to compete, but it’s a state of mind and a certain mental disposition that can lead to athletes competing on higher levels.

The research on the effects of social, cultural, and media on athletes being bigger, stronger, and faster has been proven to be a result of parents and peers pushing their athletes to improve their body image through better more intense training. Some may ask: why are these groups pushing athletes so hard? The top answer: individual recognition and visibility. The chance to be number one, earn a full-scholarship, be a big star at a big time university, have financial stability, and have a rock star lifestyle are all societal, cultural, and media pressures applied to athletes to train harder, become stronger, and run faster.

Steroids

With athletes becoming larger over the past twenty years there has been an increased emphasis on gaining every possible competitive advantage. Recently this trend has included the use of steroids. Size and strength are perceived to be a necessity to be able to compete at a high level in sport and many feel steroids are the only way that an athlete can keep up with other athletes that are naturally bigger and stronger. Studies have been done that show that mental expectancy can help overcome this notion that steroids are a necessity to gain the perceived size and strength required to keep up with the competition. A study done by Maganaris, Collins, and Sharp (2000) gave two groups of power lifters a pill that the participants were told would help them increase their lifting performance immediately. Maganaris, Collins, and Sharp (2000) told the lifters that it was an Anabolic Steroid (AS). Maganaris, Collins, and Sharp (2000) also

ensured that the participants, through secondary sources, heard that AS would increase their size and strength. However, the pill administered to the participants was a placebo, and the results of the study showed improvements in strength for all lifters. This study shows that mental motivation and expectancy helped the participants make strength gains comparable to steroids solely through expectancy of the desired result. This reveals an important insight that can be applied to the physical development of Division I athletes. If power lifters can make improvements in strength based solely of the expectation of gains, then athletes in all sports can potentially make these same gains, without the need for steroids.

In another study done by Olrich and Ewing (1999) ten male body builders were studied to see what their reactions to taking steroids were, both mentally and physically. Also, their reasons for beginning steroids were studied. The research showed that every lifter studied began to take steroids in their mid twenties. It also showed that each one began taking steroids to gain an advantage because they felt they needed an extra boost to keep up with other lifters. One participant said, “Well I waited a long time, and I felt that I had hit a block or a plateau” (Olrich & Ewing, 1999). All the participants felt that they had reached the height of their bodies’ strength naturally, and felt they needed to take steroids in order to keep up with others who were getting results from taking them. This reinforces the notion that college athletes often take steroids because they perceive themselves as falling behind other who use steroids, and are simply trying to get back on a level playing field.

A study by Norton and Olds (2001) shows that physical size in athletes is highly emphasized in sport. The study shows that it is becoming more and more difficult to find athletes that are big enough to compete at the highest level as the competition for such athletes

has vastly increased. It also says that athletes are trying to increase their size due to many outside motivational factors such as increased financial rewards and social incentives of athletic success. The trend of increasing size in athletes is continuously growing and with sports such as football and basketball controlling most of the media coverage in sport, player size is a hot commodity that must be had at all costs in these sports. Norton and Olds (2001) conclude by saying that due to the emphasis on size, steroids are becoming the largest problem in sports today. The desire for success is so high in sports as compared to past years that winning at any cost has become the motto.

Strength and Conditioning Programs

Weight training now more than ever has become an integral part in the development and success of all athletes at every level of competition. Never before have athletes around the globe been as big, strong and fast as they are today. This section of the review attempts to look at advances in weight training programs as a reason why athletes have become bigger, stronger and faster.

Weight training has played a significant role in all sports over the past decade; however the effects of weight training are most evident in the sport of football. Football players, as do many other athletes today, participate in year round conditioning with the purpose of improving athletic performance and preventing injury (Secora, Latin, Berg, and Noble, 2004). In a study conducted by Secora, Latin, Berg and Noble (2004) Division I football players in the year 2000 were compared with those in the year 1987. Several performance variables were compared between the two years which included height, weight, 40-yd dash, vertical jump, body fat, bench press, squat, bench weight, squat weight, power and fat-free mass. The study found that players

in the year 2000 were significantly stronger, more powerful, faster and were bigger than those who played in 1987 (Secora, Latin, Berg and Noble, 2004). Secora et al. then agreed with the conclusion from another study made by Olson and Hunter (1985) that strength and conditioning programs have had a positive effect on college football player's physical and performance factors. This finding gives proof that weight training programs have improved over the years because this study compared players between two decades and found that the players of the current decade are bigger stronger and faster.

Strength and conditioning programs have improved over the years due to the vast amounts of research that have been done in this area. In the study done by Davis, Barnette, Kiger, Mirasola and Young (2004) they attempted to investigate the relationship among physical characteristics and functional measures of athletic performance in Division I college football players. The three response variables used were 36.6-m sprint, 18.3-m shuttle run, and vertical jump. The six physical characteristics included height, weight, percentage body fat, hamstring length, bench press and hang clean. The study found a strong relationship between bench press, hang clean and body weight with 36.6-m sprint and 18.3-m shuttle run. Because of this study, strength and conditioning coaches have a better understanding of which physical characteristics and exercises are key predictors of sprinting and cutting speed thus improving the weight training programs as a whole.

After extensively researching the area of weight training and its positive impact on athletes' size, strength and speed, it is evident that weight training is responsible for gains in the physical development of athletes. Due to the large amount of research on the topic, strength and conditioning coaches now know what physical characteristics and exercises effect performance

on the field. They are now able to target these areas and fine tune athletes in order to make them bigger, stronger and faster. Strength and conditioning programs have greatly benefited from the research and are able to provide better, more comprehensive programs for athletes to use in their pursuit of enhanced physical development. The research is clear, strength and conditioning has played a key role in producing the higher physically developed athletes of today.

The literature shows that all major topical areas addressed are important to varying extents in the physical development of Division I collegiate athletes. However, each of these areas does not impact physical development equally. The literature showed that strength and conditioning programs likely had the greatest impact on physical development of the topics covered, followed by socio-cultural influences and nutrition. It is impossible to accurately assess the impact of steroids due to underreporting, but it is clear that steroids are certainly playing a role in the physical development of some athletes.

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