FROM FLAG TO FRIDAY NIGHT—LONG-TERM ATHLETE DEVELOPMENT IN YOUTH AMERICAN FOOTBALL

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INTRODUCTION

Football is considered by many to be America's game. During the fall and into the winter months, the game captivates millions of Americans for the entire weekend—Friday (high school), Saturday (college), and Sunday (professional). At the same time, approximately 2 million youth 6 - 12 years of age participate in football every year (13). Although youth numbers are more difficult to ascertain, the National Federation of State High School Associations reported that there were nearly 1.1 million high school football participants in 2016 (15). Of this youth and high school "pipeline," 6.8% of high school seniors will play National Collegiate Athletic Association (NCAA) football and from there only 1.9% will advance to the professional level (14). To date, it has not been systematically studied how elite football players develop and advance through the system. The purpose of this article is to provide an overview of long-term athlete development (LTAD) principles as they could be applied to American football at the youth level. This article will also discuss the important role strength and conditioning coaches can have in the implementation of this model in their community.

LONG-TERM ATHLETE DEVELOPMENT

Currently, there has been increased attention on youth sports in general, and more specifically LTAD. A recent report from the Aspen Institute's Project Play Report Card on Youth Sports gave youth sports in the United States an overall grade of "C" (21). These concerns are considered in LTAD models, or what the United States Olympic Committee (USOC) calls the American Development Model (ADM) (24).

In brief, LTAD has been defined in the National Strength and Conditioning Association (NSCA) LTAD Position Statement as "the habitual development of athleticism over time to improve health and fitness, enhance physical performance, reduce the relative risk of injury, and develop the confidence and competence of all youth," (10). In turn, athleticism is defined as "the ability to repeatedly perform a range of movements with precision and confidence in a variety of environments, which require competent levels of motor skills, strength, power, speed, agility, balance, coordination, and endurance,"(10). Additionally, if these athletic traits are to be optimally developed and executed during competition, basic principles of sound nutrition and sport psychology also need to be considered. Furthermore, these athletic traits need to transfer to sport-specific technical skills that are executed within the tactical environment of the sport. Thus, when truly considering LTAD, the holistic development of the athlete in the four main domains of athletic performance—technical, tactical, physical, and mental—need to be taken into account. In addition, the game structure and how it can be evolved to deliver the principles of development and safety also need to be considered and is addressed elsewhere in this article.

A BRIEF HISTORY AND KEY TENETS OF LTAD

Before the application of LTAD principles are applied to the sport of American football, a brief discussion of the key tenets

is warranted. The reader is referred to the specific resources of both the NSCA position paper (10) and the USOC ADM website (24) for details.

The concept of LTAD stems from practices of Eastern European sports science and athletic development during the Cold War era. Many Eastern Bloc countries developed youngsters for national competition through a sport school system where they were tested and selected into schools for specialized sports training that included a regimented daily routine of athletic preparation (18). Most recently, the concept of LTAD has been popularized by Istvan Balyi, a native of Hungary who moved to the National Coaching Institute in British Columbia, Canada. Balyi, working with Richard Way, developed a seven-stage model with age and developmentally appropriate activities within each stage. There was a major impetus for LTAD in Canada at this time due to a poor performance in the 2004 Olympics, which was attributed to a decaying national sports system (19). Throughout the last decade, LTAD was adapted by Canadian national sport organizations, including Football Canada (6), and several other national sport bodies across the world. To learn more about the Balyi LTAD model refer to the book for a full account (2) or visit the Canadian Sport for Life website (20).

The United States was relatively late in adopting LTAD. Disturbing statistics on falling sport participation rates (22), childhood obesity (16), physical inactivity (23), and a projected shorter lifespan of the current generation (17) prompted the USOC and its National Governing Bodies (NGBs) to create the ADM in 2014. The ADM is comprised of four key elements: 1) a statement, 2) a visual model, 3) NGB programming, and 4) resources that are available at the website for interested stakeholders (24).

The five key principles of the ADM include:

1. Universal access to create opportunity for all athletes
2. Developmentally-appropriate activities that emphasize motor and foundational skills
3. Multi-sport participation
4. Fun, engaging, and progressively challenging atmosphere
5. Quality coaching at all age levels

These key principles are based on research-based recommendations (3). Universal access for all athletes regardless of gender, race, physical disability, economic status, and ability allows everyone to reap the myriad of benefits from participating in sport. For the youth athlete, focusing on the development of fundamental movement and motor skills in a fun and engaging environment develops competency and confidence, which in turn increases the likelihood of continued participation in sport. Of course, the preceding statement is highly dependent on the quality of coaching. The Aspen Institute's Project Play (21) identified that only about 30% of coaches reported receiving training in health and safety (cardiopulmonary resuscitation, basic first aid, concussion management), sport-specific skills and tactics, effective motivation techniques, and physical conditioning and injury prevention. Finally, the recommendation of multi-sport participation has recently been addressed in a consensus statement outlining limited evidence of the benefits of early sports specialization and the increased risk of overuse injury and burnout (9).

Currently, several NGBs report to have adopted the ADM with USA Hockey leading the efforts (see admkids.com). Recently, USA Football has focused more attention on the ADM as a possible solution to declining participation rates and concerns for the safety of the game. This will be the focus of the following section.

A FRAMEWORK FOR LTAD IN AMERICAN FOOTBALL

Per the USOC ADM, the ultimate goal is to create positive experiences for American athletes at every level by helping them realize their full athletic potential and utilize sport as a path toward an active and healthy lifestyle. With this in mind, consider a framework for LTAD in American football.

A few overarching themes based on general LTAD principles include:

- The goal is to ensure that young athletes are doing the right things at the right time for their long-term development instead of their immediate development. It is at the high school level that the complete development of a player really accelerates, and the high school coach and program continues to be at the heart of fostering individual development, competitiveness, and commitment to succeeding within the game.
- Learning progressively more demanding versions of football along with technical and tactical skill progressions along the game pathway.
- This pathway and strategy should foster a life-long enjoyment of the game with its fitness and social benefits, providing an opportunity and an appropriate environment for all American children (and adults) to play a form of football that challenges them and provides an outlet for physical activity.
- All aspects of the pathway are athlete-centered, coach-led, development-driven, and administrator-supported.

THE GAME PATHWAY

For most, but not all youngsters who participate in organized youth football, they enter directly into traditional full-field 11-player per side or they may enter into flag football for a few years and then advance into traditional football. Unlike other sports, like baseball or soccer, football does not have a clear progression of game formats. In baseball, youngsters often progress from t-ball to coach pitch to player pitch. And, even once player pitch baseball begins there are modifications to field size whereby the pitching distance and distance between bases progressively

increases across age groups. Thus, a potential solution for football is using a modified game. The authors have learned through personal communications and work with USA Football that small-sided, modified versions of the game exist throughout the United States. USA Football gathered such information and developed "Rookie Tackle" to serve as a bridge-game between flag football and 11-player tackle and to become part of USA Football's adoption of the ADM (25). The 2017 pilot season included 10 leagues across the United States with plans to expand efforts in Rookie Tackle in 2018. Key aspects of Rookie Tackle include:

- 6 - 8 players per side and reduced roster sizes
- Improved coach:player ratio, and focus on skill development and participation
- Smaller playing field
- Position sampling
- No special teams
- 2-point stance for linemen
- Center uncovered and no blitzing

During the fall of 2017, the game of football was also confronted with a media surge warning about the safety of the game and specific concerns about short- and long-term consequences of concussions and sub-concussive head impacts, primarily in former professional football players (1,12). This led to calls for a ban on tackle football before the age 12 or until high school (11) thus calling for a greater emphasis on flag football. It is beyond the scope of this article to discuss the pros and cons of this debate. However, safety and adoption of LTAD principles should not be mutually exclusive. For example from a physical developmental perspective, the need to start linemen in the 2-point stance reflects the levels of strength and postural development of a younger player: placing a helmet on a long lever (spine) in a 3-point stance encourages falling forward (leading with the head) to come out of stance. Conversely, the 2-point stance allows for the center of mass to be centered above the base of support, from where it is easier to teach forward and lateral movement. Importantly, this gives better control of the helmet (neck and head), especially in the presence of fatigue.

There are also some innovative football coaches who have been exploring another modified version of the game called padded flag football that may also fit into the game pathway (8). Padded flag football is played after flag football and can be seen as an introduction to contact skills. Regular equipment or soft shell equipment can be worn in padded flag football. Similar rules to Rookie Tackle are enforced but instead of a tackle, the ball carrier is downed by a flag pull similar to flag football. Some leagues also use this year to focus on instruction in blocking and tackling techniques which include drills that can include dummies and padded shields to develop correct techniques. Thus, players have a full year of instruction in blocking and tackling before they enter into full contact and tackle football.

Progressive ideas that build from this include eliminating contact outside of the line of scrimmage, such that higher velocity moves

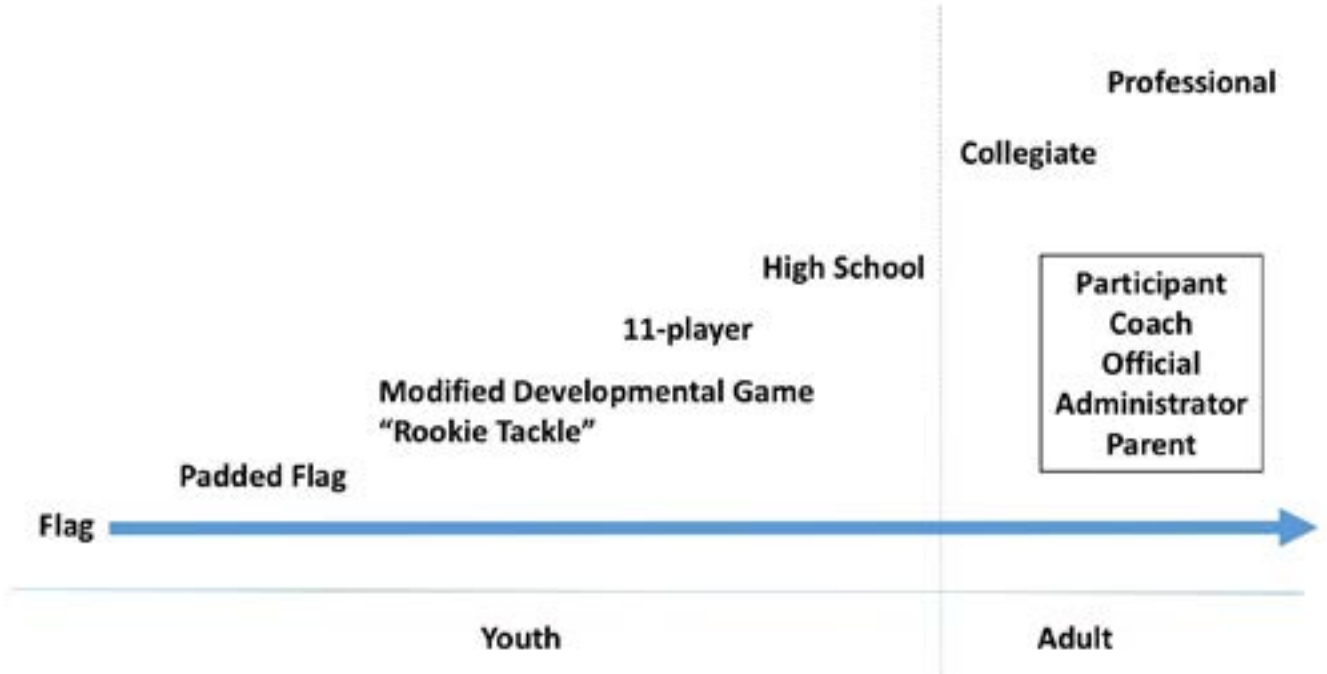

FIGURE 1. A MODEL FOR A GAME PATHWAY FROM FLAG TO FRIDAY NIGHT FOR YOUTH AND HIGH SCHOOL FOOTBALL WITH ENCOURAGED PARTICIPATION AS AN ADULT

do not lead to impacts, and ground collision (an underestimated impact force) is avoided. Removing the kicking game similarly eliminates kick-return collisions and emphasizes the focus on offense/defense. Similarly, eliminating low blocks and low tackles increases the focus on quality contact between the hips and numbers, with optimal body posture at the point of impact being the desired outcome. Considerations should also be made to remove the game clock and use total possessions or possessions per series that would facilitate player focus and engagement—a key aspect of youth sports.

The proposed pathway and strategy builds foundational game experiences, provides environments where techniques can become skills and puts these into practice by gradually introducing the player to contact prior to high school. In addition, a flag football for life approach (represented by the arrow in Figure 1) can be considered for those who do not wish to engage in tackle football or for adults who enjoy the game. Furthermore, adults exposed to the ADM pathway would have the knowledge, skills, and attitudes appropriate to participate in youth football as a coach, official, league administrator, or sport parent.

THE PLAYER DEVELOPMENT PATHWAY

As previously mentioned, the player development pathway should take into account the technical, tactical, physical, and mental development of the athlete in an age- and developmentally-appropriate manner. Indeed, a key aspect of a LTAD program is to make sure that the correct skills are emphasized in the right sequence. The key tenets of athletic development have been thoroughly addressed elsewhere and are addressed below (4).

Several analogies can be used here to highlight the learning of movement skills including learning how to write (e.g., words, sentences, paragraphs, etc.) and mathematics. At the youth level, fundamental movement skills are the basis of athletic development. These fundamental skills can be considered within the following categories:

- **Stability**: posture, static balance, dynamic balance, falling and landing (forward, backward, sideways, and on feet), rotating (forward, backward, and sideways).
- **(Bi-lateral) Object Control**: underarm throwing, overarm throwing, catching (various heights and speeds), kicking, bouncing, striking static objects, striking moving objects, intercepting.
- **(Multidirectional) Movement**: walking, running, vertical jumping, horizontal jumping, hopping, galloping, skipping, leaping, and bounding.

In essence, one needs to master fundamentals before advancing to more advanced skills. In football, this means teaching fundamental movement skills like balance, coordination, and fundamental blocking before complex skills like combo blocking to offensive linemen or bull and jerk, bull and rip, bull and swim, or other linked pass rush skills to defensive linemen. As well as the appropriate sequencing of skill progressions, it is also important to link skill expectations to neuromuscular and musculoskeletal development, in that skills should not be introduced before players are typically physically developed enough to undertake them.

Specific to football, the development of contact skills, specifically tackling, has drawn concern given recent attention to head impacts and concussion (1). Thus, the teaching of fundamental skills such as fundamental athletic position, bodyweight squat, hip hinge, lunge, and triple extension are vital to executing blocking and tackling. Furthermore, teaching proper deceleration technique is also important to tackling. The fundamental movement skills of hopping, skipping, running, backpedaling, shuffling, decelerating, and cutting are important for multidirectional movement on the football field, such as running passing routes and playing pass defense.

These fundamental movement skills can easily be incorporated into a dynamic warm-up or movement preparation period at the beginning of practice or throughout practice as microdosing sessions. Microdosing is a concept taken from the drug industry, where low, “sub-therapeutic” doses are administered to examine the response during the development of the drug. Applied to sports training, it can be seen as using a distribution of weekly training across several short sessions as opposed to fewer longer sessions to enhance athletic traits, often times because coaches are focused on technical and tactical aspects of the sport (7).

It is also important to note that the movement skills do not always need to be conducted with athletes standing in lines or in isolation. They can be performed in a fun and well-designed obstacle course or using a games-based approach, particularly in younger athletes. The latter concept means that the generic and positional technical/tactical skills along with the player’s ability to determine when and how to use these in a game to his or her best advantage can be developed in conjunction with physical capacities, and we can also fully prepare a child to graduate to the next level of play (4).

Of course, formal strength and conditioning practices are common in high school football players, and some of the athletes are exposed to formal training at younger ages. For the youth football player, it is important to lay a foundation for these formal strength and conditioning activities by teaching the appropriate postures and patterns for squats, hip hinges, push-ups, planks, etc. that can be transferred between the field and the weight room. Initially, these foundational strength training movements can be taught using bodyweight or light external loads.

NURTURING PHYSICAL DEVELOPMENT

Planning is important in a program for developmental athletes, especially since the objective is to deliver the appropriate biomotor abilities in the correct sequential order to promote the long-term development of the athlete. If a program is planned and progressed properly, it will enable a young athlete to be physically

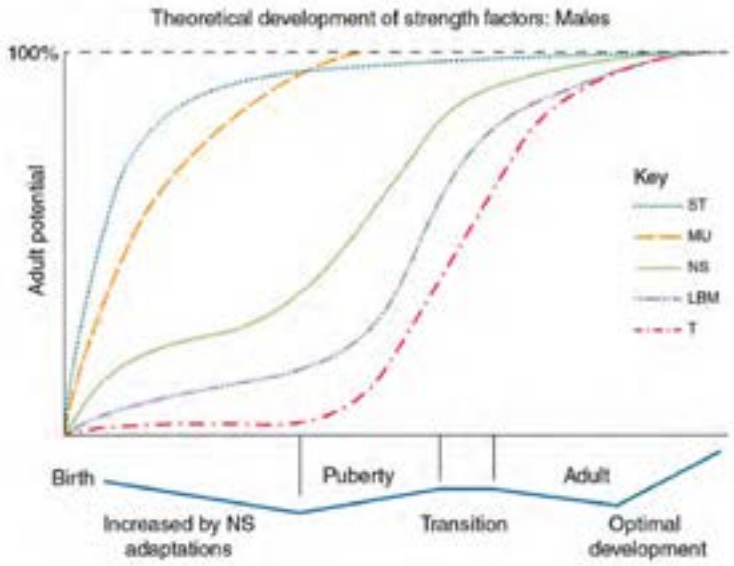

FIGURE 2. THEORETICAL DEVELOPMENT OF STRENGTH OUTPUT AS A CONSEQUENCE OF PHYSIOMECHANICAL DEVELOPMENT OF THE MALE MOTOR SYSTEM

Adapted with permission from Pierce, K, Brewer, C, Ramsey, M, Byrd, R, Sands, WE, Stone, ME, and Stone, MH. Opinion paper & literature review: *Youth Resistance Training Professional Strength and Conditioning Journal* July: 9-22, 2008.

prepared for transitions between stages (e.g., from middle school to freshman to junior varsity to varsity high school). This requires knowledge of the trainability of the youth and adolescent until the point of adulthood (biologically), where all physiological systems become fully trainable and adaptive to specific training stimuli (4).

Given the above, it is also important to note that all aspect of fitness (strength, speed, endurance, mobility, and combinations and derivatives of these) can be developed within children at every stage—not just during the popularized yet unfounded "sensitive periods" or "windows of opportunity." However, as indicated in Figure 2, the components of the motor system that influence muscular strength do not develop at a uniform rate. Understanding this developmental curve allows for the focus to be on two important determinants for the physical development program. Firstly, it provides a guideline for the physiological constraints on program delivery in terms of the methodology and volume/intensity loading. Secondly, it provides a framework for identifying how training programs should be devised to optimally support and reinforce the development of the motor system. Because so many of the components of football skills are reliant on an athlete's ability to rapidly produce multidirectional forces (a function of strength, speed and postural control) it is no surprise that the neuromuscular and musculoskeletal system development are central tenants to the athlete development model (Figure 2). In particular, the importance of the neuromuscular system as a precursor to strength, power, and speed cannot be overemphasized. Therefore, prioritizing appropriate strength, power, and motor skill competency are the major priorities for a strength and conditioning coach working with young athletes (4).

The neuromuscular system is governed by the central nervous system, which is optimally stimulated by both load and velocity. This is important information for coaches to relate to in skill development (e.g., throwing or kicking farther in the early years rather than more accurately will optimally benefit the development of the action). However, it is important to note that in physical development terms, the output objective (e.g., strength, speed, power) must not come at the expense of optimal postures, as this would be contraindicative to the long-term development of the player. The ability to link effective movement postures with effective loading postures will provide a sound basis for the development of the football athlete over time.

SYSTEM INTEGRATION

A final consideration for the implementation of an effective LTAD model in a school or community is system alignment and integration (2). For LTAD to truly work, coaches need to be on same page within a league or community. Too often, there are incongruent practices from one team to another, let alone between sports. If there is no systematic progression or curriculum, then it becomes difficult to carry out progressions in skill development from one season or year to the next. Using the school analogy again, just think if there was no curriculum from grade to grade and teachers did not communicate with each other.

Finally, football is one sport—or one subject. System alignment and integration should also consider physical education and other sports, whether they be school or club sport. To have a developmentally appropriate model where everyone talks to each other and is on the same page across ages and sports is certainly easier said than done.

SUMMARY AND CONCLUSION

Despite recent concerns for the safety of the game and specifically short- and long-term brain injury, high school football remains the top participation sport among boys (15) and collegiate and professional football are widely popular. However, recent trends also indicate a decrease in participation at the youth (13) and high school levels (15) and in viewership at the professional level (5). Thus, many believe that it is a critical time for the game, and thus re-envisioning a long-term football development pathway, particularly at the youth level, is timely. This pathway should consider age- and developmentally-appropriate strategies for the technical, tactical, physical, and mental domains within game types that also fit the needs and capabilities of youth. In doing so, the football LTAD model needs to be athlete-centered, coach-driven, and supported by the administration. Finally, a sound LTAD program should foster competent and confident movers who can enjoy football and other physical activities and sports throughout the lifespan.

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