Coaching: Designing & Implementing Physical Training

John Grace

Ohio University

Coaches, from youth to elite athletics, perform many different tasks under the title of "coach". These tasks could range from scheduling, recruiting, training, conditioning, etc., their athletes. Sport coaches may not always be the best option to complete these tasks, but the reality is that in certain scenarios the coach may be all that is available. In this case, how can athletes be sure they are being trained with the soundest philosophies and the latest in sport science research? Short answer – they don't. Coaches of all levels, from youth developmental athletes to elite professional athletes, should have the education and knowledge to "design programs of training, conditioning, and recovery that properly utilize exercise physiology and biomechanical principles." (NASPE, 2006, Standard 12)

The National Association for Sport & Physical Education, along with the United States Olympic Committee and the National Federation of State High School Associations has designed eight coaching domains to further the standardization of coaching in the United States. (Hammermeister, 2010) These eight domains are typically used in a wide range of capacities throughout a coach's career. Because of this, coaches should be educated within each domain to be prepared for the many scenarios they may face. The ability to condition an athlete for their sport is one of the eight domains that should be emphasized in coaching education. The goal of training athletes should be to optimize performance while reducing fatigue and risk of injury. While resistance training and weightlifting are one of the safest activities among many sports (Hamill, 1994), with less than adequate coaching they can quickly pose many threats for injury.

To administer safe and appropriate modes of resistance training, one should understand the basics of human movement and how the body responds to different types of resistance training. Chiu (2013) states "An appreciation of the physiology and biomechanics of explosive strength training is required to appropriately design resistance training programs to enhance

performance." (p. 603) Different sports require different athletic qualities. Thus, training should reflect the physical demands of the respective sport.

Enhancing performance should be the goal of creating a physical training program. Coaches have many different options to choose from when it comes to training their athletes. Some of the reasoning as to why coaches should have adequate knowledge in sport performance training is because it plays a major part in how an athlete performs. Research shows that resistance, plyometric, and speed training all have positive influences on performance. (Alptekin, Kilic, & Mavis, 2013; Rønnestad, Kojedal, Losnegard, Kvamme, & Raastad, T, 2012; Shalfawi, Young, Tonnessen, Haugen, & Enoksen, 2013) Without formal education on strength and conditioning best practices, it can compromise an athlete's athletic potential.

There are coaches that put a lot of stake in physical training and there are some that don't feel it is important at all. Some coaches think that the most important aspect, mainly in field and court sports, is technical and tactical skills. Not to discount skill development and improving one's technical ability in their respective sport, but there will ultimately come a time that a lack of strength, speed, and other fitness qualities will be a limiting factor for an athlete to achieve a high level of success. Physical training is just one of many aspects that go into developing a great athlete, but this shouldn't be a reason for it to be overlooked. The research suggests that resistance training can be a huge benefit to athletes. (Veliz, Requena, Suarez-Arrones, Newton & Saez de Villarreal, 2013) McGuigan, Wright & Fleck (2012) affirms, as cited in (Baker & Newton, 2006; Buchheit, Mendez-Villanueva, Delhomel, Brughelli & Ahmaidi, 2010; Olsen & Hopkins, 2003) "There is a large body of literature that shows that strength training can increase strength, power, vertical jump, speed, and acceleration in a range of different sports." (p. 3) Likewise, Judge (2013) as cited in (Stone, Sanborn, O'Bryant, Hartman, Stone, Proulx, Ward, &

Hruby, 2003) states "Weightlifting training produces many benefits, including: injury prevention, improved flexibility, improved inter- and intramuscular coordination and sharpened psychological abilities". (p. 615)

Coaches should comprehend how to correctly teach high skill movements such as sprinting and weightlifting exercises. Young (2009) states that "Sprinting is a complex task that places a high neuromuscular demand on the performer and requires high levels of coordinated movement and appropriate sequencing of muscle activations to perform at peak levels." (p. 2). Some sport coaches in the industry don't quite understand the benefit of sprint and resistance training. Nor do they believe that it is an adequate training tool. Many coaches still believe that to get anything out of training athletes have to be totally fatigued at the end of practice. In fact, sprint training is one the highest demand activities in sport, placing 4x bodyweight forces on elite level athletes (Young, 2008). While fatigue may be an outcome in utilizing certain training protocols, leaving the athlete fatigued at the end of a session should not be the goal of training. Because sprinting is both demanding and technical, coaches should be educated on how to appropriately teach and apply sprint concepts.

The knowledge to teach complex skills is an important trait, but it is also important to appreciate the basics of how resistance and speed training affect the athlete. When it comes to designing training regimens for an athlete, coaches must recognize the importance of applying training stress as well as allowing appropriate rest periods. As stress is incurred, the athlete's body will fatigue. The acquired fatigue is typically a resultant of the magnitude of the stress placed on the athlete's body. If too much stress is placed on an athlete, supercompensation (an increase in fitness qualities) may not be realized to its fullest potential and overtime could lead to overtraining. Likewise, if the stress placed on the athlete is too small in magnitude, the athlete

will, at best, maintain athletic qualities and may potentially regress or lose fitness. As fatigue accumulates, whether central nervous system or peripheral nervous system fatigue power output decreases. (Laurent & Green, 2009)

One of the easiest ways to manage stress and fatigue is the manipulation of volume and intensities. Siff (2004) states "The volume of the training load refers primarily to the quantitative aspects of training and plays an important role in the long-term adaptation of the body to intense muscular work." (p. 356) Intensity is commonly referred to as the percentage of a 1-repetition maximum or the speed of the movement. Coaches must recognize how volume and intensity interact with one another to produce the desired training effect. It is essential to program appropriate volumes and intensities for athletes to realize adaptations and make improvements in the applicable athletic qualities. (Kraemer & Ratamess, 2004)

There are many organizations and governing bodies that provide an outlet for coaches to continue their education. A few of the major governing bodies in their respective field are USA Weightlifting (USAW), USA Track & Field (USATF), and the National Strength & Conditioning Association (NSCA). These organizations provide coaching and teach basic principles in their respective fields. These organizations don't necessarily provide all of the education coaches will ever need on the respective subjects, but they are excellent choices to learn fundamental concepts and how to relate those concepts to training athletes.

Most sport-specific exercise movements (i.e. Olympic lifts, sprinting, and squatting) are highly technical skills and take a trained coach's eye to administer and to produce adequate results. Coaches should recognize that science plays a major role in training athletes and that there should not be a one-size-fits-all approach. This evidence shows the need for education in program design and sport performance coaching.

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