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To cite this article: Kacie V. Lanier, Chad M. Killian & Richard Burnett (2021) Integrating Strength and Conditioning Into a High School Physical Education Curriculum: A Case Example, Journal of Physical Education, Recreation & Dance, 92:5, 18-26, DOI: [10.1080/07303084.2021.1896401](https://doi.org/10.1080/07303084.2021.1896401)

To link to this article: <https://doi.org/10.1080/07303084.2021.1896401>



Published online: 19 May 2021.



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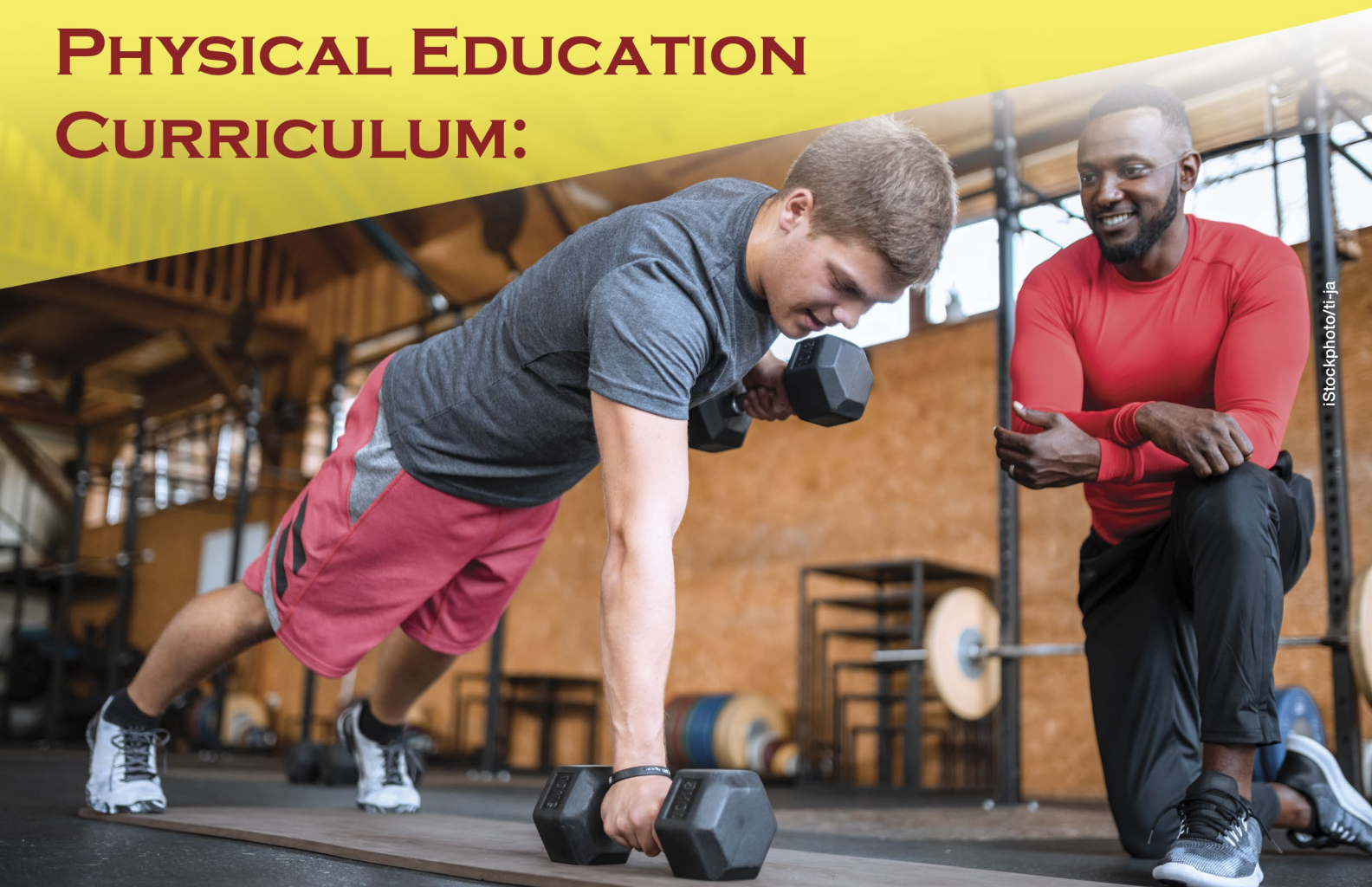


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INTEGRATING STRENGTH AND CONDITIONING INTO A HIGH SCHOOL PHYSICAL EDUCATION CURRICULUM:



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A Case Example

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The purpose of quality physical education is to support students in their development of physical literacy and life-long physical activity habits, and there are a wide variety of curricula and instructional methods designed to achieve these goals. Nevertheless, multi-activity models and team sports remain prevalent in most high school physical education programs (Ennis, 2014), despite the consistent reduction in team sport participation following graduation (Hulteen et al., 2017). At the same time, youth participation in resistance training and weightlifting is becoming increasingly common (Hulteen et al., 2017), and there is growing evidence to suggest that there are positive outcomes associated with youth participation in developmentally appropriate

strength and conditioning activities (Lee et al., 2012; Schranz et al., 2013; Takano, 2013). Indeed, the *Physical Activity Guidelines for Americans* recommends that youth engage in muscle strengthening and bone strengthening activities as part of their daily 60 minutes of physical activity on at least 3 days per week (U.S. Department of Health and Human Services, 2018), which participation in strength and conditioning encourages. In light of the growing popularity of these activities, the variety of documented positive outcomes and national recommendations, strength and conditioning represents a viable and important physical activity for high school physical education teachers to integrate into their programs or offer as course electives.



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Today, many schools have the facilities and equipment needed for a strength and conditioning program and already provide programming for school athletes. However, some schools do not, given the space and cost requirements necessary to equip traditional weight and fitness rooms. Nevertheless, strength and conditioning is more than just being in a weight room. Strength and conditioning can take place in a gym, in a classroom or outside using no equipment (e.g., bodyweight exercises such as squats, burpees, push-ups or lunges) or minimal equipment (e.g., bands, milk containers filled with sand, cans of food, weighted PVC pipes etc.). In light of this, implementing strength and conditioning into the physical education curriculum can add diversity to physical activity opportunities and introduce more students to health-enhancing, lifetime physical activities (Kozub & Brusseau, 2012; Takano, 2013; “Weightlifting Nurtures Strength,” 2018). Therefore, the purpose of this article is to provide an overview of benefits and potential value of integrating inclusive strength and conditioning courses into physical education curricula. The case example gives a practical overview of how one high school has designed a high-quality, accessible, and inclusive strength and conditioning course that all of its students have the option to participate in.

Common Terms

Strength and conditioning is an overarching term that refers to programs consisting of progressive resistance training and other training methods designed for increasing athletic performance (Reynolds et al., 2012). *Resistance training*, *strength training* and *weight training* are often used synonymously; however, they describe different technical movements and exercises. *Resistance training* includes a broader range of training procedures and training goals and is defined as

a specialized method of conditioning whereby an individual is working against a wide range of resistive loads to enhance health, fitness

and performance. Forms of resistance training include the use of body weight, weight machines, free weights (barbells and dumbbells), elastic bands and medicine balls. (Lloyd et al., 2014, p. 498)

Weightlifting technically refers to the sport that involves movements called the snatch and the clean and jerk (Faigenbaum et al., 2009) and includes a variety of “modified variations of these lifts, that are explosive but highly controlled movements that require a high degree of technical skill” (Lloyd et al., 2014, p. 498).

Benefits of Youth Participation in Strength and Conditioning

Participating in strength and conditioning can lead to physiological, psychological and other health benefits in youth. Some of the documented physiological benefits of strength and conditioning in high school athletes are increases in strength, explosiveness, proprioceptive abilities, general body awareness, athleticism, durability, balanced physical development and more efficient use of training time and energies (Takano, 2013). Resistance training can also lead to increases in strength for the leg press and the bench press in overweight or obese adolescent males (Schrantz et al., 2013). Increases in half-squat performance, squat jump performance, single-leg jump performance, 10-m sprint performance and change of direction performance in prepubescent male soccer players have been documented following engagement in a 12-week in-season low-to-moderate high-velocity resistance training program in addition to soccer training (Negra et al., 2016).

Psychological benefits of participating in resistance training include increases in resistance training self-efficacy, physical self-worth and global self-worth of youth who participated in resistance training (Collins et al., 2019). In addition, there is evidence to suggest that adolescents considered at risk of developing psychological distress show improvements in self-esteem, perceived body fat and appearance, physical self-concept, and total difficulties following participation in a CrossFit Teens resistance training program (Eather et al., 2016). Resistance training interventions that included exercises such as bench press, leg press, lat pulldowns, leg curls, shoulder press, seated rows, bicep curls, triceps pressdowns, calf raises and crunches also led to higher exercise self-efficacy, confidence in resistance

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training, and global self-worth and positive trends in physical self-worth (Schranz et al., 2013).

Finally, health benefits identified in children and adolescents who participate in resistance training include improvements in overall body composition (Sgro et al., 2009), reduced body fat (McGuigan et al., 2009), strengthened bones (Nichols et al., 2001) and increased resistance to sports-related injuries (Faigenbaum & Myer, 2010). Additionally, increases and improvements are seen in cardiorespiratory fitness, skeletal muscle mass, insulin sensitivity, body weight and body fat percentage (Lee et al., 2012). There is further evidence to suggest students exhibit more favorable cardiovascular profiles (Castro-Piñero et al., 2019) and lower levels of diastolic and systolic blood pressure, pulse pressure and rate pulse pressure (Agostinis-Sobrinho et al., 2018) when they participate in muscular fitness exercises.

Implementing Strength and Conditioning Programs in Physical Education

On top of the physiological, psychological and health benefits, participating in strength and conditioning can support youth in developing a foundation for active living after they leave high school. However, to enhance success and support student development, it is essential for teachers to follow appropriate practice. The guidelines laid out by the 2014 International Consensus Position Statement on Youth Resistance Training (Lloyd et al., 2014) and the National Strength and Conditioning Association (NSCA) Updated Position Statement on Youth Resistance Training (Faigenbaum et al., 2009) are two resources designed to help teachers and trainers implement safe and effective strength and conditioning programs for youth.

Student Readiness to Participate in Strength and Conditioning. When it comes to youth resistance training, it is important that children and adolescents are mentally and physically ready to participate. Students should be well prepared to follow instructions from their teacher or coach, be capable of handling the stress of the training program, and have competent levels of balance and postural control (Faigenbaum et al., 2009; Lloyd et al., 2016). To ensure student readiness, teachers and coaches should provide adequate instruction to help develop foundational fitness competencies and promote mental preparation. They should then implement a variety of formative assessments to document readiness and identify areas for refinement.

Qualified, Certified Instructor. Strength and conditioning programs should be led by a qualified instructor (Faigenbaum et al., 2009; Lloyd et al., 2014, 2016). The NSCA defines qualified professionals as individuals who

have an understanding of youth resistance training guidelines and who are knowledgeable of the physical and psychosocial uniqueness of children and adolescents... Ideally, adults who teach and coach youth resistance training should have practical experience working with children and adolescents, a recognized professional certification (e.g. National Strength and Conditioning Association [NSCA] Certified Strength and Conditioning Specialist or NSCA Certified Personal Trainer), and a level of knowledge commensurate with a college degree in physical education, exercise science, or a related field. (Faigenbaum et al., 2009, p. 69)

The content and competencies required for these certifications may not be addressed adequately within physical education teacher programs; therefore, it is strongly recommended that any physical education teacher assigned to teach or coach strength and

conditioning seek a high-quality certification prior to beginning instruction. Table 1 provides a list of certifications available to teachers. To support best practice in strength and conditioning instruction and programming, it is important for schools to seek out qualified individuals. If certified, qualified candidates are not available for hire, it would be important for schools to support professional development of teachers assigned to teach and/or coach strength and conditioning. Teachers interested in integrating strength and conditioning into their programs may also consider seeking out professional development certification opportunities.

Developmentally Appropriate Exercises. Once student readiness is identified, it is imperative for teachers and coaches to select not only exercises that are appropriate for children's and adolescents' body sizes, fitness levels, and resistance training experience but also exercises that promote muscle balance across joints and between opposing muscle groups (Faigenbaum et al., 2009). Table 2 provides

Table 1.

Strength and Conditioning Certifications	
Certifying Organization	Certification Name
National Strength and Conditioning Association (NSCA)	Certified Strength and Conditioning Specialist (CSCS)
Collegiate Strength and Conditioning Coaches association (CSCCa)	Strength & Conditioning Coach Certified (SCCC), Master Strength & Conditioning Coach (MSCC)
United States of America Weightlifting (USAW)	USAW Level 1, USAW Level 2, Online Programming Course
National Academy of Sports Medicine (NASM)	Performance Enhancement Specialist (PES)
National Council of Strength and Fitness (NCSF)	Certified Strength Coach (CSC)
International Sports Sciences Association (ISSA)	Strength and Conditioning Coach (SSC)

Table 2.

Strength and Conditioning Exercise and Program Resources

Books	Videos
<i>New Functional Training for Sports</i> (Boyle, 2016)	https://www.roguefitness.com/theindex/movement
<i>Youth Strength Training</i> (Faigenbaum & Westcott, 2009)	https://www.crossfit.com/exercisedemos/
<i>Essentials of Strength Training and Conditioning</i> (Haff & Triplett, 2016)	https://exrx.net/Lists/Directory
<i>NSCA's Guide to Program Design</i> (Hoffman, 2012)	
<i>Strength Training Manual: The Agile Periodization Approach</i> (Jovanović, 2020)	
<i>The Coach's Strength Training Playbook</i> (Kenn, 2003)	



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a list of strength and conditioning resources including books and exercise demonstration videos that may be useful for developing appropriate strength and conditioning content. Upon selecting the exercises to be performed, the training volume and intensity should ideally be based on training goals of the program, the interests of the students, and students' exercise technique ability levels. Teachers and coaches can either have students start with light loads and progress to heavier loads or prescribe a percentage of a one-repetition maximum (RM). Regardless of the chosen option, teachers and coaches must support children and adolescents use of the correct technique while performing all strength and conditioning exercises (Faigenbaum et al., 2009; Lloyd et al., 2014).

After deciding what exercises to perform as well as the volume and intensity, it is essential to regulate the amount of rest children and adolescents receive between sets. Rest intervals of 1 min are sufficient for most youth when the intensity of training is at a moderate level. However, when intensity and/or weight increases, a more extended rest period of 2 to 3 min may be needed (Faigenbaum et al., 2009; Lloyd et al., 2014). Lastly, recommendations suggest that children and adolescents participate in a strength and conditioning program two to three times per week on nonconsecutive days to allow for adequate rest between sessions and the development of muscular strength and power (Faigenbaum et al., 2009; Lloyd et al., 2014). This has implications for coaches and teachers who may be in schools where physical education classes meet daily. In these cases, alternative activities should be provided to allow for adequate rest and recovery. Overall, "if children are ready to engage in organized sports, they are ready to participate in developmentally appropriate strength and conditioning as part of a long-term approach to developing athleticism" (Lloyd et al., 2016, p. 1495).

Programming Structure. One final piece to consider when setting up a strength and conditioning program is the structure or

periodization of the programming. Periodization is a "planning paradigm in which training interventions are structured to maximize athletic development in accordance with a person's needs and reduces the likelihood of overtraining and monotony in youth" (Pichardo et al., 2019, p. 40). When developing a strength and conditioning program, it is necessary to select a type of periodization that will allow the implementation of the training interventions desired to reach the overall training outcome. Periodization plans for school-based strength and conditioning courses and programs should be considerate of academic events, holidays and the daily school schedule (Pichardo et al., 2019).

Though a strength and conditioning teacher or coach should structure the program in such a way to optimize the benefits for students, it is essential to remember that "the accumulation of research shows that longer programs with more sessions are the most effective" (Pichardo et al., 2019, p. 41). So, though brief instructional units may be beneficial to promote strength and conditioning and introduce students to important knowledges and skills, semester-long or year-long courses may be more supportive of positive performance outcomes. For example, a systematic review focusing on the effects of resistance training on physical performance in youth athletes found that "long lasting conventional [resistance training] (>23 training weeks) resulted in more pronounced improvements in muscle strength and agility as compared with shorter training periods (<23 weeks)" (Lesinski et al., 2016, p. 786). Another meta-analysis on the effects of resistance training in children and adolescents found that "longer training interventions are slightly more beneficial than similar programs of shorter duration" (Behringer et al., 2010, p. 1205).

Assessment in Strength and Conditioning Programs. A strength and conditioning program should follow research and best practice recommendations. Equally important, and similar to teaching in other content areas, teachers should implement robust assessment in the form

Table 3.**Strength and Conditioning Testing Options**

Test Category	Test Examples
Muscular power	Vertical jump, clean, standing long jump, clean and jerk
Muscular strength	Bench press, squat test, clean test, 1-RM bench/squat/deadlift, 3-RM squat/bench
Muscular endurance	RM pull-ups, sit-ups, and push-ups; prone holds; bench RM; other RM tests
Speed, agility, acceleration	10- to 60-yard sprints, Pro-Agility Test, T-test, three-cone test, 30-yard shuttle, 10- to 20-yard dash test
Anaerobic capacity	300-yard test, beep test, 800-m run
Cardiovascular endurance	1-mile run, 12-min run
Flexibility	Sit and Reach Test

Adapted from Duehring et al. (2009).

of a formal evaluation system to track students' progress. Providing testing opportunities for students in a strength and conditioning program provides teachers or coaches and students with many advantages. Consistent assessment allows consistent monitoring of acute performance in training and continued understanding of students' responses to training interventions. It also helps identify strengths and areas of improvement for students, helps teachers and coaches individualize the training programs, and allows students to compare their performance to normative data (McGuigan et al., 2013).

Testing opportunities should be specific to the students' goals and abilities, the data collected should be meaningful to both teacher and student, and it should impact students' learning, preparation, and performance. Furthermore, tests selected by the strength and conditioning teacher must be valid, meaning that the tests measure what they are supposed to measure, and are reliable, meaning that the performance on the tests is repeatable. With this information in mind, a strength and conditioning teacher can then select tests related to maximal strength, power, strength endurance, reactive strength and rate of force development (McGuigan et al., 2013). Table 3 provides a list of popular, appropriate strength and conditioning testing options used by strength and conditioning teachers and coaches (Duehring et al., 2009).

The following section offers a case example of an exemplary, inclusive strength and conditioning program implemented at the high school level as part of a physical education curriculum. Variability in teaching contexts, student interests, funding and support will likely make it difficult for physical education teachers to replicate the following program. However, the broad components are outlined below to demonstrate characteristics of one exemplar program and can be implemented independently. The purpose of the case is to highlight some of the practical implications of the aforementioned recommendations and to provide a concrete example of implementation strategies.

Case Example to Demonstrate a Quality Program

Greater Atlanta Christian School (GACS) is one independent school that has a unique set up for its physical education program.

This school provides high school students the option of participating in strength and conditioning or traditional physical education classes throughout high school. The teachers assigned to the strength and conditioning courses are qualified, certified strength and conditioning coaches. In light of having qualified personnel to run these courses, the strength and conditioning course focuses its curriculum solely on helping students develop the correct technique of exercises; the sets, reps, and weight that can be performed for each exercise; the testing protocols; and the technology used throughout the program. By focusing only on strength and conditioning over at least one school year, students have opportunities to progress in their abilities to perform various movements and can establish a foundation of correct movement patterns and knowledge that can be applied after high school. Figures 1 and 2 provide two different views of the strength and conditioning facility at GACS.

Richard Burnett, an NSCA Certified Strength and Conditioning Specialist and a Strength and Conditioning Coach Certified, leads the GACS strength and conditioning program with the help of Leon Burks, a Strength and Conditioning Coach Certified. Each school day, the coaches lead eight strength and conditioning classes consisting of 9th- to 12th-grade boys and girls. A main goal of these classes is to help students become efficient participants in strength and conditioning and supporting this requires differentiation of the programming. The coaches recognize that



Figure 1.
One view of the GAC strength and conditioning facility.



Figure 2.
A second view of the GAC strength and conditioning facility.

differentiation is vital not only in strength and conditioning but also in physical education more generally, because it allows the teacher to adapt learning opportunities and learning tasks to students' skills and abilities. Furthermore, differentiation takes into account a student's readiness and interest in the activity (Whipp et al., 2014), which is a key component for a successful and safe strength and conditioning program. With the importance of differentiation in mind, the coaches have developed a strength and conditioning program where the exercises chosen will lead to the best results for the students and one where they can succeed based on their ability level and goals.

The GACS strength and conditioning program is differentiated into five different levels consisting of three separate phases, each lasting 4 to 5 weeks. The first level is called the Foundation Program. It is designed for students who are new to strength and conditioning and focuses on engaging students in the repetition of reps to learn the proper technique for each exercise. For students in the Foundation Program, the coaches emphasize the correct positioning of each exercise and support students in developing the ability to apply the correct position on their own. The second level is called the Fitness Program. This program's main objective is to get students physically fit for a varsity level sport. At the Fitness Program level, students review how to perform each exercise and are now trying to build

strength. The Fortified Program (third level) includes students who have demonstrated the appropriate fitness and competencies along with students ready to compete at the varsity level. These students have developed a baseline of relative strength compared to their body weight and are looking to increase strength in order to compete and perform well at a competitive level.

Having established their relative strength compared to body weight, students in the Fast Program (fourth level) continue working to build strength to remain competitive. However, at this level, the coaches take a more central nervous system approach by training to increase the firing rate of motor neurons. Students use different tempos when completing exercises and perform more explosive and reactive exercises. The fifth and most advanced level is called the Freak Program. Students at this level are usually seniors who have either committed or are at least considering competing in sports at the collegiate level. It also consists of high-performing students who have achieved top scores according to the standards outlined in the Performance Training class structure. These students are recognized as gifted and highly athletic and have tremendous strength and motor control. With this in mind, a primary goal is to increase their athletic profile by targeting specific weaknesses. Additionally, the reps and percentages are more individualized for the students in this program.

In addition to developing these five program levels, the coaches individualize each workout each day to the different program levels. Students in every program level perform the same exercises or very similar exercises each day but differ in the number of sets and reps completed. An example of a daily plan can be found in Figure 3. The workouts are individualized even further by having students perform percentage work, which is tracked by the TeamBuildr app, a cloud-based strength and conditioning software (TeamBuildr, 2019). By differentiating the workout to each program level, the coaches can accomplish their goal of helping students succeed at every program level.

Evaluation. Knowing the importance of tracking students' progress through the strength and conditioning program, a 12-exercise evaluation system has been established. These specific exercises were chosen because they provide valuable information on the overall strength and athletic development of the students. Additionally, the coaches implemented evaluation measures and protocols for these tests, so results are comparable across different testing phases of training. Table 4 lists the 12 exercises included in the evaluation system along with what the test is measuring, how it is performed (e.g., 1-RM, 3-RM, 5-RM, 8-RM, or 10-RM), and any technology needed while performing the test.

Technology. The coaches use a variety of technologies to assess students following phases 1 and 3 of their training programs. The technologies offer coaches and students efficient capacity for continuous, formative evaluation to track progress between testing phases and adjust programs accordingly. Each student has access to iPads throughout the facility, which they

use to access different training apps and instructional support tools. One of the apps the GACS strength and conditioning program uses is the TeamBuildr app (TeamBuildr, 2013), which enables coaches to program and track training sessions. During each session, students can quickly log in to one of the iPads and follow the exact exercise prescription allocated to them by the lead strength coach. The expectation is that the students follow the prescription precisely as it is derived from maxes, program allocation, and sport season considerations. Students also have the responsibility of logging any changes made during the session (for example, if they change the number of repetitions or sets or if they adjust the amount of weight lifted). By carefully following the plans and recording the specifics of each movement in TeamBuildr, students and coaches gain a clear visual that illustrates student progress between testing dates. The Jawku Timing System is a wristband students wear that connects to the Jawku app, which allows speed, agility and reaction time to be measured (Jawku, 2020). In the GACS program, this timing system is used to time students as they complete the Pro-Agility Test and the 10-yard dash. Students also wear Polar heart rate monitors to track their heart rate throughout the workout.

Tendo units are used to measure speed and power output for exercises such as the power clean, clean pull, and snatch (Tendo Sport, 2020). The Tendo unit has a string that attaches to a barbell and each time a student performs an exercise the velocity or power conducted is displayed on the Tendo unit microcomputer (Tendo Sport, 2020), which allows students to receive instant feedback on their performance. For example, when performing the clean

PHASE 3: WEEK 2 – TUESDAY/WEDNESDAY				
VARSITY GAME DAY	TIER 1	TIER 2	TIER 3	TIER 4
CHAIN BOX SQUAT 3 x 3-6 >.70M/S AVG. VELO	BACK SQUAT 11, 8, 5, 8, 11	A. CLEAN PULL + HANG CLEAN 4 x 3 B. BB SJ 4 x 6	A. DB CURLS 3 x 10 B. DIPS 3 x 15 C. JG PLANK HOLD 3 x :20s	SPARTAN GRIT CIRCUIT VERSION 3 35/20 x 2
A. HANG CLEAN 3 x 3-5 B. RFESSJ 2 x 6-8 EA C. SKATER JUMP 2 x 6-8 EACH	BACK SQUAT 4 x 4, 4+	A. YO-YO CLEAN 5 x 2 (0:2:0) B. BB SJ 4 x 6	A. DB CURLS 3 x 10 B. DIPS 3 x 12 C. JG PLANK HOLD 3 x :30s	SPARTAN GRIT CIRCUIT VERSION 3 35/20 x 2
A. SB LEG CURL x 10 B. SB PUSH-UP 2 x 12-15 C. SB PLANK REACH 2 x 15-18	BACK SQUAT 8, 5, 3, 3 x 5 POWER ON LAST 3 SETS	A. CLEAN 3, 3, 3, 3, 3 B. BB SJ 4 x 6	A. DB CURLS 3 x 10 B. DIPS 3 x 12-15 C. JG PLANK REACH 3 x 12-15	SPARTAN GRIT CIRCUIT VERSION 3 35/20 x 2
POWER PLATE MOBILITY	BACK SQUAT FOLLOW PROFILE FOR ZONE	A. CLEAN 3, 3, 3, 3, 2 B. BB SJ 4 x 6	A. DB CURLS 3 x 10 B. DIPS 3 x 12-15 C. JG PLANK REACH 3 x 12-15	SPARTAN GRIT CIRCUIT VERSION 3 35/20 x 2
GAC PERFORMANCE TRAINING	CHAIN BOX SQUAT 4 x 5-7 >.30M/S AVG. VELO	A. CLEAN 4 x 2-4 B. DB RFESS JUMP 3 x 6-8 EACH	A. SB LEG CURL x 10 B. SB PUSH-UP 3 x 12-15 C. SB PLANK REACH 3 x 15-18	SPARTAN GRIT CIRCUIT VERSION 3 35/20 x 1-2

Figure 3.

An example of one day of programming at GAC. Fitness Program (blue row), Fortified Program (green row), Fast Program (orange row), Freak Program (red row), In-Season (yellow row), and Game Day (gray column). This example shows how each program level is differentiated in a way that allows students to be successful.

Table 4.
Greater Atlanta Christian School Evaluation System

Test	Test Measure	How the Test Is Performed
Barbell bench press	Upper body strength	1-RM, 3-RM, 5-RM, 8-RM, 10-RM ^a
Barbell back squat	Lower/total body strength	1-RM, 3-RM, 5-RM, 8-RM, 10-RM ^a
Trap bar deadlift	Total body strength	1-RM, 3-RM, 5-RM, 8-RM, 10-RM ^a
Chin-up	Upper/total body strength	1-RM, 3-RM, 5-RM, 8-RM, 10-RM ^a
Rear-foot elevated split squat (RFESS)	Lower body strength	1-RM, 3-RM, 5-RM, 8-RM ^a
Clean (power/full)	Total body strength/power	1-RM, 3-RM, 5-RM ^a
Block clean pull	Total body strength/power	3 of 5 repetitions > 1.75 m/s peak velocity ^b
Standing vertical jump	Total body power	3–5 max effort attempts ^c
Four-jump pogo	Lower extremity stiffness/elasticity	4 consecutive pogo jumps ^c
Pro-Agility	Change of direction proficiency, speed, and efficiency	3–5 attempts of a 20-yard shuttle ^d
10-Yard dash	Change of direction proficiency, speed, and efficiency	3–5 attempts of a 20-yard shuttle ^d
Postural readiness evaluation	Establish and reassess local function and mobility	7 mini tests in 5–10 min with the help of a partner, PVC pipe, and board

Note. ^aDepending on periodization and program allocation.

^bMeasured with the Tendo unit.

^cMeasured with the Just Jump Mat.

^dMeasured with the Jawku Timing System.

pull, the goal for students is to produce a speed and power output of 1.75 m/s. Upon achieving a bar speed of 1.75 m/s or higher, weight is added to the barbell before completing the next set. However, for those unable to maintain a peak velocity of 1.75 m/s, weight is removed from the barbell for the next set. By using the Tendo unit and recording the weight performed in the TeamBuilder app, students track their progress over the course of a cycle and identify their ability to increase the amount of weight lifted for exercises like the power clean, clean pull, and snatch. In addition, the Tendo unit helps ensure students' safety. By setting the goal of performing each lift at 1.75 m/s or higher, the amount of weight students perform is limited to what they can lift and still reach 1.75 m/s.

An additional piece of technology implemented in the GACS strength and conditioning program is the PUSH Band. The PUSH Band is a "smartphone-based wearable device designed to track movement velocity during a variety of resistance exercises" (Balsalobre-Fernández et al., 2016, p. 1970). In the GACS strength and conditioning program, students use the PUSH Band to measure velocity when performing exercises such as squat jumps. Though the PUSH Band is meant to be worn on the forearm (Balsalobre-Fernández et al., 2016), the coaches have attached it to the barbell on certain exercises to reduce inactivity time that can occur from transferring the band from student to student.

Lastly, the GACS strength and conditioning program uses Just Jump Mats when students are completing the vertical jump and the four-jump pogo tests. The Just Jump Mats provide instant feedback on the height of a student's vertical jump and the explosive leg power or rebounding quickness they create in the four-jump pogo test (Probotics, 2009). The instant feedback students receive from not only the Just Jump Mats but also the Tendo units and PUSH Bands is motivation for students to train harder during class.

All of the technologies are meant to provide an accurate record of student progress throughout the program, offer instant feedback on performance, and ensure that students are safely engaging in a

strength and conditioning program tailored for their individual readiness, needs, and goals. Teachers can monitor student programs using coaching views of the apps and make real-time adjustments based on results. Embedded throughout the program is instruction designed to help students make sense of the data they receive, with a key goal of transferring knowledge and skills toward a lifetime of physical activity.

Conclusion

Though research recommends having a certified individual run a strength and conditioning program, any school or any physical education teacher who currently runs a strength and conditioning program or is interested in starting a strength and conditioning program can benefit from this case example, regardless of certification. This article is meant to be used as a guide for what to do to set up a successful program where teachers and students see results. The authors acknowledge that not all schools will have access to the same size weight room, the amount of equipment, or the technology that GACS has access to. However, all physical education teachers teaching strength and conditioning classes can ensure that students use proper technique when performing exercises. Teachers can also guarantee that the programming is differentiated for all student levels. Lastly, physical education teachers can establish a testing protocol that allows both teacher and student to see the progress being made.

It is imperative, especially in today's children and adolescents, that the concept and importance of a healthy lifestyle and lifetime participation in physical activity be instilled as early as possible. One avenue available for achieving this goal is a school's physical education program. GACS has taken this concept and developed it into a strength and conditioning program where the coaches and students see results and progress. Like this school, with evolving mindsets and the currently available training and certifications (Table 1), the possibilities for engaging and rewarding physical education programs are infinite.

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