



Resistance Training for Elementary School Age Children

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It is essential for physical education teachers to utilize a foundation of physiological principles to design and monitor appropriate, safe, and effective exercise for their students. Adult training programs are not appropriate for children. Teachers should consider individual levels of maturation, motor skill ability, and affective needs when designing the program. The students' level of maturation, training experience, and ability should be considered in addition to grade level and chronological age when making decisions related to the level of exercise or type of program to implement.

Strength Development in Children

Exercises in this article can be implemented for both young girls and boys. Essentially, there is no difference in strength among boys and girls during early childhood prior to puberty. As both genders advance through puberty, the difference intensifies (Malina & Bouchard, 1991). By age 11-12 years, the average strength of girls is about 90% that of boys. The percentage drops to about 80% by age 13-14 and 75% by age 15-16. Such changes occur primarily due to pubertal, hormonal changes.

Developing an appropriate resistance training program for younger children requires an understanding of the adaptations that occur in their bodies after regular participation in a resistance training program. Preadolescent boys and girls have the ability to improve their relative strength similar to gains observed in adults (Pfeiffer & Francis, 1986). However, due to low levels of muscle building hormones, strength gains in preadolescent children are more a result of neuromuscular adaptations and improved technique (Blimkie, 1993). In adolescence, strength improvements become attributable to neuromuscular adaptations, improved technique, and muscle hypertrophy (Pfeiffer & Francis, 1986). So,

when resistance training programs are well organized and students are taught proper technique and safety precautions, training can be safe and beneficial for both preadolescents and adolescents (Faigenbaum & Bradley, 1998; Falk & Tenenbaum, 1996; Kraemer et al., 1989).

Strength Training Without Weights

The following exercise program is designed to improve classroom management for the teacher who has large numbers of students and very little or no weight training equipment. Most of the equipment indicated is inexpensive and can be used for maximum participation by allowing individual, partner, and small group work. The training program can be conducted as a circuit, with students moving from station to station with a partner.

Emphases within this program are (a) to improve muscular strength and endurance, while (b) learning to control the weight of the body with proper technique, and (c) making resistance training fun. Progressive overload or increases in resistance are promoted through changes in body position. There is minimal need to add external weight.

Lower Body Training

Muscle Groups: The following exercises will improve muscular strength and endurance for the lower back, hip, knee, and ankle:

Flying Bird

Technique Points: Complete between 3-6 repetitions. Each repetition requires a high energy cost to control the body while supported on one leg. Technique should be emphasized in place of a high number of repetitions.



Figure 1 Flying bird.

- **Flying.** With a straight back, support all your weight on one leg. Bend forward at the hip of your stance (support) leg while extending the other leg behind you, which we will call the *tail*. Extend your arms to the side to simulate *wings* (see Figure 1). While pretending to *fly*, allow your upper body to move in all directions. Keep your back straight. Try to fly for about 10 seconds at a time. Note: You may slightly bend and extend the hip and knee of your support leg as you fly.
- **Fly With Toe Touch.** *Flying*, as above, slowly bend further at the hip and knee to touch the toes of your stance leg with your opposite hand. For example, touch your right toe with your left hand. Return to the flying position. Repeat this 3-4 times.
- **Fly Vertical.** Get into *flying* position and hold a resistance band with a partner (*wings* reaching forward instead of to the side). Your partner (not flying) will stand in front of you and simply anchor the resistance band, maintaining a slight tension on it. From your *flying* position, drop your *tail* and lift your *wings*, returning to a stand. This is a *flying vertical* position. Maintain a straight upper body while bending and extending at the hip. Work against the resistance band as you extend to the *flying vertical* position. Repeat the extension into *flying vertical* position 4-6 times.

Three-in-One Squat

Technique Points: Support as much weight as possible on one leg. Keep the knees in line with the toes and heels on the ground.

- **Floor.** Place your feet shoulder wide. Perform a 2-leg squat so that your thighs are parallel to the floor. Then return to a standing position.



Figure 2 Wobble squats. Student on the right is leaning to place more weight on the right leg.

Next, lean to the right so most of your weight is supported on your right leg. Perform the same squat action, to the parallel position if possible. Now, to further shift your weight to a single leg, lift the toes of your other leg so you are using only the heel for support. Do the squat again. Do not go further down than the parallel position. We call this a *partial single-leg squat*. Now, repeat the same progression on your left side. Complete 4-6 repetitions. Emphasize body control and technique, shifting the body weight over the support leg.

- **Wobble Squats.** Perform the 3-in-1 squats while standing on a balance disc. The balance disc increases the difficulty without adding resistance to the exercise (see Figure 2).

Toe Touch Single-Leg Squat

Technique Points: Support most of your weight on your front leg. Keep your waist level. Keep the knee of your squatting leg in line with the toes. Your heel remains on the ground. During the squat, your knee should move forward to a position directly above or slightly in front of your big toe.

- **Toe on a Step.** Stand 6-12 inches in front of a 6-12 inch step (step is behind you). Support your body weight on one leg. Reach back and place the toe of your other leg on top of the step for slight support. Lean your upper body slightly forward at the hip, but keep your back straight. Complete 6-8 repetitions of single-leg squats on each leg. To increase the difficulty, use a stability ball in place of the step. This reduces the stability of the back leg.



Figure 3 Single-leg squat on the ball.

- **Toe on/Toe off Step.** If you're able to support all your weight on the front leg, lift your toe from the step on the upward movement.
- **Toe on Step with Dumbbells.** If you're strong enough and want a challenge, hold dumbbells or a medicine ball while squatting. Continue to place your toe on the step for added support.
- **Toe on Step Wobble Squat.** Do single-leg squats as described above while standing on a balance disc.

Single-Leg Squat on a Ball

Technique Points: S-l-o-w-l-y squat, lowering your hips to touch the ball. There should be no "bounce" at the bottom of the squat phase. Keep your waist level. The opposite leg should mirror the position of the stance leg but not touch the floor. Because the opposite leg provides no support, this is considered an advanced exercise.

- **Single-Leg Squat on the Ball.** Raise the height of a stability ball by placing it on a 6-12-inch step. Adjust the height so you can complete a half squat. Extend your knee to straighten the non-support leg. Reach your arms forward to improve balance. Squat, touch the ball with your hips and return to a standing position (see Figure 3). Complete 6-8 repetitions on each leg.
- **Single-leg Squat on the Ball and Pause.** To add difficulty, pause 2-3 seconds just before or after touching the ball on each repetition.
- **Single-leg Squat on the Ball on the Floor.** To further increase the difficulty, place the ball on the floor and perform the squat as described above. This brings most students closer to a parallel squat (see Figure 4).



Figure 4 Single-leg squat with ball on the floor.

Single-Leg Squat

Technique Points: Squatting to parallel is the goal, but students can squat to any depth attainable.

- **Free-Standing Single-Leg Squat.** Perform a single-leg squat to parallel with no support from the other leg and without the ball under the hips. Keep the knee in line with the foot and the waist level. This exercise is more advanced than the squat on the ball. Complete 4-6 repetitions on each leg.
- **Free Standing Single-Leg Wobble Squat.** For a fun challenge, complete the single-leg squat on a balance disc.
- **Stepping Stones.** Spread several balance discs approximately 2 feet apart in all directions on the floor. Students step from one disc to another in any direction without contacting the floor. After making contact with the disc, bend at the hip and knee to a half or 3/4 squat and return to the standing position before stepping to the next disc. To add interest, have several students participate at the same time. See who can remain on the "stepping stones" for the most repetitions.

Upper Body Training

Muscle Groups: The following exercises will improve muscular strength and endurance for the chest, shoulders, triceps, biceps, and forearms.

Technique Points: Straight posture throughout movement. Avoid letting the hips sag. Flex the elbows to 90° at the bottom of the push-up. Push to a full extension without locking the elbows.

Wall Push-Up

- Place your hands shoulder width apart on the wall. Keep your legs and back straight while performing push-ups against the wall. Start with your feet close to the wall for light resistance. Move your feet farther away from the wall to increase the resistance.
- To further increase resistance, try moving your hands farther apart or closer together. Perform single-arm push-ups in the same manner. After doing the push-ups with one arm at a time, try alternating your arms to increase resistance.

Decline Bench or Chair Push-Up

- Place a bench or chair close to a wall, or have a partner hold it for stability. Start with your hands shoulder width apart on the chair or bench. With your knees on the floor, the muscle activity will be relatively high, even with low resistance. To increase the resistance, perform the push-up with your feet on the floor (straight legs).
- Move your hands farther apart or closer together to increase the resistance. Also, progressing from the use of one arm at a time to alternating between your arms increases resistance.

Incline Bench or Chair Push-Ups

- This is the same as the decline exercise, except your feet are now placed higher on a bench, with your hands on the floor. To change resistance, make the same adjustments as indicated for the decline push-ups.

Stability Ball Push-Ups

- Hold a ball against the wall at chest level. Your hands should be about shoulder width apart on the ball. Keeping your legs and back straight, perform push-ups. Start with your feet closer to the wall for light resistance and gradually move them farther away from the wall to increase the resistance. To increase resistance even more, try moving your hands farther apart or closer together.
- Place your ball on the floor against a wall, or have a partner hold it in place. To begin, support your body weight on your knees and hands. But gradually, attempt push-ups with straight legs (see Figure 5). Then, move the ball away from the wall or partner to further increase the difficulty.
- Place your ball on aerobic steps and against the wall. Start the push-up from a standing and leaning forward position. Increase the resistance by moving the ball closer to the floor.



Figure 5 Stability ball push-ups.

- Place your ball on the floor and against the wall. Place your hands about shoulder width apart. From the traditional push-up position, with back and legs straight and toes on the floor, perform the push-up. To increase resistance, try moving your hands farther apart or closer together.

Stick Bench Press

Muscle Groups: Chest, shoulders, triceps, biceps, forearms

Technique Points: Back should remain flat on the floor or bench. Partner provides resistance against eccentric and concentric contractions as the stick is lowered and raised. The amount of resistance should be consistent with a slow movement of the stick.

- Place your hands on the stick, shoulder width apart, while lying on the floor or a bench. From a full arm extension, *pull* the stick toward your upper chest, while your partner resists the movement (hands placed inside the performer's



Figure 6 Stick bench press: Partner is resisting the push.



Figure 7 Stick bench press: Increasing the resistance.

hands). Return your arms to the starting position while your partner resists the *pushing* movement (see Figure 6).

- To increase difficulty, try moving your hands farther apart or closer together. Your partner can also increase the difficulty by increasing the resistance during both contractions, by moving their feet back, or by lowering their hips to make a straight line (like a push-up position; see Figure 7).

Stick Arm Curls

Muscle Groups: Biceps, forearms

Technique Points: Body should remain straight without leaning. Partner should resist against the eccentric and concentric contractions (as the stick is lowered and raised) with hands inside the performer's hands. The amount of resistance should be consistent with a slow movement of the stick.

- Place your hands on the stick, shoulder width apart, while standing erect. From a full arm extension in front of the body, raise the stick toward your upper chest while your partner resists the movement. Return your arms to the starting position while your partner resists the downward movement (see Figure 8).
- Your partner can increase the difficulty by increasing the resistance during both contractions. To increase the difficulty further, work each arm separately while your partner continues to exert resistance with both hands.

Triceps Dips

Muscle Group: Triceps

Technique Points: Movement should be slow throughout the exercise. Avoid using legs to move your body.



Figure 8 Stick arm curls: The student on the left is “curling” the bar while her partner resists the action.

- Place a bench or chair close to a wall or have a partner hold it for stability. From a seated position, place your hands on the chair seat to the sides of your hips and press your arms out to full extension. Walk your feet forward until your buttocks clear the front of the chair. With bent knees, lower your body slowly downward until your arms are at a 90° angle. Return by pressing upward to the starting position. To increase resistance, place your feet at a higher level off the floor.

Abdominal Training

Muscle Groups: The following exercise will improve muscular strength and endurance for the trunk flexors and rotators, hip extensors, knee extensors, and trunk extensors.

Stability Ball Sit-Ups

Technique Points: Perform the exercise with hips and knees bent at different angles to adjust the amount of torso inclination. Place your hands on top of your knees and flex your trunk in a crunch position.

- Perform crunches with the middle of your back on the front side of a ball and your upper body close to vertical. Position your hips near your heels with knees completely flexed. The backs of your calves will touch your hamstrings. Your partner should stand behind the ball and hold it in place. Lower your chest a few inches toward your waist and allow your hands to slide over the top of your knees (see Figure 9).
- To increase resistance, begin the crunch with the upper body more horizontal than vertical and position the ball closer to your lower back with



Figure 9 Stability ball sit-ups with low resistance.

your thighs almost parallel to the floor. Also, try moving your hands near the side of your head or cross your arms over your chest.

- To train the oblique muscles of your trunk, perform a side bridge (lie sideways) on the ball. Position the side of your body, from hip to shoulder, against the ball, with feet contacting the floor and legs straight. Twist slightly to hold the ball in place with both arms. Push with arms to raise hips off the ball, while maintaining the side orientation in the lower body. Continue to push up until the lower and upper body forms a straight though slightly twisted line. Return the hips to the ball to begin the next repetition. Complete 6-8 repetitions on each side.

Conclusion

After initially practicing these exercises, begin with a one-set circuit. When designing the circuit for beginners, alternate upper and lower body exercises. The intensity of the circuit can be increased by increasing the number of sets and by gradually adding several upper and lower body exercises in succession.

The amount of time required for a partner to complete a set provides adequate rest between the exercises. For the majority of the exercises described, we suggest 4-8 repetitions. This is due to the high energy required for students to control their body weight under unstable conditions. It also places the emphasis on proper technique. As strength improves on each exercise, several levels of resistance can be provided to introduce new challenges. This, in part, serves to maintain or increase students' interest in participating in resistance training. The emphasis on body weight resistance makes these exercises appropriate for students of any age and ability. However, they can also be incorporated with traditional, more advanced dumbbell and barbell resistance training.

Introducing these exercises early in a resistance training program teaches students how to control their body weight. Unstable conditions, such as in the single-leg stance exercises, are often present in activities of daily living and sport activity. Building a foundation of muscular strength and endurance at an early age, with a variety of movement experiences, can enhance human performance and prevent injury.

The exercises described in this article can be included in physical education curriculums throughout elementary, middle, and high school. Using the body as resistance, a weight room is right under everyone's nose.

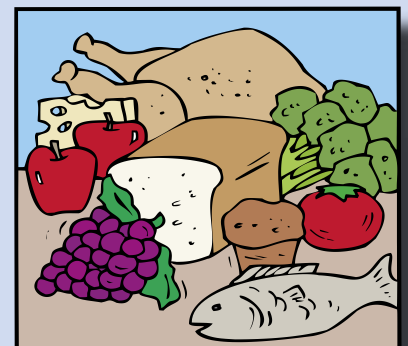
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Nutrition Jeopardy

This activity is popular at the Fairhill Elementary School in Fairfax, VA: Create a school Nutrition Jeopardy game by having the students and teachers write the answers to nutrition-related questions. This activity will get students to do some research on nutrition and their health. Prizes can be awarded to the students who ask the right questions to match the answers. Contact local organizations for nutrition education materials, such as the Dairy Council or local chapter of the American Cancer Society.



Source: pelinks4u.org