2015

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Recommended Citation

Previously published in ACSM's Health and Fitness Journal. 2015; 19(4): 5-11. http://journals.lww.com/acsm-healthfitness/pages/default.aspx

TRAINING TOYS … BELLS, ROPES, AND BALLS — OH MY!

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LEARNING OBJECTIVES

- Develop a better understanding of three popular adjunct modalities: kettlebells, battling ropes, and medicine balls.
- Learn how to use these modalities to help infuse fun, new strength training, and cardiovascular fitness challenges into a client's workout by using goal-specific activities to "break up" an exercise bout.

Key Words:
kettlebells, battling ropes, medicine balls, training, exercise modality

Participation in regular moderate-to-vigorous physical activity often decreases with increasing age (16), and among people who do exercise, long-term adherence often is a challenge because of various factors including lack of enjoyment, intrinsic motivation, or social support; poor environment; inconvenience; fear of injury; and health-related issues (5,18). During the past decade, general fitness professionals and personal trainers have incorporated numerous adjunct modalities (''toys'') to ''break up'' the rigors of fitness training and as a means to introduce some diversion and goal-specific activities. Three popular modalities are kettlebells, battling ropes, and medicine balls. This article briefly reviews each device and presents some applications for their use in the fitness setting.

KETTLEBELLS

Kettlebells (KBs) have gained popularity in recent years, especially, from exposure during KB competitions to their inclusion in contemporary training programs (*e.g.,* CrossFit). The shape of the KB allows the client to substitute KBs for dumbbells and perform a variety of traditional and new exercises for the upper and lower extremities. For some (*e.g.,* novice clients or patients undergoing rehabilitation), resistance training can be initiated for complex multijoint exercises (*e.g.,* squat, clean and jerk), using a KB that may otherwise be too challenging (before skill acquisition) or simply contraindicated for a patient during the initial phases of a rehabilitation protocol (3,20).

The unique shape of the KB allows one to perform the KB swing (1,13). The swinging motion is initiated by grasping the handle with one or two hands, followed by swinging the weight between one's legs (like hiking in football). The upward motion of the swing is performed by explosively extending the lower extremities (see Photo 1), with minimal contributions from the upper extremities. When the KB is at shoulder height (see Photo 2), the downward swing is initiated,

Photo 1.

Photo 2.

with the individual controlling the KB through the downward motion, then repeating the swing for the desired number of repetitions. The hip-dominant KB swing emphasizes explosively extending through the hips, maintaining a neutral lumbar spine posture, and minimizing knee flexion when lowering the KB (1). A lack of muscular flexibility in the back or the hamstrings and/or a lack of strength of the core (*e.g.,* the low back and hips) may challenge one's ability to maintain a neutral spine. An inability to maintain a neutral spine may increase the risk of low back injury when performing the hip-dominant KB swing. The squat-dominant KB technique can be performed by those who are unable to perform the hip-dominant swing correctly. The squat-dominant KB swing allows one to flex one's knees, or squat, when swinging the KB between the legs (1).

Proponents of KB training suggest that KB exercises can be used to increase muscular strength, power, and cardiorespiratory fitness. Recent research has explored the physical and physiological changes associated with KB training programs (4,8,9–13,15,19). Farrar et al. (8) assessed the effects of a two-handed 16-kg KB swing protocol on measures of cardiorespiratory fitness in healthy young men. Subjects were asked to perform as many swings as possible during a 12-minute exercise bout. Acute cardiorespiratory changes during an exercise bout included an average heart rate (HR) and oxygen uptake ($\dot{V}O_2$) of 87% and 65% of maximum, respectively, when compared with subject responses during a graded exercise test.

Thomas et al. (19) found that a training program consisting of two KB exercises (two-handed swing and sumo deadlift) could provide a similar training response as a ''moderate-intensity treadmill walking'' program. In this study, 10 subjects performed three 10-minute training bouts, with each bout separated by three 1-minute rest periods (19). Subjects performed 10 two-handed KB swings, 10 KB sumo deadlifts, and then repeated the sequence throughout the exercise session (19). The take-home message from the above (and similar) (4,8,9,19) studies is that a prolonged KB training protocol may represent a sufficient training stimulus to promote improved cardiorespiratory fitness; however, they do not suggest that KB training should replace traditional forms of cardiovascular exercise.

Increases in strength and power have been reported in subjects who have participated in KB training programs. Manocchia et al. (12) reported on a two times a week for 10 weeks program that was subdivided into five microcycles, each consisting of a variety of KB exercises, including, but not limited to, one-handed and two-handed swings, squats, push presses, bilateral presses, Turkish Get-Up, and the clean and press. Each subsequent microcycle was marked by increasing intensity, and end-of-study results showed significant improvement in bench press and clean and jerk measures. Otto et al. (15) reported that a 6-week KB training program was not superior to a weightlifting program at increasing strength (back squat), and Jay et al. (10) randomized subjects to either a KB training group (swing exercises and deadlifts, three times per week for 8 weeks) or a no-intervention control group and showed that the KB training group did experience a significant increase in jump height; however, the gains were not significant when compared with the control group.

The take-home message from the aforementioned studies is that strength or power can be increased with performance of a KB training program. Strength training professionals may prescribe the aforementioned exercises/protocols; however, to optimize results for one's clients/patients, one should manipulate dosing variables to achieve desired outcomes and frequently tested functional measures. For example, to develop lower-extremity muscular endurance in a patient undergoing rehabilitation or an untrained client, one could prescribe the two-handed KB swing performed with low weight for a high number of repetitions. As the patient/client becomes experienced with the swing movement, weight can be increased using lower repetitions to develop muscular strength (four to six reps) or power (one to three reps). Finally, KBs also can be used for complex movements, such as the snatch or jerk, as one's skill level develops.

BATTLING ROPES

The popularity of rope training has increased dramatically in various populations from general health and fitness training to becoming part of strength and conditioning programs for professional athletes. Historically, rope training consisted mostly of jumping rope or rope climbing but has evolved to include additional applications, including pulling/dragging, suspension, and wave (undulation) exercises. Pulling exercises derive resistance from wrapping a rope around a post, which may be pulled from multiple angles and body postures (see Photo 3). Ropes also may be tied to sleds or other objects for pulling or dragging exercises. Suspension exercises involve using a suspended rope

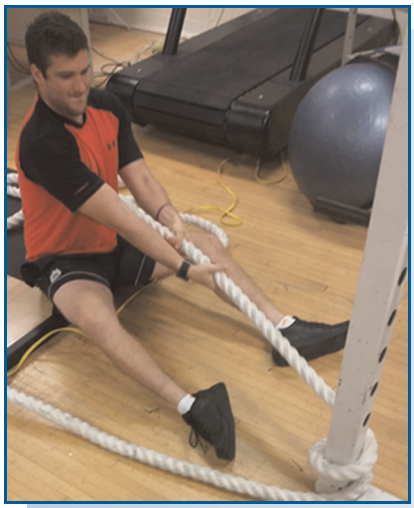

Photo 3.

(similar to a TRX) to perform a number of body weight exercises (*i.e.*, inverted rows, pull-ups, etc.).

Ropes are most commonly used for wave (undulation) training. The ropes are anchored at a fixed point, and waves are generated via multiple movement patterns. The intensity of the exercise is governed by rope size (length, weight, and diameter), wave velocity and amplitude; the anchor position; and the amount of muscle mass used (2,14). Ropes typically are 10 to 100 feet in length, 1 to 2 inches in diameter, and weigh approximately 0.46 to 0.98 lbs per foot of rope, depending on the diameter and type of rope used.

Benefits of Rope Training

Battling rope exercises often are included in programs that target cardiorespiratory conditioning and training for muscle strength, endurance, and power (2,14). Studies are limited but have shown potent acute metabolic and cardiovascular responses. Research protocols have examined alternating and double-arm waves and rope slams, with various set durations and rest intervals (*e.g.,* 15− to 30-second sets followed by 45 seconds to 2 minutes of rest). Results showed average training HR values of 154 to 163 per minute and average $\dot{V}O_2$ values of 38 to 40 mL · kg^{-1} · min^{-1} (7,16).

Program Design

Battling ropes can be used as the sole training modality or integrated with other modalities to achieve an overload stimulus. Important variables to consider include exercise selection and order, training volume, training intensity, repetition velocity, and rest intervals (Table). A large number of exercises and variations can be performed. Common rope exercises include:

- Single-arm alternating waves (see Photo 4)
- Double-arm waves (see Photo 5)
- Double-arm slams
- Jumping jacks
- Grappler hip toss (see Photo 6)
- In-and-out waves
- Side-to-side snakes (see Photo 7)
- Clockwise/counterclockwise arm circles
- Ultimate Warrior shakes (right, left)

TABLE: **Battling Rope Training Progression**

Beginner Guidelines	Progression Strategy
• Select a small rope 30 to 50 feet in length, 1- to 1.5-inch thick (ropes can be wrapped multiple times around some anchors if necessary)	• Use of larger and thicker ropes as movements become easier
• Start with basic movements such as single-arm alternating waves and double-arm waves	• More complex movements can be added across time with various sequencing strategies • Rope exercises can be integrated with other movements such as jumps, lunges, and lateral shuffles. • Rope exercises can be included in metabolic circuits that use other modalities (plyometrics, agility, speed, body weight, aerobic and weight training equipment, and implements) • A trainee may progress to use ropes for other purposes in addition to wave training (pulls/drags, climbing)
• Allow enough rest time (*e.g.,* 30 seconds to 2 minutes if needed) in-between sets to maintain proper form/technique and volume	• Decrease rest intervals to where little rest is allowed between sets • Many advanced programs consist of circuits of exercises with minimal rest in-between and more rest in-between circuits
• Start with a low number of repetitions (15 to 20 reps per set) or set duration (15 to 20 seconds)	• Increase repetitions and set durations to where the workout becomes more continuous
• Use a moderate-to-fast cadence to produce waves	• Increase cadence to produce high wave oscillation velocities and to allow more reps per unit of time

Photo 4.

Exercises can be made more complex by changing posture (from standing to seated, kneeling, or prone/plank), using BOSU balls or stability balls, and by adding other movements such as squats, lunges, hops, jumps, and shuffles to the wave patterns. Trainees may begin with a few basic rope exercises and gradually include more complex exercises as conditioning and coordination improve. Numerous exercise sequences may be used effectively.

Exercise intensity depends on several factors including the exercise selected; the size, diameter, and length of the rope; and the speed and amplitude of wave motion. Intensity increases as the length, diameter, and weight of the rope are increased. A 50-foot 1.5-inch rope is recommended for beginners. Rope length

Photo 5.

Photo 6.

can be reduced by wrapping it multiple times around the anchor. This technique can be useful for difficult exercises as a means to maintain a lower intensity of effort, especially if the facility only has a few ropes to choose from. Anchors support some of the weight of the rope. Low-to-moderate anchoring positions (below waist level) provide more of a challenge to the trainee. Rope exercises typically are performed at high oscillation velocities.

The number of sets varies based on the trainee's level of fitness and whether battling rope exercises are integrated with other training modalities or performed as a specific workout. When performed individually, 8 to 12 sets of rope exercises per workout may serve as a starting point. Battling rope sets usually are timed, although counting repetitions also can be performed. For the beginning trainee, start with 15 to 20 seconds of exercise, followed by 40 to 45 seconds of rest (or longer if needed). With progression, set durations and the number of sets completed may increase and rest intervals can decrease, especially if increasing muscular endurance is the main goal. Progressing to where set durations of 30 to 60 seconds are used, followed by short (15- to 30-second) rest intervals, is very

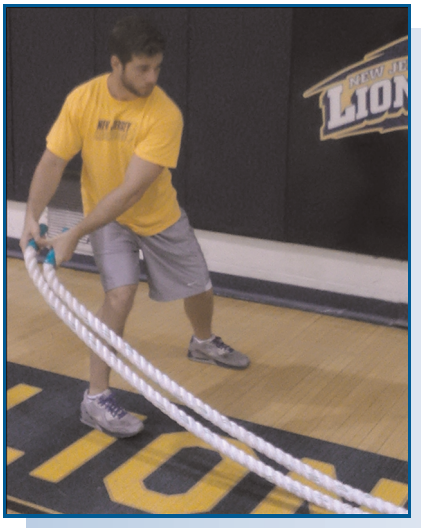

Photo 7.

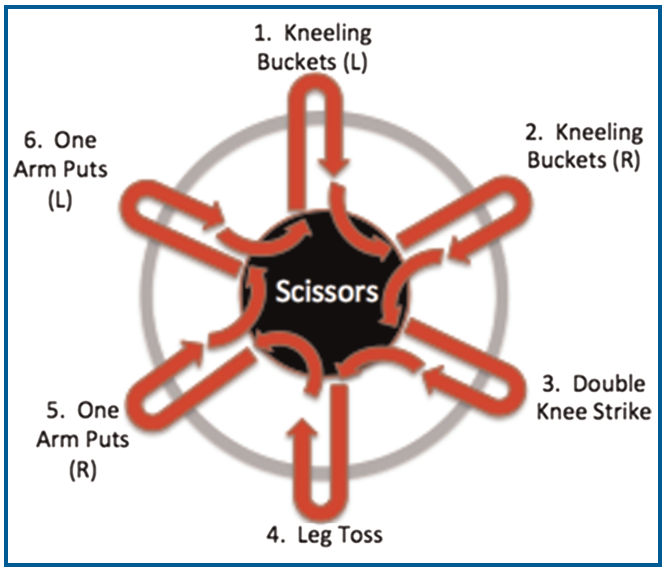

Figure 1. Wheel workout.

challenging. Advanced training programs involving battling ropes are continuous in nature, such that several exercises are performed in sequence with little rest.

MEDICINE BALLS

Medicine balls are a popular training tool because they are functional and fun, making workouts seem more like play. The product is affordable and portable, and using ''partners'' creates camaraderie and accountability. There are many brands available, but one ball (Dynamax©) is somewhat unique in that its design approximates shoulder girdle width and it is less dense and bouncy than other balls.

Programming and Workout Design

Training with a Dynamax© ball targets the development of physical skills, such as power and coordination; it is partner-based, with movements that are cooperative rather than competitive. In the group setting, the partners should be of similar stature and ability. In the trainer-client setting, the role of the trainer is to catch the ball and return it in optimal position for the client to throw the ball through the designated pattern. *Cornerstone* exercises are the foundation of Dynamax© workouts and fall into three categories: upright rotational, locomotion, and ground work. Workouts are designed in several formats, including *series* (sequential exercises alternating between the core and posterior chain), *combos* (a sequence of two or three multiplanar exercises, often working opposing muscle groups), *medleys* (structure-combining locomotion and rotation), and *wheels* (6).

As the name implies, the wheel workout consists of a ''hub'' and a series of ''spokes'' (6). The hub begins and ends the wheel and typically is a bilateral movement. The spokes contain rotation and/or multijoint exercises that are performed alternately with the hub. When designing workouts, factors such as exercise selection, pace, and rest intervals are varied to accomplish particular goals. Materials provided by Dynamax© claim that the wheel depicted in Figure 1 will develop physical skills and target the cardiovascular system because of the large amount of muscle mass used. To evaluate this claim, the wheel workout was evaluated in a pilot study at the University of Texas, where each wheel consisted of 16 repetitions of the hub exercise (scissors) performed alternately with 10 repetitions of each spoke — for 3 times around the wheel (To view a video of the wheel exercises, go to http://www.medicineballs.com/ut-wheel/). A maximal treadmill exercise test was completed on a different day to determine $\dot{V}O_{2max}$ and maximal HR (HR_{max}).

Preliminary Findings

The project showed that HR increased linearly from exercises 1 through 13, increasing from 66% to 86% of maximum across

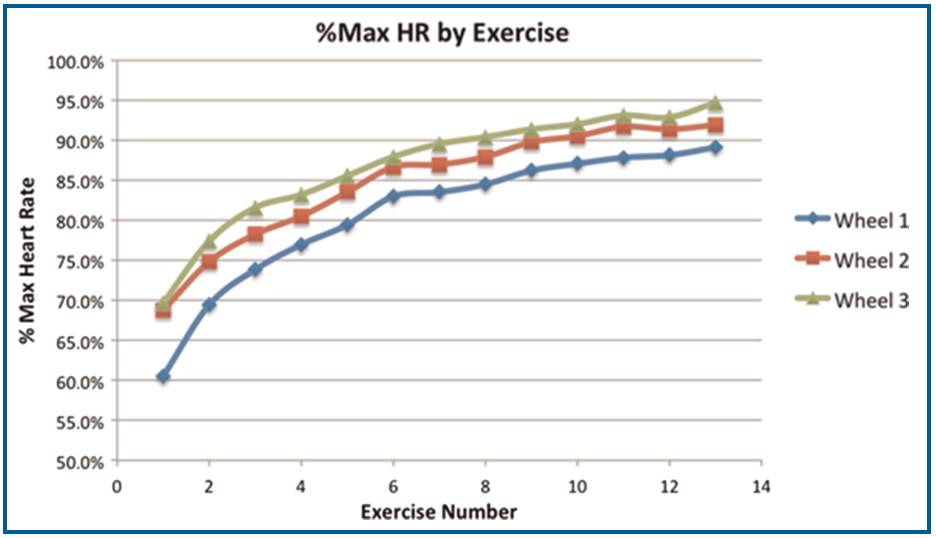

Figure 2. Percent of maximum heart rate across each wheel.

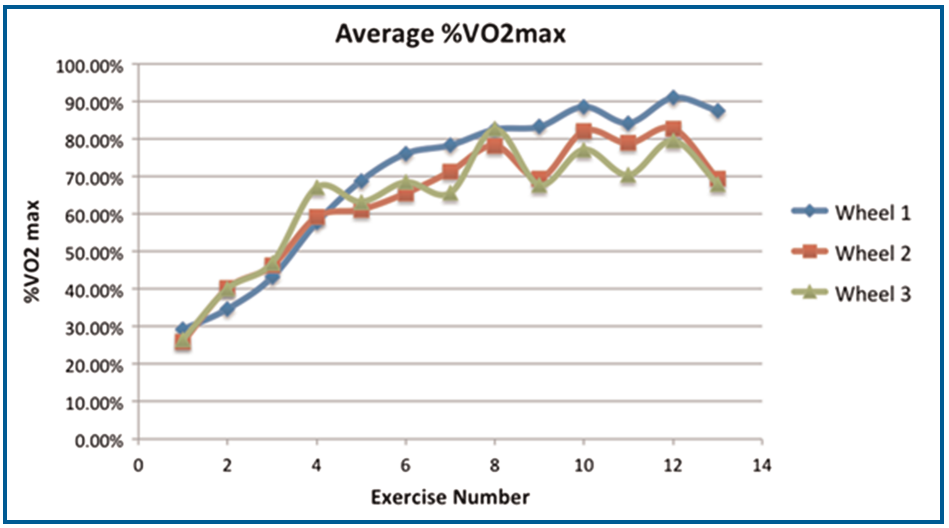

Figure 3. Percent of $\dot{V}O_2$ maximum across each wheel.

exercises 1 to 6 and then to 92% of maximum across exercises 7 to 13. HR expressed as a percentage of maximum was slightly higher during each wheel (Figure 2). Unlike HR, $\dot{V}O_2$ was generally similar for each wheel, with the average value for the three wheels being 70% of $\dot{V}O_{2max}$ (Figure 3), remaining above 50% of $\dot{V}O_{2max}$ across exercises 4 through 13. The $\dot{V}O_2$ increased linearly through the first seven exercises (~2 minutes) and then remained steady for the last six exercises (~1.5 minutes) at an average of 35.0 mL · kg^{-1} · min^{-1} (80% of $\dot{V}O_{2max}$). Exercises 10 (log toss) and 12 (one-arm put) elicited the highest $\dot{V}O_2$ values despite being upper body dominant. Caloric expenditure averaged about 10 kcals min^{-1} for a total of 98 kcal for three repetitions of the wheel.

The aerobic intensity achieved during this workout would be classified as ''vigorous'' to ''near maximal'' and should be of sufficient intensity to improve aerobic fitness. And because the HR-$\dot{V}O_2$ relationship during the wheel workout was similar to what was measured during the graded exercise test, HR can be used as an indirect indicator of exercise intensity. The linear relationship demonstrated between HR and $\dot{V}O_2$ is what we expect for cardiorespiratory-type activities but does not always exist in circuit training programs.

We concluded from this pilot work that, as a novel training method, the wheel workout format provides an additional tool for trainers to help clients improve aerobic fitness and increase caloric expenditure. In addition, activities such as those used in the wheel workout may offer more than aerobic conditioning alone in that they also may produce gains in muscular strength, endurance, power, coordination, agility, and balance.

SUMMARY

Maintaining a regular exercise program is an important part of proper health maintenance, which can include three modalities that often are used in the fitness setting. Fitness professionals currently involved in the physical training of others are encouraged to consider kettlebells, battling ropes, and medicine balls as a means to interject both a new physical challenge and diversion into one's workout routine while focusing on goal-specific training. Used correctly, these ''toys'' become powerful tools to help clients achieve their health and fitness goals.

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Disclosure: The authors declare no conflict of interest and do not have any financial disclosures.

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Whitley Atkins, M.Ed., is an avid triathlete who believes in balancing physical fitness and nutrition to maintain a healthy and active lifestyle. After earning her bachelor's degree in Exercise Science from the University of Tennessee, she moved to Austin, TX, to pursue a master's degree in Sport Science and Nutrition from The University of Texas. She continues to work in the field of fitness at one of the top gyms in Austin, where her training is based on variety, functional movement, and strength for overall health.

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BRIDGING THE GAP

Kettlebells, battling ropes, and medicine balls remain popular in the health and fitness setting. These modalities have been used effectively to interject both new physical challenges and variety into a workout routine while focusing on goal-specific training. Kettlebells, battling ropes, and medicine balls all offer simple to complex uses while providing both strength training and cardiovascular fitness benefits.