Resistance band training for Older Adults
Presented by Fiona White and Marietta Mehanni

The benefits of using resistance bands with older adults

- **Resistance can be adjusted quickly and effortlessly during exercises.** Older adults can find picking up or changing weights both challenging and time consuming whereas with resistance bands transitions between and during exercises are quick and simple.
- **Bulky gym equipment and weights can be foreign and intimidating for older adults in contrast to resistance bands, which are small, lightweight and familiar (“elastic bands”).**
- The resistance can be micro loaded by changing the length of band used, or distance from the point of tethering. This ensures the correct amount of tension is used, which is important for older adults who often don’t like or cannot increase weight used unless very small increments are provided. This enables many clients of varying abilities to do the same exercise which challenges them appropriately with only a single piece of equipment.
- When using free weights, poor technique is common, whereas with resistance bands the angles of movement are more guided.
- Improved muscle strength and endurance, balance, joint stability, coordination and postural awareness, which can help to reduce the risk of fractures as well as falls.
- **Heightened balance and joint proprioception** - when performing resistance bands exercises standing up, the body is constantly working against the tension of the bands, providing resistance and feedback to the postural muscles.
- Resistance bands not only strengthen the large muscle groups but also smaller stabilising muscles around the joints e.g. rotator cuff muscles.
- Adds variety to traditional types of exercises by adding resistance that is not reliant on the body’s position in relation to gravity (unlike free weights). This is advantageous if the range of movement is limited or they struggle to move into or maintain different positions.
- Bands can be tethered to a huge array of everyday equipment including beds, table legs, doors and wheelchairs, making bands easy for clients to exercise anywhere, anytime.
- **Reduced risk of injury** because the exercise bands can be pulled from mechanically advantageous positions. An example of this is the squat – the least mechanically efficient position is when the knees are fully flexed. When using resistance bands the only resistance in this position is the individual’s body weight, and the resistance increases as their knees extend.
- **Compact, light and affordable.**
- Resistance bands are generally attached to points away from the body’s centre of gravity which means the more the bands are stretched, the greater the challenge on the
body’s musculature to maintain a stable trunk position. This ensures the body's core is effectively ‘switched on’ during even the most basic exercises. The instability created by these co-dependent levers also help to improve joint strength and stability.

- In order to complete a movement effectively (and safely) with the resistance bands more eccentric control is required (than with free weights), which acts to increase the pre-loading necessary for an effective concentric muscle action. This assists in maintaining tendon integrity and reduces the risk of injury.

Research for training with resistance bands

**Pilot Randomized Controlled Trial of an Elastic Tubing Resistance Training and Lifestyle Activity Intervention for Sedentary Older Adults**

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- School of Medicine and Public Health, University of Newcastle, Newcastle, AUSTRALIA;
- School of Biomedical Sciences, University of Western Sydney, Penrith, AUSTRALIA

**Abstract**
The aim of this study was to determine the efficacy and feasibility of a resistance training and lifestyle activity program for sedentary older adults. Eligible participants (N=44) were randomized to an 8-week intervention or a control group. The primary outcome was lower body muscular strength and participants completed a range of secondary outcomes. There was a significant group-by-time interaction for lower body muscular strength (difference= 3.9 repetitions, 95% CI = 2.0 to 5.8 repetitions, \( p<0.001, d=1.0 \)). Changes in secondary outcomes were generally small and not statistically significant. Attendance and program satisfaction were both high. A combined elastic tubing resistance training and lifestyle activity program delivered in the community setting is an efficacious and feasible approach to improve health in sedentary older adults.

**A home-based resistance-training program using elastic bands for elderly patients with orthostatic hypotension**

- Zion AS; De Meersman R; Diamond BE; Bloomfield DM

**Abstract**
Falls are a common hazard in the elderly. Orthostatic hypotension (OH) is prevalent in older patients and contributes to the high incidence of falls. Our aim was to test whether a home-based resistance-training program (HBRT) using elastic resistance bands could safely and effectively increase muscle strength and functional ability, and attenuate the orthostatic fall in blood pressure. Eight subjects (> 60 yrs) underwent orthostatic provocations; muscle strength testing (isometric and dynamic), and a functional test of gait and mobility (Timed Up & Go), at baseline and following 8 weeks of training. Ten exercises were assigned and customized to each participant. At 8 weeks, significant increases occurred in dynamic strength in the chest press \( p = 0.017 \), quadriceps extension \( p = 0.017 \), and leg press \( p = 0.025 \); no significant differences occurred in isometric strength or in blood pressures. Functional mobility increased in 7 of 8 subjects. There were no falls during the investigation period. CONCLUSIONS: A HBRT program using elastic resistance bands effectively increases dynamic muscle strength in elderly individuals with OH. Although no changes occurred in orthostatic blood pressures, which could be attributed to the limited length of the program, this therapy may be recognized as a safe method to improve strength, functional ability, and promote physical activity - variables that can reduce the incidence of falls and enhance the quality of life in this population.
Research for resistance training for the older adult

The effects of progressive resistance training on bone density: a review

- High-intensity resistance training, in contrast to traditional pharmacological and nutritional approaches for improving bone health in older adults, has the added benefit of influencing multiple risk factors for osteoporosis including improved strength and balance and increased muscle mass.

Centre for Disease Control and Prevention: benefits of strength training

- recommends performing three resistance-training sessions each week for older adults to reduce risk for arthritis, diabetes, osteoporosis and back pain
- Post menopausal women lose 1-2% of their bone mass annually. Resistance training minimizes this loss, and can increase it
- Strength training increases metabolism
- Improved glucose control
- Sleep improvement- regular exercises fall asleep more quickly, sleep more deeply and wake less often.
- Can increase aerobic capacity

Weights vs. resistance bands - what is the difference?

<table>
<thead>
<tr>
<th>Functions</th>
<th>Weights</th>
<th>Resistance bands</th>
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<tbody>
<tr>
<td>Provides weighted resistance against gravity</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Provides weighted resistance across gravity</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Wide range of resistance available</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Provides a total body workout</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Balance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Co-ordination</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Muscular strength/endurance</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Effective for rehabilitation</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Easy to carry and store</td>
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<td></td>
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<tr>
<td>Cost effective</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Easy to travel with</td>
<td>Yes</td>
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<tr>
<td>Safe to use</td>
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<tr>
<td>Durable</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Manipulate resistance quickly</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Assists with flexibility</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Encourages correct posture</td>
<td>Yes</td>
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Respiratory fitness

Using resistance bands in the hands and around the arms increases the “Work of Breathing”, meaning the amount the breathing muscles need to work to inhale sufficient oxygen to meet the demands of the activity. For fit, healthy people, this increase may be barely noticeable, but for people who rely more heavily on their accessory muscles of breathing, it may be more significant. The accessory muscles help the diaphragm expand and recoil the lungs, especially when oxygen demand increases, and consist of the intercostals, abdominal muscles, latissimus dorsi, pectorals, scalenes and trapezius amongst others. When the arms are being used to lift, push or pull on the resistance bands, those accessory muscles assisting the movement are less able to assist this breathing process, and thus all respiratory muscles must work harder. When these exercises are completed regularly, the respiratory muscles increase in strength and endurance, thereby reducing the work of breathing.

Often as people age, postural muscles weaken and poor posture results. Breathing is most efficient with good posture, as this allows the ribs, lungs and diaphragm to expand properly. Working with resistance bands can strengthen these postural muscles, increasing the efficiency of breathing in normal activities of daily living, and increase the potential for higher intensity exercise.

Reduced joint stress

Traditionally, some weighted exercises often start where the resistance is greatest at the point where the joint is most compromised, as in a Bench Press. In this exercise, the initial inertia can be difficult to overcome because the shoulder is in its’ least mechanically efficient position. This starting position is also the shoulders’ most compromised position, risking injury to the joint with heavy weights. An excellent use of this principle for the older adult is a squat, where the most strain-inducing component is at the peak of knee/hip flexion. Resistance band squats provide minimal to no resistance in this position, but work the muscles against progressively stronger resistance as the knees and hips extend. This is an advantage over traditional weights or dumbbells, which continue to put pressure on joints in flexion positions. If clients cannot squat with their body weight, let along even a small amount of resistance, clients can be assisted by holding onto bands tethered to bars on ceilings or even over head door jams, providing more assistance in the lowest (most difficult) part of the movement.

Other challenging exercises for clients with shoulder injuries or reduced mobility are overhead movements. Resistance bands are ideal for enabling these exercises, as the starting point has the least amount of resistance. For example if a client were to perform a shoulder press with a dumbbell or barbell, the initial phase of lifting the weight and positioning it at the shoulders can be a challenge in itself. With resistance bands these initial and set up phases are performed with minimal resistance, thus the client can begin with a small range of motion and increase both range and difficulty of exercises proportionally as they strengthen.
If necessary, there can be no resistance for the first stage of the movement by squatting, sitting in a chair, or using longer bands that provide that are slack for part of the movement.

**One to One Rehabilitation and Personal Training with resistance bands**

Resistance bands can be used in one-on-one personal training sessions. One of the advantages is that the trainer can play a more interactive role by effectively controlling and adjusting the level of resistance, coordination, balance and proprioception provided to the client. With each exercise, this can be increased or decreased according to the intensity required. The trainer receives kinaesthetic feedback, which assists in appreciating the level of challenge that the client is undergoing – more so than visual observation alone when clients use free weights.

The greatest advantage that resistance bands provide a personal trainer or rehabilitation therapist is the ability to coach whilst conducting the training because of the interactive involvement between trainer and client. This ‘hands on’ approach assists the trainer to actively observe technique and provide feedback through the resistance in the bands.

An example of this is the *standing row*.

To set up the exercise, the client is holding the bands in front of their body, whilst the trainer stands in front of the client holding the other end of the resistance bands. It is important to begin with an appropriate level of tension in the bands. To do this, the trainer can move backwards to increase the tension. The client then pulls the elbows back drawing the bands towards the torso and expanding the chest.

A way of adding challenge to the exercise which will focus more on stability is to randomly or predictably alter the resistance of the bands during the exercise. Both proprioception and balance will be challenged by this exercise.

Progress this exercise by asking the client to march on the spot and perform the row to further challenge coordination and balance. The band resistance could stay the same or could be altered during the exercise.

**Co-activation of multiple muscle groups**

Another advantage of using resistance bands is that several joints and movements are in use simultaneously – and all whilst performing a simple exercise e.g. chest press.

The next two exercises require heightened proprioception, balance and the ability to decelerate with control compared to a weighted exercise.

The ends of the bands can be held by the trainer or tethered to a solid object. Clients initiate the chest press by positioning the...
feet hip width apart and holding a band in each hand. Care needs to be taken with the tension of the bands because if there is too much the client will not be able to control the eccentric phase of the movement. The client horizontally adducts the shoulders and extends the elbows to the front, ensuring that the elbow stays slightly flexed. Return back to the starting position.

Progress this exercise by adding a step forward with the chest press. As the body returns to the setup position, ensure that the client retains balance and control i.e. does not spring backwards.

Adding this component increases the functionality of this movement as the traditional chest press does not replicate everyday actions.

**Using resistance for feedback and confidence**

The increased resistance can also provide more neuromuscular feedback. This feedback is imperative for the client to gain an awareness of joint actions, muscle contractions and proprioception. The increased resistance can make the client feel safer and supported by the bands. For example a squat row, with an option of a chair or wall behind the client, can build awareness of increasing resistance/muscle tension to aid stability.

**Line of pull**

Resistance bands can create a line of pull away from, through or across the centre of gravity. This generates forces that challenge the body’s ability to stay in alignment. An example of this is a 45 degree shoulder press in split stance. The client holds the bands in front of the chest and the other ends are positioned around each foot. The immediate feedback to the upper body is to rotate the torso towards the back foot. Balance is challenged in several ways in this exercise; initially to maintain the alignment of the body and secondly to adjust the stabilising muscles throughout the movement. This exercise recruits several muscle groups that play an essential role in keeping the body still i.e. gluteals, quadriceps, hamstrings, erector spinae, core muscles, muscles of the feet, shoulder complex and upper limbs.
Another point to consider is that in the standing position, when the bands are positioned on each foot, the line of pull is very different compared to when both bands are both positioned on one foot. Interestingly, the challenge on balance can shift to make the exercise easier, though the strength requirement is greater. An example of this is the step back with shoulder press. By placing both bands around one foot, the focus of the exercise is strength whereas one band on either foot challenges balance much more.

This is not the case when the bands are positioned around the wrists. In fact, often it has the opposite effect (ie. 2 bands on one hand make the exerciser more difficult) e.g. client/partner chest fly or press. When the bands are around each wrist, the forces are equally divided between the two limbs, but when both bands are held in one hand, the rotational forces increase, thus making it more difficult for the body to maintain alignment.

Asymmetrical load requiring increased core activation for stability

Symmetrical load – less core stability required
This inequality can be utilized in from an injury management perspective by the trainer pulling the resistance bands back further to one side, or by the client holding the bands closer to the attachment point on one side. This may be beneficial when one upper limb is weaker from injury.

The line of pull principle also allows trainers to easily adjust the difficulty of the exercise with a small change in set up position. A resisted leg extension (shown below) demonstrates how the height that resistance bands are tethered to changes the resistance and pull of the exercise.

Resistance bands on the floor increases the resistance through the movement.

Resistance bands at the height of the client’s knee reduces the resistance through the movement.

Client holding the resistance bands allows some assistance throughout the movement.
Safety Considerations

The following can be used to improve safety where indicated:

- Tie double knots at the end of resistance bands to create handles for clients with reduced grip strength or dexterity. Bands can also be tied directly around wrists, arms, legs or ankles.
- For clients with reduced balance, use a wall, chair or object in front or behind for standing exercises. Encourage them NOT to lean against it unless needed.
- Stand nearby until you are confident the client can co-ordinate the movement safely.
- Encourage slow movements initially, as the elastic properties within the bands can create a hard to control significant force when retracting, often putting clients off balance.