PROGRESSIVE STRATEGIES FOR TEACHING FUNDAMENTAL RESISTANCE TRAINING MOVEMENT PATTERNS

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Common resistance training exercises are loaded variations of generalizable multi-joint movements known as "movement patterns." Proficiency in common movement patterns via resistance training may reduce injury risk, as poor technique is considered a risk factor for training injuries (10,12,21). Moreover, movement pattern proficiency allows for progressive overload via gradual addition of load or volume, which is key to the ongoing effectiveness of resistance training.

Teaching fundamental resistance training movements to novice clients can be challenging. After pre-exercise screening and consideration of the client's needs, the teaching process consists of selecting and instructing appropriate exercises, monitoring performance, and providing feedback. The process may be repeated for progressively more difficult exercise variations. The result is "learning," or permanent improvement in movement pattern skill (1).

This article provides the personal trainer sample exercise progressions for teaching resistance training movement patterns along with practical strategies for instruction and reinforcement of proper technique.

FUNDAMENTAL RESISTANCE TRAINING MOVEMENT PATTERNS

Fundamental resistance training movement patterns underpin the training of clients across all levels of ability. Many strength and conditioning professionals and researchers have categorized these movement patterns, resulting in variability between sources (6,11,17,20,23). For this article, lower body fundamental resistance training patterns are the squat, which is knee-dominant (e.g., double- and single-leg squat variations, lunge, leg press), and the hip hinge, which is hip-dominant (e.g., deadlift, Romanian deadlift, single-leg Romanian deadlift).

Upper body patterns are categorized by the direction of the primary resisted movement: horizontal push (e.g., bench press, push-up), horizontal pull (e.g., row), vertical push (e.g., military press, overhead press), and vertical pull (e.g., pull-up, pulldown). Competency in these patterns is needed for effectiveness, standardization, and safety of comprehensive resistance training programs. It is the personal trainer's task to help novice clients build proficiency in resistance training movement patterns.

EXERCISE PROGRESSIONS

An "exercise progression" refers to a series of exercises arranged in order of increasing difficulty. Personal trainers use exercise progressions to develop appropriate technique and stimulate neuromuscular adaptations. Informed by the principle of specificity, exercises selected for teaching resistance training fundamentals should share biomechanical similarities with the movement pattern they strive to reinforce—major joint and body segment movements should resemble the target fundamental movement pattern. Moreover, teaching exercises should be appropriately loaded as early as possible. In addition to stimulating desirable training effects, the inclusion of resistance load tends to promote proper technique (8).

Although assessments and criteria for fundamental resistance training movements have been proposed, no consensus exists for selection or sequencing of exercises to best teach them (8,17,29). Many factors must be considered when developing teaching progressions. Factors include, but are not limited to, the client's current abilities, preferences, goals, known injuries or systemic health limitations, equipment availability, and personal trainer's expertise.

Sample exercise progressions for teaching the squat, hip hinge, upper body horizontal push, upper body horizontal pull, upper body vertical push, and upper body vertical pull are shown in Figures 1 – 6. Although brief descriptions are provided, personal trainers unfamiliar with basic exercise techniques are referred to published resources (4,7,13,14,24,25,31). Sample progressions are not intended to be comprehensive, nor universally applicable to all clients. The personal trainer is encouraged to individualize or modify these exercise progressions to suit the needs of individual clients. For example, a client proficient in bodyweight squat performance may not require the touch-and-go box squat (Figures 1a and 1b) nor the free squat (Figures 1c and 1d).

This client might begin with the goblet squat (Figures 1e and 1f), a variation recommended for initiating loaded squatting (4). A client interested in Olympic-style weightlifting (i.e., clean and jerk, snatch) may also require the front squat, overhead squat, split squat, and Olympic-style lift derivatives to develop goal-specific movement pattern proficiency. To help the personal trainer develop individualized exercise progressions, basic principles of exercise selection, instruction, cueing, and feedback are discussed in the following sections.

EXERCISE SELECTION

To teach resistance training fundamentals, personal trainers commonly use simplified exercise variations with progression over time. Complexity may be the most important resistance training variable for developing exercise teaching progressions. Complexity describes the technical difficulty of an exercise (15). Features informing the complexity of an exercise include, but are not limited to: the level of stability offered by the exercise (e.g., balance and coordination demands), execution speed, degrees of freedom (e.g., number of movements produced or controlled), equipment used, and the amount of guidance provided. The personal trainer may manipulate one or more of these features to progress or regress the complexity of an exercise.

For novice clients, low-complexity exercises are favored for teaching fundamental movements of resistance training. When

possible, the personal trainer should initially select supported exercises (e.g., seated or lying on a bench or machine). Compared to unsupported exercises, supported exercises reduce complexity by limiting degrees of freedom and demand on the trunk (26). Supported client positioning may facilitate more effective monitoring, cueing, and spotting, when indicated. Bilateral exercises are typically favored for early learners, while unilateral exercises may be indicated for more advanced clients due to asymmetrical stabilization demands (3,26).

As the client's proficiency improves, more complex exercise variations may be introduced. For example, the prone bench pull (Figures 5a and 5b) is appropriate for early instruction of the upper body horizontal pull pattern, because it provides bench support, which minimizes demand for postural stability. Next, the inverted row (Figures 5c and 5d), requires the client to control trunk and lower body movements. Finally, the suspension row (Figures 5e and 5f) introduces additional degrees of freedom at the shoulders and forearms, which must be managed for successful performance. Progression need not end with the final exercise in the sample progression—for a client proficient in the horizontal pull, the personal trainer might introduce additional progressions, such as the single-arm dumbbell row or unilateral suspension trainer row.

Certain exercise variations may promote learning because they impose guidance or rules (e.g., task constraints) that narrow the client's movement options (22). For example, by requiring the client to touch their buttock to the wall, the back-to-wall hinge (Figures 2a and 2b) promotes posterior movement of the hips, a key feature of the hip hinge (13). The next progression requires the client to maintain tailbone, mid back, and head in contact with a dowel (Figures 2c and 2d). Use of the dowel introduces a constraint that tends to promote movement from the hip joints rather than the spine (13). The personal trainer should thoughtfully select exercise variations with equipment constraints and outcome goals conducive to desired movement performance.

Finally, the personal trainer must consider the influence of exercise complexity on other programming variables. Modifying exercise complexity does not necessarily require changing traditional exercise variables (e.g., load, volume, density, frequency) (15). However, an inverse relationship exists between the complexity of an exercise and maximum possible load (3,18,19,26). Altogether, as higher complexity exercise variations are introduced, reduction in load and/or repetitions may be necessary.

EXERCISE INSTRUCTION AND CUEING

Personal trainers commonly instruct exercise via demonstration and verbal instruction. The personal trainer's instruction directs attention to performance constraints, thereby promoting desirable movement performance and learning (22). Modeling refers to the provision of visual exercise demonstration. At minimum, modeling should include exercise set up (e.g., points of contact, grip, starting position) and movement technique. The personal trainer should model three to five repetitions, encouraging the client to view the movement from the front and side (29).

When providing verbal instruction, more detail is not necessarily better—it can be worse if it overwhelms the learner. To determine which elements to include, consider condensing performance elements down to one or two most important element(s) (27). Ideally, these elements encompass multiple elements of setup and execution without being overly detailed. For example, instructions for the pull-up might simply include, "hang from the bar with hands just outside of shoulder width, then pull toward your chest." Since modeling is provided alongside verbal instruction, the client is likely to glean a holistic sense of exercise performance features.

Practically, the personal trainer may instruct a portion of the exercise and allow for practice before instructing the entire exercise or putting multiple parts together. Termed "part-task practice," this strategy helps to simplify resistance training fundamentals. While there are many possible ways to divide exercises into parts, Smith recommended instructing the concentric portion of an exercise before introducing the eccentric phase (29). Concentric-only part-task practice begins in the bottom position and ends in the top position. This strategy works particularly well for the horizontal push (Figure 3) and horizontal pull progressions (Figure 5). Next, the eccentric phase may be practiced in isolation before the entire exercise is re-integrated. Alternatively, the exercise can be attempted in entirety following concentric part-task practice.

Modeling with effective instruction promotes safety, proficiency, and learning. The personal trainer may further enhance these outcomes by directing the client's attention to key features of performance via cueing. Cueing is the use of simple words or actions to direct focus to one feature of movement or technique. Cues may be visual, tactile, audio, or verbal. Visual cues commonly include gestures and body movements performed by the personal trainer. Tactile cues involve strategic and appropriate use of touch to draw addition to body positions, target muscle groups, or movements. Audio cues in the form of metronomes or music are commonly used to draw attention to exercise tempo, which thereby affects movement speed. Verbal cues, or spoken words, are arguably the most common form of cueing provided by personal trainers.

Effective cueing may enhance motor learning (1). Depending on the focus, cues are external or internal. External cues direct the learner's attention outward or to the environment, while internal cues direct the learner's attention to their own body (9,35). For example, the personal trainer may provide an external cue to a learner whose heels rise from the floor during the squat by asking them to focus on sitting back toward a box (Figures 1a and 1b) (1). Alternatively, the internal cue, "keep pressure through your heels" may accomplish the same result (14). External cues are thought to accelerate the learning process and tend to be preferred for improving power, accuracy, and efficiency (1,9,14,30,34,35). Internal cues may better promote hypertrophy of some muscles (e.g., biceps brachii) but not others (e.g., quadriceps femoris) (28). Historically, internal cues have been supported for their ability to help clients learn the "feel" of an exercise (e.g., sensations of movement, muscle contraction, pressure, tension) (5,11).

Fortunately, the personal trainer might only need to change several words to switch between internal cue and external cue (9). For example, "focus on pushing your hips back" is a common internal cue to promote posterior movement during a squat or hip hinge. To develop an external cue, the personal trainer should consider objects in the training environment and spatial relationships and use action words or analogies (34). Touch-and-go box squats (Figures 1c and 1d) and back-to-wall hinge (Figures 2a and 2b) are conducive to external cues due to the presence of obvious environmental objects, which can serve as reference points for cues such as, "gently touch the box/wall)." Less obvious spatial relationships and reference points may also be effective—the external cue, "create more space between the front of your shoulder and the floor" may promote appropriate movement of the scapula during horizontal pulling (16).

Altogether, external and internal cues are known to immediately affect movement performance (9,30,33,35). The personal trainer may use either or a combination of cue types, as long as they are targeted and understandable. Clear and meaningful cues should be established early in the training process. Cues reminiscent of well-rehearsed movement patterns may be particularly effective. For example, for the hip hinge pattern (Figure 2), "close the car door with your buttock" may resonate with anyone who tends to unload all of their groceries from their vehicle in a single trip.

"Catchy" or memorable cues are recommended (29). After the client demonstrates shoulder muscle engagement with vertical forearms using the resistance band press (Figures 6a and 6b), the vertical push may be progressed to pressing a dowel or training bar overhead (Figures 6c and 6d). Through powerful imagery and alliteration, "bend the bar" reminds the client to create appropriate upper body tension and alignment. To determine cues that best resonate with individual clients, the personal trainer may need to try several cues, ideally during separate attempts. Ultimately, generalizable cues, or those that can be used in subsequent exercise progressions, should be favored to maximize efficiency and effectiveness.

FEEDBACK

Feedback refers to verbal, visual, or other sensory information the client receives related to their movement performance (35). The sound of one's foot contacting the floor, the sensations of body position and motion (i.e., proprioception and kinesthesia), or the sight of one's form in a full-length gym mirror may be valuable for improving and self-correcting movement performance. While the importance of information gleaned directly from the senses cannot be overstated, the client may also benefit from additional feedback provided by the personal trainer or monitoring technology (e.g., camera, accelerometer). This type of feedback is termed "augmented feedback" (32). Augmented feedback is provided to increase knowledge of movement outcome, movement quality, and the technique characteristics leading to those outcomes (32). Despite increasing accessibility of technology for feedback, the personal trainer is likely to provide most augmented feedback to the client in typical fitness environments.

Clients naive to training may have limited abilities to use sensory feedback to self-correct movement (1). Feedback from the personal trainer may be needed. Performance feedback from the personal trainer points to movement characteristics that led to the acceptable or unacceptable outcome. Suppose a client practicing the standing overhead press (Figure 6e and Figure 6f) demonstrates the common error of "looping" the bar in front of the head rather than retracting the neck back (31). The personal trainer may provide outcome-based feedback (e.g., "that wasn't a good rep") followed by additional feedback on technique (e.g., "you didn't have a vertical bar path because you kept your head too far forward"). After receiving feedback, the client should be offered additional opportunities to improve technique.

In addition to providing feedback to correct unacceptable repetitions, the personal trainer should also provide feedback on "good" repetitions. Feedback informing "what went right" or how performance compares to others (i.e., social-comparative feedback) can be motivating (35). Encouraging feedback may be particularly effective among clients who demonstrate poor confidence in their ability to succeed (i.e., low self-efficacy) or decreased motivation to perform (i.e., low conscientiousness) (2,32). High-quality feedback—whether descriptive, prescriptive, or motivational—plays a key role in the client's eventual mastery of resistance training skills.

TAKEAWAY

Effective teaching is underpinned by critical exercise selection, high-quality instruction, thoughtful progression and regression, targeted cueing, and timely feedback. The personal trainer is cautioned to be judicious about the amount of verbal instruction, cueing, and feedback provided to the client. More is not necessarily better. While the client is learning, they are actively exploring and developing movement solutions (22). Extraneous information may consume valuable attention resources. To avoid information overload, a practical and effective strategy is to simply ask the client to select how and at what frequency they wish to be provided with feedback (35).

Although it is outside the scope of this article, the personal trainer should remain vigilant for factors other than motor control or coordination that affect movement quality. The presence of pain, range of motion deficits, or overt weakness may negatively affect movement performance. The use of movement screens, clearing tests, and physical assessments may be necessary to distinguish factors contributing to poor movement performance. If underlying pathology is suggested, referral to a physical therapist or physician is indicated.

Personal trainers facilitate their clients' athletic development by teaching fundamental resistance training movement patterns. These movement skills are important for general population clients and high-level athletes alike. When personal trainers develop and deliver effective exercise progressions for learning and performance, they promote ongoing improvements in clients' capabilities, injury-resilience, and health.

FIGURE 1A. SQUAT EXERCISE PROGRESSION - TOUCH-AND-GO BOX SQUAT

FIGURE 1B. SQUAT EXERCISE PROGRESSION - TOUCH-AND-GO BOX SQUAT

FIGURE 1C. SQUAT EXERCISE PROGRESSION - FREE SQUAT

FIGURE 1D. SQUAT EXERCISE PROGRESSION - FREE SQUAT

FIGURE 1E. SQUAT EXERCISE PROGRESSION - GOBLET SQUAT

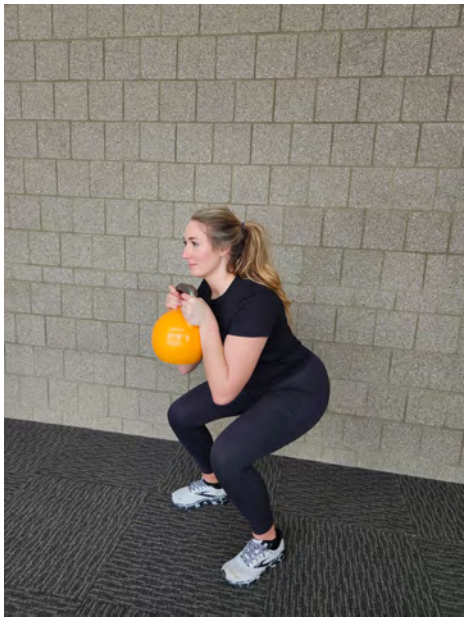

FIGURE 1F. SQUAT EXERCISE PROGRESSION - GOBLET SQUAT

FIGURE 1. SQUAT EXERCISE PROGRESSION

Touch-and-go box squat (A and B): Client stands slightly in front of the box with feet flat on the floor. The client flexes knees, hips, and ankles to make contact with the box or bench at the bottom position then stands to return to the top position.

Free squat (C and D): The client lowers by flexing knees, hips, and ankles, then returns to standing.

Goblet squat (E and F): While holding a kettlebell or dumbbell with both hands under the jaw and tight to the chest, the client performs knee, hip, and ankle flexion, then returns to standing.

FIGURE 2A. HIP HINGE EXERCISE PROGRESSION - BACK-TO-WALL HINGE

FIGURE 2B. HIP HINGE EXERCISE PROGRESSION - BACK-TO-WALL HINGE

FIGURE 2C. HIP HINGE EXERCISE PROGRESSION - 3-POINT DOWEL HINGE

FIGURE 2D. HIP HINGE EXERCISE PROGRESSION - 3-POINT DOWEL HINGE

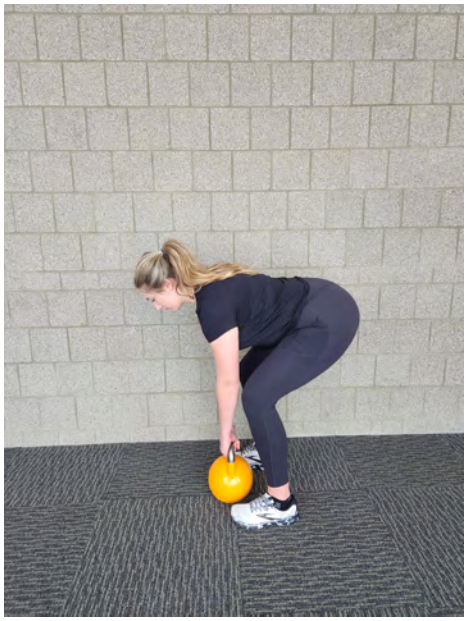

FIGURE 2E. HIP HINGE EXERCISE PROGRESSION - KETTLEBELL DEADLIFT

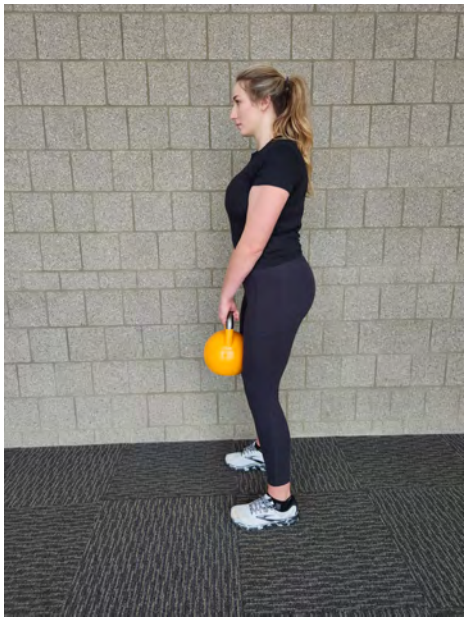

FIGURE 2F. HIP HINGE EXERCISE PROGRESSION - KETTLEBELL DEADLIFT

FIGURE 2. HIP HINGE EXERCISE PROGRESSION

Back-to-wall hinge (A and B): Standing approximately 12 in. in front of a wall with feet between hip- and shoulder-width apart and knees unlocked, the client pushes hips back to touch the wall then returns to standing.

3-point dowel hinge (C and D): Standing with feet between hip- and shoulder-width apart and knees unlocked, the client holds a dowel vertically along their back. The client flexes or hinges at the hips while keeping the dowel in contact with the sacrum, midback, and head, then returns to upright standing.

Kettlebell deadlift (E and F): The client stands with feet between hip- and shoulder-width apart, knees unlocked. The client hinges at the hips to retrieve the kettlebell in the bottom position then returns to upright standing by extending the hips.

FIGURE 3A. HORIZONTAL PUSH EXERCISE PROGRESSION - ELEVATED PUSH-UP

FIGURE 3B. HORIZONTAL PUSH EXERCISE PROGRESSION - ELEVATED PUSH-UP

FIGURE 3C. HORIZONTAL PUSH EXERCISE PROGRESSION - PUSH-UP

FIGURE 3D. HORIZONTAL PUSH EXERCISE PROGRESSION - PUSH-UP

FIGURE 3E. HORIZONTAL PUSH EXERCISE PROGRESSION - BENCH PRESS

FIGURE 3F. HORIZONTAL PUSH EXERCISE PROGRESSION - BENCH PRESS

FIGURE 3. HORIZONTAL PUSH EXERCISE PROGRESSION

Elevated push-up (A and B): With palms placed under shoulders and upon an elevated surface, the client maintains rigid, plank-like form while lowering the trunk toward the floor and returning to the start position.

Push-up (C and D): Supported by the hands and front of the feet, the client uses the upper body to lower to the bottom position and return to the top position.

Bench press (E and F): Client lies supine on a bench and grasps the bar with a closed overhand grip. Client lowers bar toward the chest until bottom position is reached then pushes push bar back to the top position.

FIGURE 4A. VERTICAL PULL EXERCISE PROGRESSION - LAT PULLDOWN

FIGURE 4B. VERTICAL PULL EXERCISE PROGRESSION - LAT PULLDOWN

FIGURE 4C. VERTICAL PULL EXERCISE PROGRESSION - ASSISTED PULL-UP

FIGURE 4D. VERTICAL PULL EXERCISE PROGRESSION - ASSISTED PULL-UP

FIGURE 4E. VERTICAL PULL EXERCISE PROGRESSION - PULL-UP

FIGURE 4F. VERTICAL PULL EXERCISE PROGRESSION - PULL-UP

FIGURE 4. VERTICAL PULL EXERCISE PROGRESSION
Lat pulldown (A and B): Client sits with a vertical or slightly reclined trunk position and holds the bar with arms fully outstretched overhead. The client pulls toward the chest, holds briefly at the bottom position, then returns to the top position.

Assisted pull-up (C and D): With assistance from the personal trainer, a band, a purpose-built machine, or the client's lower body (as shown), the client pulls their body toward the bar to reach the top position then lowers to the bottom position.

Pull-up (E and F): Client hangs from the bar with their elbows fully extended. The client pulls upward until the top position is reached then returns to the bottom position.

FIGURE 5A. HORIZONTAL PULL EXERCISE PROGRESSION - PRONE BENCH PULL

FIGURE 5B. HORIZONTAL PULL EXERCISE PROGRESSION - PRONE BENCH PULL

FIGURE 5C. HORIZONTAL PULL EXERCISE PROGRESSION - INVERTED ROW

FIGURE 5D. HORIZONTAL PULL EXERCISE PROGRESSION - INVERTED ROW

FIGURE 5E. HORIZONTAL PULL EXERCISE PROGRESSION - SUSPENSION ROW

FIGURE 5F. HORIZONTAL PULL EXERCISE PROGRESSION - SUSPENSION ROW

FIGURE 5. HORIZONTAL PULL EXERCISE PROGRESSION

Prone bench pull (A and B): While supported atop a bench, the client grasps the bar with arms outstretched toward the floor and pulls the bar toward the midsection then lowers it back to the bottom position.

Inverted row (C and D): The client hangs under a low bar with a grossly horizontal body position then pulls body to the top position before returning to the bottom position.

Suspension row (E and F): The client hangs from a low suspension trainer or gymnastics rings with a grossly horizontal body position and pulls the body to the top position then returns to the bottom position.

FIGURE 6A. VERTICAL PUSH EXERCISE PROGRESSION - RESISTANCE BAND PRESS

FIGURE 6B. VERTICAL PUSH EXERCISE PROGRESSION - RESISTANCE BAND PRESS

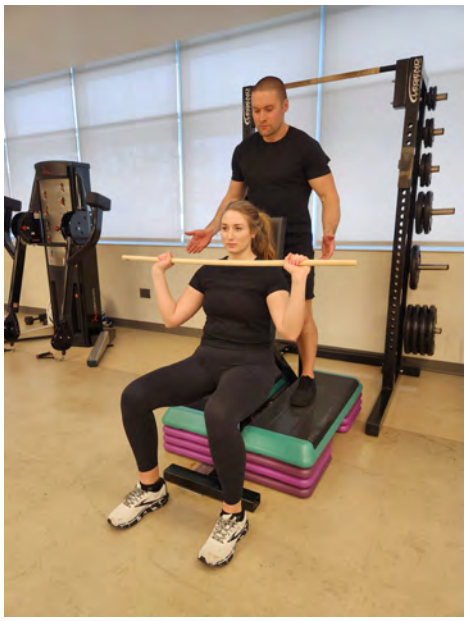

FIGURE 6C. VERTICAL PUSH EXERCISE PROGRESSION - SEATED OVERHEAD PRESS

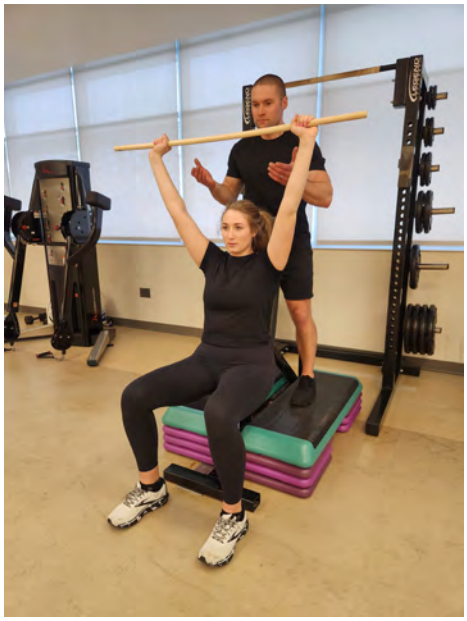

FIGURE 6D. VERTICAL PUSH EXERCISE PROGRESSION - SEATED OVERHEAD PRESS

FIGURE 6E. VERTICAL PUSH EXERCISE PROGRESSION - STANDING OVERHEAD PRESS

FIGURE 6F. VERTICAL PUSH EXERCISE PROGRESSION - STANDING OVERHEAD PRESS

FIGURE 6. VERTICAL PUSH EXERCISE PROGRESSION

Resistance band press (A and B): The client sits or stands holding a resistance band horizontally with forearms vertical. The client presses the resistance band vertically and returns to the staring position maintaining tension in the resistance band throughout.

Seated overhead press (C and D): The client sits with the feet flat on the floor while buttock and back are supported by the bench. The client holds a dowel or training barbell in front of the neck with forearms vertical and presses it vertically before lowing it to the start position.

Standing overhead press (E and F): The client stands holding a dowel or training barbell in front of the neck with forearms vertical. The client presses it vertically and lowers to the start position.

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