

ANALYSIS OF MOTOR TRAITS

Motor strengths and weaknesses are determined by comparison to ED's motor factor standard score (STD) of 63. Individual strengths and weaknesses are listed in descending order. Standard scores (STD) (mean of 100; standard deviation of 15) are for each motor trait.

ED's strengths in this factor listed in descending order are:

STD = 92 ** Slow, Controlled Fine Movements
STD = 86 ** Bimanual Speed and Coordination
STD = 85 ** Right Upper Body Coordination
STD = 82 * Left Upper Body Coordination

The following motor traits are within 15 STD score points (+/- 1 SD) of ED's motor factor score of 63.

STD = 77 * Coord. of Upper Body W/Eyes Closed
STD = 75 * Lower Body Strength
STD = 74 * Right Fine Motor Speed
STD = 72 * Left Fine Motor Speed
STD = 53 * Balance With Eyes Closed

ED's weaknesses in this factor include:

STD = 45 * Right Side Balance
STD = 43 * Left Side Balance
STD = 41 * Balance With Eyes Open

ED has severe weaknesses in this factor for the following:

STD = 31 * Right Upper Body Strength
STD = 29 * Lower Body Coordination
STD = 28 * Left Upper Body Strength

*** Above average when compared with the general population
** Average when compared with the general population
* Below average when compared with the general population

GENERAL TRAINING APPROACHES

TRAINING FORMAT

Select as an initial training task one that requires those skills described in the "Activities" section for each motor function in need of remediation. This initial training task can be varied to meet the needs of the individual or environment. The initial task is continued for a specified period of time before the individual goes on to related tasks. The appropriate length of training time for the individual's level of performance is given in the "Activities" sections of this report. This initial training task is suggested for obtaining the baseline measure.

HOW TO DETERMINE THE EFFECTIVENESS OF TRAINING

The results of a training program can be determined by measuring performance before and after training.

USING THE MAND

The MAND motor trait standard scores listed in this report can be used as the "before" measure. A similar report utilizing the results of the MAND administered after the completion of a training program will provide standard scores showing the improvement derived from training.

ESTABLISHING YOUR OWN BASELINE MEASUREMENT

The initial training task (see "Training Format" above) should be used for your baseline measurement. This task should have an operation or movement that can be easily timed or counted by the trainer. Orient the trainee to the task. The baseline measurement should reflect performance after learning the activity. Measure performance (e.g., number of objects transferred from one location to another in a specified time period or time required to complete an assembly task) before training to determine the baseline. Train the individual on the initial (baseline) task and other related tasks. The appropriate length of training for the individual's level of performance is given for each motor function in the "Activities" sections of this report. Measure performance again on the baseline task after training to determine the effectiveness of training.

TRAINING EXPECTATIONS

Training expectations vary according to the individual's level of performance. The degree of improvement at each level which indicates a successful response to the training procedures is listed for each motor function in the "Criterion of Performance" section.

When an individual has disabilities on several of the RMT factors, less than the usual expected improvement may be seen. Less improvement should also be expected when an individual has already received some treatment for the disability. Improvement tends to be slower as more and more gains have been made. When the disability is due to trauma, and the treatment is within one year of injury, spontaneous recovery of functioning may occur in addition to improvement as a response to training.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
RIGHT OR LEFT HAND FINE MOTOR SPEED

DEFINITION

Fine motor speed refers to the speed and efficiency of performance of finger, hand, wrist and arm movements of one hand. Efficiency of performance is indicated by completed motions within a defined time period with either the right or left hand. For example, the number of objects that can be picked up and transferred from one location to another within a set period of time can be used to measure an individual's fine motor speed. The essential neuromotor components of motor efficiency include rapid adjustment of the visual perspective to focus on the object, volitional movement of the hand to reach the object, effective pincer grasp to obtain the object, and rapid contraction of arm muscles for transfer. Thus, remediation would include training tasks to facilitate rapid visual adjustment, progressively more rapid movements of the hand, wrist and arm, and increased precision of a pincer grasp.

A pincer grasp refers to efficient and controlled movement of the index finger in opposition to the thumb. A pincer grasp is a fundamental neuromotor action involved in use of the hands. The index finger and thumb work together to pick up and transfer objects, as well as turn and position materials in the performance of routine daily tasks. A poor prehensile grasp restricts the individual's functioning in many ways, especially in vocational skills. Tactile-visual sensory integration is also involved in transfer tasks. When the objects are reduced in size, tactile perception tends to predominate. The sense of touch in the fingers guides the manipulation of small objects. Observations of the individual's manipulation of progressively smaller size materials can provide insight for planning an appropriate sequence and level of pre-vocational training activities as well as selecting appropriate job options. For example, limitations in either sensory or motor processes render assembly of electronic and other small machine parts difficult.

ACCOMMODATION

Accommodations for weaknesses in fine motor speed may include the positioning of materials. The materials should be within one forearm's length (14-18 inches) from the body. An elevated stool with a supportive back which elevates the worker slightly above the workbench can facilitate performance. In addition, a task analysis of the sequential steps to perform the training task or job can indicate ways to accommodate the position of the materials, with more prominent use of the better functioning hand to perform the difficult movements. The impaired hand can serve in a supportive role for the better functioning hand. While the lesser functioning hand usually serves to hold the object, a holding jig could also provide the necessary support and accommodation to facilitate training performance or job production.

REMEDICATION

Relatively simple tasks such as transferring and stacking material within a designated time period can be used for training. Placing pegs into a pegboard or placing washers onto pegs illustrates the type of activity used to develop fine motor speed. The training

activities are applicable to either the right or left hand. When one hand is significantly impaired compared to the other, initial orientation and practice may first involve the better functioning hand. This allows for correct manipulation of materials and skill acquisition. The skills acquired with the good hand may then be transferred over to performance with the impaired hand. While the "good" hand initially leads performance of the impaired hand, make certain to subsequently allocate extensive time for performance with the impaired hand. Initial training focuses on developing a pincer grasp, sustained attention to the task, and visual-tactile-motor integration. As the individual's performance improves, more precise and rapid transfer of objects can be observed.

LEVEL 3 (Standard Score Range = 72 and above)

Materials

Materials used in the initial training task include a cribbage pegboard with 1/8 inch holes, one box each of (2/52 inch) brass and steel machine screws and #2 brass and steel washers.

Materials used in related training activities may include relatively small size objects 2 mm (1/8 inch) or smaller in diameter including screws, washers and wooden pegs. The Crawford Small Parts Test and the Micro-Tower Electronic Assembly can also be used to develop fine motor skills.

Activities

Level 3 activities focus on developing a pincer grasp, sustained attention to the task and efficient visual-motor integration. Your initial training task should incorporate these skills. One appropriate task would be rapid placement of small (2/52 inch) brass and steel machine screws and washers (#2) into a cribbage board with 1/8 inch holes. Both the right and left hands are used. If the individual has only one functional hand, the task may be accommodated. A washer is placed over the hole in the cribbage board; a machine screw is then inserted through the washer and into the board. For persons with two functional hands, a machine screw is obtained with the left hand and a small washer with the right hand. The washer is placed on the screw and the assembled unit placed into the cribbage board hole. Steel screws and washers are placed in the green area, while brass screws and washers are placed in the red area. Start placement of the assembled unit at the bottom of the board and proceed upward to the top of the board. This task can also serve as the baseline measurement by counting the number of assembled units placed on the board within a specified time period. Continue training on the initial task with emphasis on speed of movement for 20 minutes daily for two weeks. Conduct training on other related tasks for two months.

Some related activities can be performed using the Crawford Small Parts and the Micro-Tower Electronic Assembly.

Criterion of Performance

MAND: Look for an improvement of 10 or more standard score points in fine motor speed traits over a two and a half month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 10-15%.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
COORDINATION OF UPPER BODY

DEFINITION

Coordination of the upper body involves facility in use of the hands and arms, regulation of movement and ability to sustain performance. The fingers are used to precisely manipulate materials. Visual, proprioceptive and tactile sensory inputs help control movement. When the task requires a high degree of precision, multisensory processes are involved. The individual must sustain focused attention to the task while inhibiting tendencies for impulsive responding. Facility of hand movement, controlled pincer grasp and sensory regulation are essential aspects of upper body coordination.

ACCOMMODATION

The individual is seated in close proximity to the work area. The height of the individual above the work area is adjusted for vision, arm reach and comfort. When seated in a wheelchair, most work tables need to be elevated a few inches for knee clearance. Materials should be positioned within 18 inches of the body for efficient movement. Proper lighting and partitions to minimize visual distractions may also be helpful. When hand tremors are encountered, instruct the individual to rest the side of the palm on the table for stabilization. The hand is then slid into position while resting in a stabilized manner on the table. Such accommodation strategies of hand stabilization should be encouraged.

REMEDICATION

The tasks selected to remediate deficits in upper body coordination should involve multisensory input with careful regulation of movement. The training tasks are selected to require increasing levels of precision. Improved skills can be measured in terms of the increased degree of precision and regulation of movement.

LEVEL 3 (Standard Score Range = 72 and above)

Materials

Materials for the initial training task include a package of Pick-Up Sticks.

Materials for related training activities may include a deck of cards, musical instruments, pencil sharpener, various kitchen utensils, tweezers or needlenose pliers and various small items to manipulate.

Activities

Level 3 activities focus on facility of hand movement, controlled pincer grasp and sensory regulation. Your initial training task should incorporate these skills. One appropriate task would be manipulating Pick-Up Sticks. The individual holds 30-50 plastic or wooden Pick-Up Sticks in the fist, resting the ends on a table. The sticks are released so that they fall in a pile on the work surface. The individual removes one stick at a time from the pile without removing any stick other than the one being picked up. One

stick may be used to help remove another by flipping off a stick or carefully separating two sticks. While this activity is usually performed with the preferred hand, the training procedure can involve the nonpreferred hand which makes the task considerably more challenging. This game task can be enjoyed by two or more persons. This task can also serve as the baseline measurement by determining the number of sticks removed in the described manner within a specified time period. A baseline measurement can be obtained on both the left and right hands. Continue training on the initial task for 20 minutes daily for two weeks. Conduct training on other related tasks for two months.

Some related activities include playing musical instruments, shuffling and dealing cards, setting the table, stirring food, slicing and chopping food, sharpening pencils and using tweezers or needlenose pliers to manipulate materials and playing musical instruments.

Criterion of Performance

MAND: Look for an improvement of 10 or more standard score points in upper body coordination traits over a two and a half month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 10-15%.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
LOWER BODY COORDINATION

DEFINITION

Lower body coordination simultaneously involves several neuromuscular systems which regulate balance and synchronize movement of the right and left sides. Muscle strength and flexibility of the legs, abdomen and back are also essential factors.

The integration of sensory perception including proprioceptive/kinesthetic sensations is essential for efficient movement. Proprioceptive feedback (sensations from muscles, tendons and joints) assists in the maintenance of body position and in the continuous regulation of movement. The extension of the foot to climb a step and forward leaning of the torso involve proprioceptive/kinesthetic feedback. In addition, careful regulation of hand/arm movement involves discrete starting and stopping motions. Kinesthetic perception provides the positional or starting and stopping cues which are important for accurate movement. Thus, sensory feedback assists in the regulation of body movement required for carrying, stooping and climbing. Lower body coordination simultaneously involves several neuromuscular systems which regulate balance and synchronized movement of the right and left sides. Muscle strength and flexibility of the legs, abdomen and back are also essential factors.

ACCOMMODATION

Accommodation for individuals with problems in lower body coordination involves the adapting of tasks and work situations so movement of the whole body is not required. An everyday example of accommodation is to keep everything necessary to make coffee in one upper level kitchen cabinet.

Individuals can be instructed in the exercise program individually or in groups according to their performance levels. For example, a person with limited receptive vocabulary, restricted awareness of body in space, confusion of left and right, and the capacity to follow only one or two step directions would be placed in a low developmental level group. Additional time may be needed to teach slow learners to assume the correct body posture and acquire the correct performance techniques.

The instructor may initially need to focus more attention on individuals who have the most limitations in performance readiness. The teaching of low functioning individuals should focus on the strategic or step-by-step components of each exercise.

REMEDICATION

Presentation of new movements to a person should be slow, deliberate, sequential and concrete. The individual will need to understand how to place his body parts correctly for each component of the movement. For example, demonstrate a circular movement of the arms as follows:

1. Move the arms to shoulder height on the count of one.
2. Move the arms above the head on the count of two.
3. Extend the arms back on the count of three.
4. Lower the arms to the side of the body on the count of four.

As the individual learns this series of arm positions correctly, the instructor may start moving smoothly through the series of positions rather than stopping at each strategic position. The advanced goal will be a continuous movement of the arm in a large circle. This method of presenting an exercise will enable the instructor to make adjustments in the individual's body alignment and adjust body parts to the proper position to assure that the exercise will be learned correctly. The instructor may stop at any strategic position to make necessary corrections.

Sequential presentation of an exercise will enable a person to use the senses of hearing and seeing as well as doing. The following is a guide for using this process:

1. State the name of the exercise.
2. Verbally describe the series of movements required to perform the exercise.
3. Slowly move through the series of movements for the exercise by demonstrating the technique as you provide a verbal description.
4. Have the individual participate in performing the series of movements with the instructor serving as a model. (Watch for steps which are not performed correctly.) Have the individual repeat the performance and participate, with the instructor serving as a model, at least three times before going on to the next step.

LEVEL 1 (Standard Score Range = 46 and below)

Materials

While materials are not required for the exercise program, the use of music, floor mats and a mirror can be beneficial. The exercises are best performed when the individual wears clothing which permits comfort and unrestricted movement of the body. Loose fitting slacks, cotton-knit shirts and no shoes are preferred. Accompanying music which provides for a more enjoyable activity may be used for the exercise program. An appropriate cadence (initially slow, 2/4 or 4/4 time) is suggested. After the correct techniques, body position and movement have been learned, the individual can focus on learning to synchronize movement to the rhythm of the music. The beat of the music encourages the individual to continue working until the required number of repetitions for each exercise is performed.

Performing floor exercises on a wood, tile or concrete floor can be uncomfortable. This problem is readily solved by providing each person with a small 2 X 4 foot strip of indoor/outdoor carpeting with a rubber backing. When available, gym exercise mats may also be used. A mirror six feet high, mounted two feet from the floor and several feet wide is useful. The mirror enables a student to receive immediate feedback when positioning the body and while performing an exercise. A person observes how the body is positioned and with assistance makes corrections. The individual visually compares his/her interpretation of a movement to the instructor's mode. Observation of the reflection of the body in the mirror also serves as a stimulation to motivate maximum effort.

A gymnasium or a large empty room is the ideal place for an exercise program. However, a room can be converted into an exercise area by moving tables, chairs and other equipment aside to create an empty space. Each individual will require a minimum of four square feet of space. If it is impossible to provide enough space for all of the class to participate simultaneously, let them take turns. Sections of indoor/outdoor carpeting may be placed throughout the room.

Activities

The 20 minute development exercise program is planned to provide the individual with movement exercises which will meet basic physical fitness needs. The exercise program is described in detail in the manual entitled "Exercise Program for Lower Body Coordination" (McCarron, 1985). The exercise program has the following sequence:

1. Warm-Up Exercise Program
2. Beginning Developmental Exercise Program
3. Cool-Down Procedures

The purpose of the Warm-Up Exercise Program is to prepare the muscles for exertion. It is recommended that the warm-up exercises be presented to the individual in the sequence as outlined. Each exercise should be performed at a slow tempo. The number of repetitions for each warm-up exercise is intended to sufficiently stretch the muscles and provide a warm-up before beginning the more strenuous exercises.

The exercises selected and number of repetitions performed should be compatible with the individual's capabilities and his/her doctor's recommendations. Some suggested exercises for the beginner at this level include:

1. Foot Press/Knee Lift (8 repetitions each foot)
2. Jump (16 repetitions)
3. Push-Up to Knees (4 repetitions)
4. Sitting Twister (8 repetitions both directions)
5. Cat Stretch (16 repetitions)

Criterion of Performance

MAND: Look for an improvement of approximately 5 standard score points in these traits over a four month period when using the MAND to measure response to training.

An individual chart of progress is used to monitor improved performance. An individual can be expected to progress from the Beginning to the Intermediate series of exercises after four months of training. The exercises are repeated each day for at least 20-30 minutes.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
BALANCE WITH EYES OPEN, BALANCE WITH EYES CLOSED,
RIGHT SIDE BALANCE AND LEFT SIDE BALANCE

RIGHT AND LEFT BALANCE

DEFINITION

The maintenance of equilibrium and body movement is essential for human activities such as walking, carrying and climbing. The cerebellum and vestibular system integrate information from the motor cortex as well as proprioceptive feedback from the body. The control of balance and orientation of the body in space is derived from vestibular sensations and positional cues through body sensation in the muscles, tendons and joints. A basic function of the cerebellum and vestibular system is the smooth coordination of muscular movements and the maintenance of posture. The cerebellum has a function in the anticipation of body position and integration of the corrective signals to retain balance. Hearing impaired, neurologically damaged and certain learning disabled persons often experience significant difficulties in maintaining balance. Developmental activities initiated at an early age may facilitate improvement of impaired balance skills.

ACCOMMODATION

For a worker unable to stand for the entire work period (20, 40 or 60 minutes), short intermittent rest periods are recommended. When possible, tasks should be changed to allow the individual to sit. For persons with poor balance, standing requires both physical effort and mental concentration. In some cases, individuals can perform tasks while sitting which would be impossible from a standing position. Any task requiring climbing must either be accommodated or eliminated since balance is essential. Consideration of a diet program is important for obese persons.

REMEDICATION

A systematic approach to training can gradually improve balance skills. Emphasis is on awareness of body positional cues and conscious control of body movements. Proper positioning of the legs and arms to maintain balance is indicated. When one side of the body is weak or poorly coordinated, the individual may tend to favor one side and place body weight on the better side. For persons with a lateralized problem in coordination, training focuses on improvement of total body coordination. Training activities are performed with the entire body to improve balance and strength.

LEVEL 1 (Standard Score Range = 46 and below)

Materials

Materials for the initial training task include 20 sheets (8-1/2 inch square) each of light and dark construction paper. A series of patterns alternating light and dark colors to make stripes, diagonals, squares, etc., are drawn on a sheet of paper as a guide.

Activities

Level 1 training should focus on maintenance of body posture and improvement of balance. Your initial training task should emphasize these traits. One appropriate task would be placing 8-1/2 inch square sheets of light and dark construction paper on the floor in a predetermined pattern. The paper is placed on the floor, one sheet at a time, with a standing position resumed after each placement. Crouching, standing and orienting the body to different positions in space are essential for the development of balance skills. This task can also serve as the baseline measurement by counting the number of patterns completed in a specified time period. Continue training on the initial task for 30-40 minutes daily for four weeks. Conduct training on other related tasks for four months.

Some related activities include moving materials from one level to another (e.g., a lower shelf to a higher shelf or vice versa), dancing, walking and participation in any recreational activity that requires balance.

Criterion of Performance

NOTE: Less improvement should be expected when deficits in balance are due to neurological or inner ear problems.

MAND: Look for an improvement of approximately 5 standard score points in right and left balance traits over a five month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 5-7%.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
COORDINATION OF UPPER BODY WITH EYES CLOSED

DEFINITION

Upper body coordination simultaneously involves several neuromuscular systems which regulate synchronized movement of the right and left sides. Muscle strength and flexibility of the arms, abdomen and back are also essential factors. When vision is restricted, the integration of sensory perception including proprioceptive/kinesthetic sensations is essential for efficient movement. Proprioceptive feedback (sensations from muscles, tendons and joints) assists in the maintenance of body position and in the continuous regulation of movement. When vision is obstructed, the extension of the arm and hand to reach an object involves proprioceptive/kinesthetic feedback. Kinesthetic perception provides the positional or starting and stopping cues which are important for accurate movement. Thus, upper body sensory feedback assists in the regulation of movement required for performance of manual tasks.

ACCOMMODATION

Individuals can be instructed in the performance of tasks with assistance of tactile proprioceptive/kinesthetic cues through cognitive mediation. For example, a person with limited vision may have confused directionality and restricted awareness of spatial relationships and body position. Thus, training requires extensive use of tactile/kinesthetic orientation. The trainer stands behind the person, places his hand directly over the individual's and guides the movements of the hands/arms in performance of the task. The trainer explains the task and they discuss what is being accomplished as the task is being performed. These multisensory modes of information contribute to the learning process, and the individual can form verbal rules to assist in the coordination of the activity. The instructor may initially need to break the process down into three-step sequences to facilitate learning. Teaching should focus on the strategic or step-by-step components of each task.

REMEDICATION

A poorly developed awareness of tactile, proprioceptive and kinesthetic processes can be enhanced with specific skills training. Slow, controlled fine movements contribute to a consistent quality of activity. Training activities are designed to enhance control of hand movements with increased awareness and reliance on proprioceptive and tactile feedback. Regulation of impulsive responses and improvement of quality of performance through reliance on tactile, proprioceptive and kinesthetic cues are the primary objectives of training.

LEVEL 3 (Standard Score Range = 72 and above)

Materials

Materials for the initial training task include electronic wire or string of 1/8 inch diameter or less and spools or cylinders. The wire or string should be at least 25 feet in length.

Materials for related training activities include small engines, appliances and hand tools. Assorted craft materials can also be used.

Activities

Level 3 program activities include assembly tasks and bimanual manipulation which require carefully regulated hand coordination and use of tactile/kinesthetic cues to initiate repeated, discrete starting and stopping motions as well as continuous rotary motions. Your initial training task should incorporate these skills. One appropriate task would be winding of electronic wire or string onto spools. This task can also serve as the baseline measure by determining the time required to wind a specified length of wire. The wire or string should be wound evenly and tightly around the spool. Continue training on the initial task for 20 minutes daily for two weeks. Conduct training on other related tasks for two months.

Some related activities include assembly of electrical components, stripping of wires and wood finishing. Mechanical work in which vision is obstructed such as automobile or small appliance repair provides appropriate training experiences. Assorted crafts such as pottery making, needlework, crocheting and knitting are also suitable tasks.

Criterion of Performance

NOTE: Less improvement should be expected when deficits are due to neurological problems.

MAND: Look for an improvement of 10 or more standard score points in these traits over a two and a half month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 10-15%.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN
RIGHT AND LEFT UPPER BODY STRENGTH

DEFINITION

Effective hand strength is achieved by the synchronized and simultaneous contraction of several muscle systems. The dynamic tension of the hands, forearms and shoulders comprises upper body strength. Weak muscle power may be due to an inadequate diet, physical or mental fatigue and/or a lack of development and limited use of skeletal muscles. Upper body strength has been observed to improve with better nutrition and adequate sleep. The synchronized simultaneous contraction of muscle units may also be improved through systematic training in a series of motor activities.

ACCOMMODATION

Weak muscle power results in early fatigue and poor quality of work. More frequent rest periods can prolong endurance over the day. Added leverage can be obtained by extending the length of handles or bars and thereby reducing the amount of strength required to operate the tool or fixture. Hydraulic equipment to drive or remove bolts, screws, staples or nails can also facilitate work performance. The implementation of hydraulic equipment or pneumatic tools in sheltered workshops or industry is particularly recommended. Experience has indicated that pneumatic tools can significantly improve both production and quality control of work output of handicapped as well as nonhandicapped workers.

REMEDICATION

A program of activities which requires progressively greater hand, arm and shoulder strength is used. The initial tasks require only modest muscle strength and limited coordination of hand muscles such as the use of a plier-stapler. The tasks involve progressively greater muscle power and more extensive synchronization of muscle systems. The simultaneous contraction of muscle units is gradually developed in a specific group of muscles and then extended to include several muscle systems such as the hand, arms and shoulder muscles.

There are substantial differences in hand strength between men and women. The combined (right and left) hand strength for an average male is about 100 kg and 60 kg for females. There is nearly a 40% difference in muscle power between normal healthy men and women. Therefore, the variable of sex is significant when selecting training tasks or when comparing an individual's strength to a normative group.

Since fatigue is a critical factor in activities to improve body strength, the first series of trials usually provides the best measure of body strength. Fatigue tends to develop rapidly, so avoid attempting to obtain a baseline measure after the first two or three trials.

LEVEL 1 (Standard Score Range = 46 and below)

Materials

Materials for the initial training task include 1 inch strips of stiff cardboard and a hand plier-stapler with an ample supply of staples.

Materials for related training activities may include a hammer, assorted nails and woods which vary in hardness. Materials for assembling a foam rubber dish scrubber may also be used.

Activities

Level 1 training focuses on strengthening the muscle systems of the hands, arms and shoulders. Your initial training task should incorporate these muscle systems. One appropriate task would be to staple cardboard strips using a hand plier-stapler. Staples are inserted as closely as possible to one another along the edge of one inch wide strips of stiff cardboard. This task can also serve as the baseline measurement by counting the number of staples affixed during a specified period of time (approximately 5 minutes). The task is repeated with the nonpreferred hand. Training on this task should be structured to alternate hands and allow for brief rest periods between hands. Continue training on the initial task for 30-40 minutes daily for four weeks. Conduct training on other related tasks for four months.

Some related activities include use of a hammer to drive progressively larger nails into woods of increasing hardness. Assembly of a dish scrubber can also be used to improve hand strength. The pre-cut foam rubber brush is folded in half twice and squeezed into a small diameter. The brush is then inserted into the circular end of the handle.

Individuals at this level will fatigue at about twice the rate of normal persons. Training tasks, therefore, would require a restricted degree of hand strength. Additionally, it is advisable to structure tasks that require about 1/3 the individual's peak performance. For example, a person with a peak grip dynamometer of 15 kg would be assigned to a task which required an intermittent capacity to grip 5 kg. The duration of the task would also be restricted depending upon the scheduling of intermittent rest periods. Effective dispersion of rest periods can substantially prolong the active work period, and an intermittent schedule of training body strength is recommended. While improved muscle strength tends to be maintained over an extended period of time, participation in a training program can help maintain the gains in strength and endurance.

Criterion of Performance

MAND: Look for an improvement of approximately 5 standard score points in upper body strength traits over a five month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 5-7%.

REMEDIAL MOTOR TRAINING FOR DEFICITS IN LOWER BODY STRENGTH

DEFINITION

Body strength in the lower extremities depends upon the healthy functioning of the skeletal muscles. Muscle systems of the feet, legs, abdomen and back are involved in lower body strength. The greatest muscle power is achieved when these muscle systems are synchronized. Weak dynamic muscle strength can be due to poor coordination of muscle units. Additional causes of weakness might include inadequate diet, lack of sleep, physical fatigue or a lack of development in the use of lower skeletal muscles. Limited lower body strength results in early onset of fatigue while standing and limited carrying and lifting capacity. Distraction due to increasing discomfort in the lower body and legs may also limit performance of the task.

ACCOMMODATION

When an individual has limited lower body strength, performance of work in a sedentary position may compensate for the problem. A wide variety of machinery can be used for lifting, transporting and performing the power function of tasks. The individual with restricted physical capacity can use the devices effectively to transport goods. It is important for both normal or handicapped persons to recognize their limitations and not attempt to lift an object that exceeds their capacity. Lightened loads, the use of dollies, hoists and pulleys may be used to accommodate for limited physical strength.

CAUTION!!

The proper method of lifting objects with the legs should also be emphasized to avoid muscle/tendon strain or damage. Carrying is accomplished with two hands/arms supporting the bottom of the box in front of the body at waist level and lifting with the legs. General everyday living tasks follow the same considerations as do occupational tasks.

REMEDICATION

Training activities can involve lifting, carrying, pushing and pulling. Lifting is defined as raising or lowering an object from one level to another (includes upward pulling). Carrying is defined as transporting an object, usually holding it in the hands or arms or on the shoulders. Pushing and pulling refer to exerting force on an object so that the object moves away from or toward the force. Each of these strength behaviors involves the muscle systems of the hands, arms and shoulders in the upper extremities and/or muscle systems in the legs, abdomen and back in the lower extremities. An exercise program which involves the coordinated use of lower muscle systems is recommended. Activities such as walking, swimming, jumping, etc., are also beneficial.

Basic body movements such as lifting, carrying, pushing and pulling for specified time periods can be used for training activities. Both legs are used to perform the tasks. The arms and shoulders are also used for transporting materials. Care should be taken not to exceed the individual's physical limits in lifting and carrying. Persons with back problems, spine or muscle dysfunctions should first be

reviewed and approved by a physician before participating in the activities. Limit the activities to the recommended time period to avoid unnecessary fatigue.

LEVEL 3 (Standard Score Range = 72 and above)

Materials

Materials for the initial training task include cinder blocks, books or any objects of the prescribed weight available in the environment.

Activities

Individuals at this level can participate in heavy work. Lifting of 100 pounds maximum, with frequent lifting and/or carrying of objects weighing up to 50 pounds can be accomplished by males. Lifting of 60 pounds maximum, with frequent lifting and/or carrying of objects weighing up to 30 pounds can be accomplished by females. Your initial training task should be designed for this level. One appropriate task would be stacking cinder blocks, books or any objects of the prescribed weight available in the environment. This task can also serve as the baseline measure by determining the time required to stack a specified number of objects. Continue training on the initial task for 20 minutes daily for two weeks. Conduct training on other related tasks for two months.

Some related activities include janitorial tasks such as removing trash, floor polishing, moving furniture and loading and unloading materials from a truck. Climbing ladders, stairs, scaffolding and ramps while carrying light loads also involves lower body strength. Level 3 training activities might also include disassembly and assembly of automobile or truck transmissions, rear ends, axles, wheels, etc.

Please follow the cautionary measures outlined in the Remediation section.

Criterion of Performance

MAND: Look for an improvement of 10 or more standard score points in lower body strength traits over a two and a half month period when using the MAND to measure response to training.

Baseline Measure: After establishing the performance score (baseline) and following the training procedures described above, expect an improvement of 10-15%.