

**The Effects of a Nine Week Strength Training Program on
Adolescents and Young Adults with Cognitive Disabilities**

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Abstract

The purpose of the study was to investigate the effects of resistance training on adolescents and young adults with cognitive disabilities, i.e., mental retardation (MR). More specifically, it aimed at determining whether or not individuals with MR could increase their strength through a nine-week resistance training program. Twenty individuals with MR, ages 16-22 participated in the program, twice per week, over 9 weeks. Separate t-tests analysis revealed that participants, as a group, improved significantly ($p \leq .05$) on all of the exercises performed. Further analysis of variance tests revealed no significant differences between genders. The majority of the participants increased their upper body and lower body strength during the duration of the program.

Introduction

Although a multitude of studies on effective resistance training have been conducted, only a few have focused on the effectiveness of this training for individuals with mental retardation (MR) (Pitetti, Rimmer & Fernhall, 1993; Stopka, Limper, Siders, Graves, Goodman & Silverstone, 1994; Ellis, Cress & Spellman 1993, Frey 2004). Previous studies have also given much attention to investigating the benefits of improvements in flexibility in fitness programs for the general public, but have not given attention to populations with MR (Stopka, Morley, Siders, Schuette, Houck, & Gilmet 2002). This particular program was started to help individuals with MR increase their muscular strength and endurance, so they would be able to perform at their job settings after school. A major public health goal is to create a more active population (Kimieck, 1991; Ramirez 2000; Rimmer, Braddock & Fujiura 1993; Draheim, Williams &

McCubbin 2002). The ravages of a sedentary lifestyle are overwhelming. This type of lifestyle can lead to problems such as cardiovascular disease, strokes, diabetes, obesity, and osteoporosis (American Alliance for Health, Physical Education, Recreation and Dance 2003; Powell, & Blair 1994).

Since individuals with disabilities are less likely to have opportunities to be active, their health concerns due to inactivity are even greater (Block, 1995; Draheim, Williams & McCubbin, 2002; Rimmer, Braddock & Fujiura, 1993; Pietti & Williams 1991; Hill 1999, Messent, Cooke, & Long 1999). Multiple studies (Ribley, 1988; Sailors & Berg, 1987; Ulrich, Reid & Yeater 1987; Hovell, Sallis, Kolody & McKenzie 1999; Chanas, Reid & Hoover 1998) on the general population have demonstrated that resistance training programs can improve muscular strength and endurance, physical work capacity, and metabolic function. Resistance Exercise programs for individuals with (MR are especially important because they can have a positive impact relative to normal activities of daily living (Frey, McCubbin, Hannigan-Downs, Kasser & Skaggs 1999; Fox 2000). Resistance training programs have been shown to decrease risk of injury from a fall, loss of balance or accident (American College of Sports Medicine, 1998; Dewitt & Roberts, 1991; Wolpaw, 1994). However, none of these studies focused on resistance training on persons with MR, especially adolescents and young adults. Some researchers have examined recently, cardio respiratory endurance levels but very few have examined muscular strength (Davis, 1987; Pitetti, 1990; Pitetti, Climstein, Mays & Barrett, 1992; Rimmer, 1992; Rimmer & Kelly, 1991; Suomi, Surburg & Lecius, 1992; Todd & Reid, 1992). Thus, the purpose of this study was to investigate the effects of a strength training program on this particular age group.

Methods

Twenty individuals (14 males, six females) participated in a resistance exercise training program. The participants studied had mild to severe MR. Participants were chosen for the study on the basis of their teacher's recommendation, physician's approval, parent/guardian consent, and their own desire to participate.

The students participated in two training sessions an academic semester, nine weeks. Each session lasted approximately 50 minutes per session, for two months (9 weeks) excluding school holidays. The first 5 minutes were spent in some type of aerobic warm-up activity (jogging or walking), followed by stretching. The next 25 minutes were spent in a weight training facility using Med-X equipment. The last 20 minutes of the program consisted of everyone participating in inclusive sports activities. [See Figures 1-3.](#)

The Med-X machines are made from the distributor Nautilus. Seventeen of the participants performed the Abdominal Crunch, Lower Back, Leg Curl and 18 of the participants performed the Leg Extension. The participants would perform one set of 8-12 repetitions on the machines. Their initial level of resistance was determined by their body weight and then adjusted accordingly to how well they performed on each individual exercise.

There were nine exercises in total. Seven of the exercises tested trunk and upper body muscular strength, while two of the exercises tested lower body strength. All of the exercises utilized Med-X exercise equipment. The last 20 minutes of the exercise period were spent playing some type of adapted sport or activity (basketball, football, volleyball, freeze tag, ultimate Frisbee etc...). This last portion of the program is important because it keeps the student active. Each activity would be modified in order to incorporate all

the students so everyone could not only participant but have an active and meaningful experience (Karp, Depauw & Langendorfer 1993).

Results

Average weight lifted was determined for both genders on each exercise. The average weight resistance increase is as follows, F=Female, M=Male: Abdominal Crunch (+14.4 lbs, F), (+25.7 lbs, M); Chest Press (+24 lbs, F) (+34 lbs, M); Seated Row (+19.1 lbs, F), (+17.7 lbs, M); Overhead Press (+15.5, F), (+34.2 lbs, M); Biceps Curls (+11.3 lbs, F) (+24.8 lbs, M); Seated Dip (+33.7 lbs, F) (+47.2 lbs, M); 10* Chest (+15.5 lbs, F), (+20 lbs, M); Lower Back (+26.3 lbs, F), (+17.1 lbs, M); Lateral Raise (+18.8 lbs, F), (+21.4 lbs, M).

Each of the exercises were performed by all 14 males except the abdominal crunch, leg extension and the leg curl; all of the females performed the chest press, seated row and overhead press.

The following observations were made for each particular exercise. On the Chest Press all six females and 13 males showed improvement. Regarding the seated Row one female and 13 males showed improvement. Biceps Curl four females and nine males showed improvement. Seated Dip four females and 12 males showed improvements. For the abdominal crunch all females and 11 males showed improvement. Lower Back (performed by four females) two females showed improvement 13 males showed improvement. Leg Curl eight of 11 males and all females showed improvements, and leg extension nine out of 13 males and all females showed improvements.

The bicep curl and seated dip were the only two exercises that the any females decreased from their initial weight, and each exercise had only one female decrease. The male participants as a whole did not decrease on the overhead press, lower back or leg extension. However, at least one male decreased from his initial weight on every other exercise.

Discussion

Interestingly the overhead press and the lower back exercise were the only upper body exercises that all participants had an increase in resistance weight or kept their initial resistance weight. Both the leg curl and extension exercises had only increases in initial weight or the same resistance weight for males and females. In every other exercise there was at least one male or female that decreased for their initial resistance weight.

Seemingly, the participants have a higher success rate on the lower body exercises. All of the participants seem to have strong lower body muscles. Exercises that worked the same muscle groups did not have the same success rates among the participants. The females as a whole did better on all exercises that focused on more than one particular muscles group, (i.e chest press, seated dip, and overhead press) and had more trouble on the exercises in which using the bicep muscle was a main focus. The males thrived on the chest press and seated row as well. Generally, males tend to have more upper body muscles.

The warm-up exercise before the resistance exercise can also have an affect on how well each participant did on each respective exercise (Ellis and Cress, 1993). This factor can relate to how well the student stretched or how positive their attitude was during the

warm-up exercise (Ellis and Cress, 1993). If the warm-up exercise was not effective for the individual, their workout and effort would probably reflect such.

After starting the resistance training, the student with MR can be pushed forward or held back depending on the student volunteer who is training them. In recent years, it has been highly encouraged that the same volunteer work with the same student to ensure they are getting the best workout possible. This practice will make the students more comfortable and more apt to want to perform to their highest level possible (Ribley, 1988). The program staff also encourages the volunteers to make sure the students are using the same machines for each particular exercise. This is important because the med-ex machines display more resistance than some of the others in the facility. If the students change machines their resistance weight might change, thus making the weight recordings inaccurate. Other factors, in the student's resistance workout performance are the order of exercise completion (Rimmer and Kelly, 1991). The order in which the exercise is completed is usually based on availability of the equipment therefore there is no set routine as to which exercise will be performed first and last. This means that a student who just performed a set of bicep curls could go on to perform a set of seated rows, and their performance on the seated row exercise if not normal could be attributed to fatigue of their bicep muscle.

Even with all of these factors the results show that individuals with MR can on average increase their strength through resistance training two days a week for about two months (Rimmer and Kelly, 1991). This study also shows that individuals with MR can increase their upper body strength and lower body strength through a resistance training program.

Future Directions

It was determined that examining lower body resistance training (in addition to the upper body exercise reported here) would be beneficial. We followed through with this direction in subsequent semesters where lower body strength was measured and the students succeeded with improving their lower body resistance exercise.

In addition, increasing the participant numbers to enable a comparison of the improvements by gender would be interesting. Increasing participant numbers would examine the study on a more global scale in determining that a vast majority of individuals with MR could improve their strength and endurance through resistance training.

Future research examining time could focus on if finishing the exercises in a specific time or order plays a role in how well a student's improvements will be. Performing this study would measure if students who finish exercises first will feel more confident about their ability, and if they have a set pattern in which they like to complete the exercises. This measurement could get complicated because it will not only encompass the individuals with MR, but also the perceptions of the people who are working with them.

Other future studies could be directed towards measuring each disability of the students and their respective improvements. This type of study would examine how/if the students disability is a factor for them during their resistance training exercise. Also observing the days of the week, this program meets Tuesday and Thursday, so comparing the two days to see if the students have more success on one day than another.

Clearly, there are numerous directions for the possibilities of future research. The main concept from this research is individuals can and will improve their muscular strength over a nine-week period through a resistance exercise-training program. This research indicated that each semester the individuals with MR increased their strength progressively through the program; emphasizing that the numerous factors of the study while important, will not hinder the individuals with MR improvements in resistance exercise training. Individuals with MR have the ability to do exercises effectively with the right training, support and encouragement.

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