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Influence of "resistance caming" on physical performance among disabled youth

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Abstract

The purpose of this study was to assess the influence of "resistance gaming" on physical performance capacities of youth with cognitive and motor impairment. Considering the variability in disability among the participants, positive trends for improvement were evident from pre- to post-intervention for the physical performance capacities.

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INFLUENCE OF "RESISTANCE GAMING" ON PHYSICAL PERFORMANCE AMONG DISABLED YOUTH

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Introduction

For youth with disability, their movement is usually, more often than not, very constrained by both physical and cognitive barriers. This in turn limits the abilities of this population to perform everyday tasks (such as pushing, pulling, carrying, and lifting) that involve movement. Knowing this information, I researched the impact that 'resistance gaming' would have on this population. With resistance gaming being the use of games and/or activities involving weighted objects or the student's body weight as resistance to improve the students' skills.

The research involved the use of this resistance gaming to determine the influence (if any) it would have on the physical performance of the students in regards to their pushing, pulling, lifting, and carrying skills. The goal of the study was to improve these skills so that the students could transition from high school to working in a vocational setting/workplace (ex., a ware house). To improve these skills, the students were exposed to a 12 week, once per week, intervention that involved an hour of resistance gaming and/or weight training. Before beginning the resistance gaming intervention the students were pre-tested on the skills of pushing, pulling, carrying, and lifting. Upon completing the 12 week intervention the students were then post tested on the same skills.

Review of Literature

Research regarding this topic (influence of resistance gaming specifically) is still relatively new and therefore the amount of research done is somewhat limited. Majority of the research that has been done focuses on movement and youth with

disability. It looks at how movement is restricted and limited among this population and ways to improve range of motion and movement function rather. Because majority of the research does not focus on improving movement for the transition into a vocational setting/workplace, the literature reviewed will discuss movement in general among this population and ways to improve their movement.

For youth with disability, movement is often constrained by physical and cognitive barriers, thus limiting the ability to conduct various movement tasks. These barriers restrict the "degrees of freedom" with which an individual can move about, thus limiting the potential for conducting physical performance abilities or tasks in a vocational setting or the workplace. Seagraves, Horvat, Franklin, and Jones (2004) indicate that numerous research efforts have determined that individuals with mental retardation commonly function at lower levels physically, when compared to their able-bodied peers. Seagraves et al. (2004) further state that individuals with mental retardation have more functional limitations with regard to adaptive behavior, lower vocational qualifications, and reduced physical capacity and motor ability when compared to other groups with disabilities.

Additionally, it is reported that physical activity is an appropriate avenue to enhance socials skills, interpersonal interaction, teach coping strategies, and enhance self-esteem (Pavri, 2001). Because an inactive life-style increases the risk of coronary heart disease (CHD), high blood pressure, thromboses, osteoporosis, obesity, and non-insulin dependent diabetes mellitus (NIDDM) among the able-bodied, the importance of

regular physical activity among persons with disabilities becomes more vital to their health and well-being because of restricted motor and functional abilities (Heath and Fentem, (1997).

Anderson and Behm (2005) demonstrated resistance training can be used to induce strength, power and endurance adaptations with a myriad of exercises and equipment that will provide a spectrum of stable and unstable loads. Physical training regimens can elicit gains in physical functioning in a similar manner to peers without disabilities. Seagraves, et al. (2004), state that improving the functioning of individuals with mental retardation may enhance their capability to perform vocational tasks at levels commensurate with the demands for employment.

The effect of resistance exercise on muscle strength and size has been clearly documented, but evidence suggests that resistance training absent of specific balance training, also has a positive effect on balance. Several modes of training are currently available, with some of the more popular methods being the use of free-weights, weight stack machines and iso-kinetic devices. The use of free-weights allows for the mimicking of movement demands of real-life sport and everyday activities from the numerous possible variations with free-weight exercises and is vital for training in a specific manner to produce a specific outcome. Previous work by Seagraves et al. (2004) demonstrates that task oriented skills (pail carry, chair stack, dolly push, and box stack) enable to assess the work productivity performance among the participants in their

study. The progressive resistance training sessions were conducted in a circuit fashion, involving multiple stations with each station containing a different exercise.

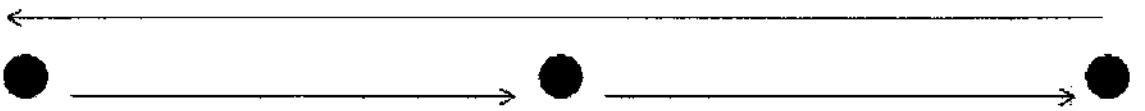
The acquisition and enhancement of fitness parameters is considered to be paramount with regard to health, however, physical performance capacities (e.g., static and dynamic balance, movement time, power, dexterity, and accuracy) are the basis for functional ability, enable one to expand their "motor vocabulary", and potentially become purposeful for an occupation that requires movement with multi-planar conditions. Future studies should determine what impact activity has on persons with disabilities.

Methods

The results of the study showed that an improvement was made for a majority of the students that participated. The participants consisted of males (n=7) and females (n=9) aged 13 to 18 years with a variety of physical and cognitive impairment. The goal of the tests performed by the students was to assess agility, anaerobic endurance, power, and balance along with the skills of pushing, pulling, carrying, and lifting. The three tests that were performed were the "Get-up and Go" test, the "Warehouse shuffle," and the "Static balance."

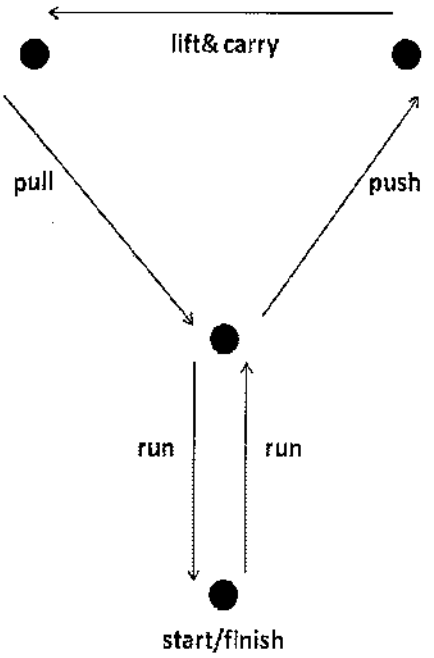
The first test, the "Get-up and Go" test (see diagram below), required the students to move a 3.6 kg medicine ball (placed at the far right dot in the diagram) from the farthest most point on the right side of the diagram to the farthest most point on the left side of the diagram in as short amount of time as possible over a total distance

of 10 m. This test specifically focused on the student's ability to lift the object, carry it 10 m to another spot, and finally set it back down. The time was started when the student left the starting point and was ended when they returned back to the same point.



start/finish

The second test, the "Warehouse Shuffle" (see diagram below), involved the use of a weighted crate (8 lbs of weight in the crate) and required the students to move it in a triangle formation over a total distance of 25 m. The first leg of the triangle required the students to push the weighted crate a distance of 5 m, then the second leg of the triangle (a distance of 5 m) required the student to lift the crate and carry it to the next point, and finally the third leg of the triangle (also a distance of 5 m) required the student to pull the crate to the last point where the student left the crate and returned to the starting point. This test was also focusing on the student finishing in the shortest amount of time as possible with the time starting when the student left the starting point and ending when they returned.



The "Static balance" test required the student to stand on one leg for as long as possible. This test focused on the student's ability to balance on one foot for the greatest amount of time possible before they put their foot back on the ground. The students were timed starting with the moment they lifted their foot up off the ground and stopping the moment their foot returned to the ground. Of the three tests, the students had the easiest time performing the "Static balance" because it required the least amount of instruction and only required the student to focus on one movement rather than two to three movements in one test.

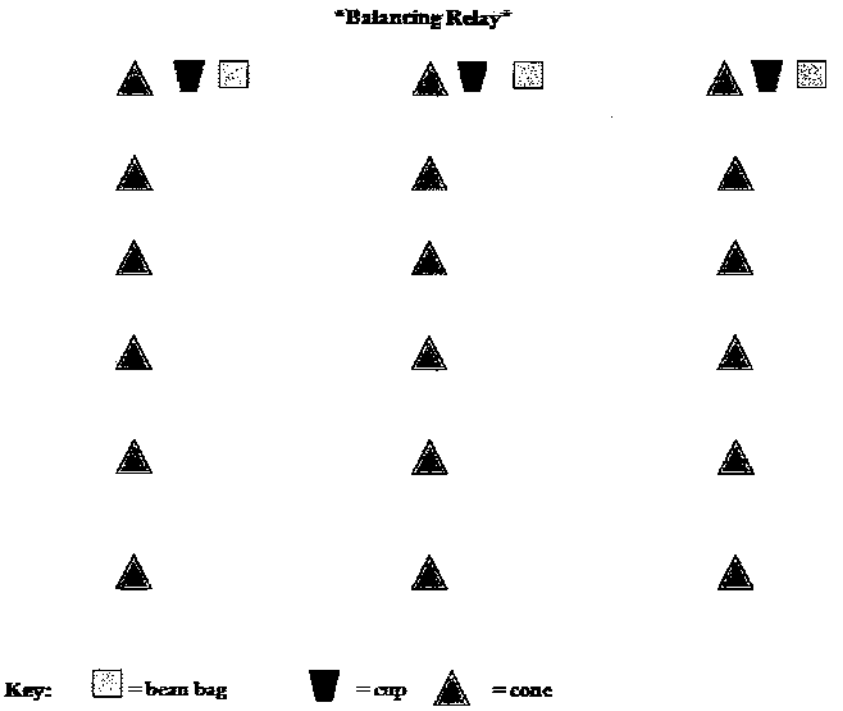
The three aforementioned tests were performed by each student before the beginning of the 12 week 'resistance gaming' intervention. Following the pre-tests the students then participated in the 12 week 'resistance gaming' intervention that involved the use of games and/or activities to improve the skills that were tested (pushing,

pulling, carrying, and lifting). The weight room was also used to improve the strength of the students as well as their range of motion. The activities and/or games consisted of mostly relays, agility courses (involving the use of agility ladders), tag, and activity stations. The outdoor track was also used to perform activities to help increase the students speed and endurance.

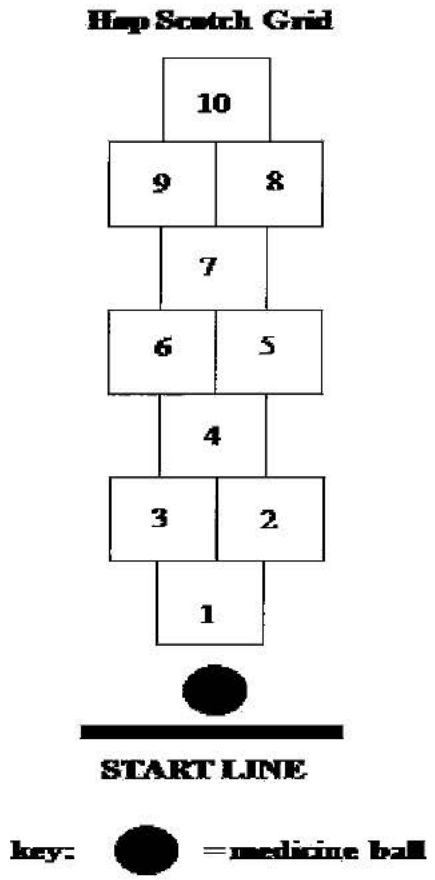
Some examples of games/activities that were played are 'Medicine Ball Pass,' a 'Balancing Relay' (with variations optional), 'Hop Scotch Grids,' and a 'Relay Race Combo.' The purpose of these games/activities was to mimic the skills needed and used while working in a vocational setting/work environment (such as a warehouse). The 'Medicine Ball Pass' involves the student performing the task of passing a medicine ball down a line of students. This activity focused on the skill of being able to pass a weighted object (successfully) to another person. This skill also required the student to cooperate and work with another individual to complete the task (a crucial skill when working in a workplace). The 'Medicine Ball Pass' required the students to practice different ways of passing the medicine ball. Some passes involved the students passing the medicine ball over their head, behind their back, twisting and passing, and bending and passing.

Another game/activity, the 'Balancing Relay,' required the students to balance a bean bag on top of a cup while navigating through a course of cones (see diagram below). The students were working in teams to perform this relay. One student would start by working their way through the course and then passing off the cup with the

balanced bean bag on top to the next student in line. This type of relay forced the students to focus on keeping an object in place while moving around other objects. If a bean bag was dropped during the relay, the student had to return to the starting point and perform the relay again. This relay also forced the students to work on passing an object to another individual without dropping the object.

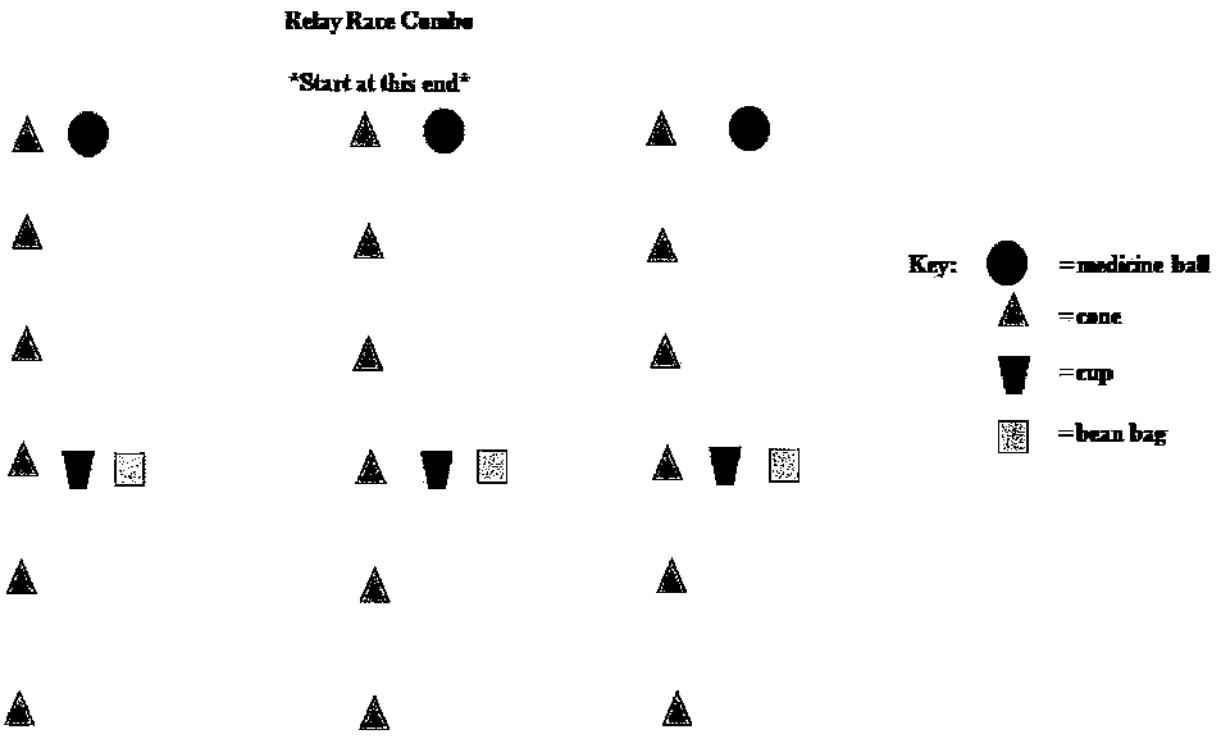


The 'Hop Scotch Grid' required the students to move through a grid (alternating between one foot and two feet hops) while carrying a medicine ball (see diagram below). This type of activity had the students focusing on carrying a weighted object while moving through a designated space. It also required the students (when returning to the starting point) to practice the skill of passing the medicine ball to the next person in line without dropping it. This again gave the student the opportunity of completing a task while cooperating/working with another individual.



The 'Relay Race Combo' combined the skills of balancing an object while carrying it along with the skill of picking up and carrying a weighted object (medicine ball) while navigating through a course. The first part of the course required the student to pick up the medicine ball and carry it through half of the course (see diagram below). Halfway through the student was to put the medicine ball down and pick up a cup with a bean bag balanced on top and continue to carry this through the remainder of the course. When coming back through the course (returning to the start area) the student exchanged the cup with bean bag on top for the medicine ball (at the halfway point) before returning to the start. When the student finished, they then passed the medicine ball to the next person in line. Again requiring the student to cooperate and work with

an individual to perform a task. This type of relay required the student to perform multiple different tasks within a short period of time. It also required the student to focus on the task at hand and to perform the tasks in the proper order while working in a designated space.



Results

Following the 12 week (once per week) intervention of 'resistance gaming' the students were tested again using the same three tests used during pre-testing. Below are the results from both the pre-tests and post-tests.

	Warehouse Shuffle (8lb.) Pre-test	Post Test	Get up & Go (10 lb.) Pre-test	Post Test	Balance Test Pre-test	Post Test
			Time (seconds)			
F1	3:40 (dragged it)		17	18.1	13.06	2.05
M1	34	24	11.79	11.1	8.87	19.77
M2	31/32	52	15.58/13.28	23.1	7.94	28.77
M3	1:18	49	21.43/18.23	23.1	4.73	2.87
F2	1:23	58	26.02	24.2	1.36	11.55
F3	28	31	13.8	13.1	3.71	8.29
M4	25/21	25	14.52/11.96	12	18.6	11.85
M5	15	14	8.63	7.1	11.87	39.29
F4	44		13.19		2.78	
F5			28.38			
F6		1:06		17.1		2.82

The table of above shows the times for each student on the three tests. The boxes with no time indicate that the student was absent for the pre-test (or post-test in some cases) and therefore only the post-test (or pre-test) time is given. The results, overall, show a slight improvement in the skills that were tested. Because I was working with youth with disability there are, the students overall "well being" of that day must be taken into account when analyzing results. If the student was having a 'good' day they may have improved significantly overall on the tests. If the student was having an

'off' day they may have refused to perform a test, or if they did perform the test, they may have chosen to take their time and give only partial effort instead of full effort. Taking all of this into account, the students (overall) improved slightly on two of the three tests and on the third test showed more of an overall improvement.

The students only slightly improved on the "Warehouse Shuffle" and the "Get up & Go" tests. These are the two tests that involved the most pushing, pulling, carrying, and lifting. These two tests are also the one that the results can be influenced by the student's mood that day. The third test, the "Balance" test, is the test most likely to not be influenced by the student's mood. This also is the test that the students showed the most improvement on. The "Balance" test involved the least amount of effort required for the three tests. The "Balance" test only required the students to balance on one foot for as long as possible. The other two tests were different in that they required a lot of effort from the students as well as a lot of focus on the task at hand. For the "Balance" test, the students had one task to focus on which was balancing on one foot. For the "Warehouse Shuffle" and the "Get up & Go" tests, the students had to focus on the tasks of pushing, pulling, carrying, and/or lifting a weighted object as well as finishing the test in the shortest amount of time possible. The goal of these two tests was for the students to decrease their time whereas the goal of the "Balance" test was to increase time.

Discussion

Resistance gaming has the potential to have an impact if implemented in the right way and for the right amount of time. Students must be exposed for either two or

three times a week throughout an entire school year. With this amount of implementation the students' physical capabilities (such as range of motion, endurance, agility, and speed), more than just work related, will increase. This was shown during the duration of the study when the students participated in resistance gaming once a week for a twelve week program. If improvement was shown for the 12 week resistance gaming intervention (a small scale of time), improvement can and will be made if the students participate in a resistance gaming intervention that is two or three times a week for an entire school year.

Resistance gaming is the use of activities and/or games that mimic pushing, pulling, carrying, and lifting (but is not limited to just this). The actual resistance in the games and/or activities comes in the form of medicine balls, body weight, free weights, and the use of some cardio and weight machines. By making the act of pushing, pulling, carrying, and lifting fun (via the use of resistance gaming), the students were more involved and challenged during the 12 week once per week "resistance gaming" intervention. It takes the focus of working on skills and puts it into the actual game or activity and having the most fun possible.

Conclusion

The results of this study show that a 'resistance gaming' intervention improves the skills of pushing, pulling, carrying, and lifting among this population of students. This means that if given the opportunity and proper training over an extended period of time, youth with disability have the potential to vastly improve their skills and

contribute to the work force. This study is a very small scale of what could take place over an extended period of time. This type of intervention has the potential to make major changes and/or improvements among youth with disability. In order for this population to show major improvement, an intervention program must be implemented that involves the students participating in resistance gaming more than once per week as well as longer than just 12 weeks. An ideal intervention program would be one that involves the students participating two to four times per week over the course of an entire school year. The intervention must also consist of both resistance gaming, endurance training, and strength training for optimal improvement. This ideal intervention program would produce the most improvement among youth with disability and would allow for the most successful transition into a vocational setting/work environment (which is the ultimate goal).

Future studies should implement the use of the aforementioned ideal intervention as well as having the students work on moving from a segregated Physical Education environment to an inclusive environment. This inclusive environment would allow the students with disabilities the opportunity to practice their skills while working with non-disabled individuals/peers. Future studies should also look at increasing the motivation of the students as well as incorporating the practice of personal-social skills into the resistance gaming intervention. This would allow for a quicker and more successful transition into a vocational setting and/or workplace.

References

Anderson, K., & Behm, D.G. (2005). The impact of instability resistance training on balance and stability. *Sports Medicine.* 35(1), 43-53.

Heath, G.W., Fentem, P.H. (1997). Physical activity among Persons with Disabilities – A public health perspective. *Exercise and Sport Sciences Reviews,* 25(1), 195-234.

Kozub, F.M. (2003). Explaining physical activity in individuals with mental retardation: an exploratory study. *Education and Training in Developmental Disabilities,* 38(3), 302-313.

Pavri, S. (2001). Loneliness in children with disabilities: How can teachers help? *Teaching Exceptional Children,* 33(6), 52-58.

Seagraves, F, Horvat, M, Franklin, C, & Jones, K. (2004). Effects of a school-based program on physical function and work productivity in individuals with mental retardation. *Clinical Kinesiology: Journal of the American Kinesiotherapy Association, 58*(2), 18-29.

Smail, K.M., Horvat, M. (2009) Resistance training for individuals with intellectual disabilities. *Clinical Kinesiology: Journal of the American Kinesiotherapy Association.*

Stanish, H.I., Frey, G.C. (2008). Promotion of physical activity in individuals with intellectual disability. *Salud Publica Mex,* 50(2), S178-S184.

Smail, Karen M.; Horvat, Michael. (2009). Resistance training for individuals with intellectual disabilities *The Free Library.* (2009). Retrieved March 16, 2010 from http://www.thefreelibrary.com/Resistance training for individuals with intellectual disabilities.-a0206342489