Children with disabilities have been shown to have a disproportional lack of physical activity and fitness compared to non-disabled peers.1 Adolescents with physical disabilities were twice as likely to report watching television more than 4 hours per day when compared to non-disabled children,2 and they tend to engage in more sedentary activities such as video and computer games compared to non-disabled children.3 It has been documented that children with cerebral palsy (CP) are weaker, 4,5 have decreased endurance6,7 and decreased physical activity compared to non-disabled peers.8,9

When developing a fitness and wellness program for Garrett, there are many factors to consider. For Garrett to be compliant with the program, it will have to be tailored to meet his goals and interests and be age appropriate as well as be beneficial from a physical therapy standpoint. Strength and cardiorespiratory endurance will be the primary areas of intervention.

One of Garrett’s primary impairments is his bilateral lower extremity muscle strength. As he has previously shown an interest in “pumping iron” with his father, a program for strengthening his lower extremities should be developed. This would integrate his family or possibly his friends could join him in this type of exercise. He could log his exercises and progress in a logbook or on an app with his cell phone. Taylor et al reported improved exercise compliance in children with CP with emotional and physical support from family members, provision of equipment, and provision of an exercise logbook.10 If he doesn’t have weight machines at home, it may be possible for the family to join a gym or a Wellness Center such as Meadowmont. If Garrett attended a gym, he would also have access to other important strengthening activities such as a stationary bike or a swimming pool. This would allow him to cross train and give him a variety of activities to choose. Garrett could also strengthen his lower extremities with “low tech” exercises as described by Dodd et al including half squats, step ups, and heel raises for 8-12 repetitions progressing to weighted resistance.11

Strength in children with diplegic CP like Garrett, is related to function.4 Strengthening has been shown to be effective in children with CP. Damiano used progressive resistive exercise and showed strength training may improve walking function and alignment in patients for whom weakness is a major contributor to their gait deficits.12 The Pediatric Endurance [Development] and Limb Strengthening (PEDALS) study in 62 ambulatory children with diplegic CP, demonstrated significant improvements in locomotor endurance, gross motor function, and some measures of strength with stationary cycling.13 Aquatic resistive exercise may facilitate strengthening and improvement in functional movements in children with ambulatory CP.14 Aquatics may contribute to a life-long exercise option for Garrett that could minimize the impact on his joints thus reducing secondary conditions such as pain, osteoporosis and musculoskeletal deformities. All studies mentioned above have a frequency of 3x/week for 45-70 minutes for 8-12 weeks which would be an appropriate intervention period with Garrett.

Garrett will benefit from an aerobic component to his fitness/wellness program in addition to strengthening. He appears to have poor cardiorespiratory endurance as evidenced by his increase in RR with minimal exertion possibly related to his pulmonary history from prematurity. Fatigue and cardiovascular conditions can be secondary conditions Garrett develops if he is not aerobically fit. Vershuren et al have developed reference values for aerobic fitness in ambulatory adolescents with CP.15 The Centers for Disease Control recommends 60 or more minutes of moderate to vigorous activity daily with vigorous activity at least 3 days week.{{88 Anonymous}} Aquatics could be used to improve aerobic fitness, in addition to strengthening, when performed in an appropriate intensity of target heart rate range.16 Aerobic exercise with use of machines such as a treadmill, recumbent stepper and an elliptical may improve cardiorespiratory fitness in children with CP.17 Exercises such as running, running and changing direction, step-ups, walking outdoors, walking uphill and stair climbing has been shown to improve aerobic fitness in children with cerebral palsy.18,19 Many of these aerobic activities could be used with Garrett in the appropriate target HR range for at least 45 minutes, 3 times per week for 3-9 months.20

As Garrett enjoys video games and sports, additional ideas for Garrett may include use of the Wii. Hurkmans et al reported moderate intensity exercise for adults with CP when playing Wii tennis and boxing.21 Bridge II Sports is a local organization that offers adaptive sports to children with disabilities.22

Education would be an important component of Garrett’s fitness/wellness program for him and his parents. They would benefit from a consultation with a dietician familiar with developmental disabilities as his BMI of 15.1 identifies him as underweight and in the 3rd percentile.23 Garrett would benefit from a consultation with an orthopedist and possible gait analysis to assess his gait kinematics and contractures which appear to be interfering with his ability to ambulate. Garrett and his family will need to understand the importance of continued physical activity at an appropriate, effective frequency, intensity and duration as participation in a fitness program may improve function and prevent or delay secondary conditions such as pain, musculoskeletal deformities, osteoporosis, fatigue, cardiovascular conditions, and poor growth for him.24,25

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