

## **The Effect of Resistance Training on Bone Mineral Density and Muscular Strength in Children with Autism Spectrum Disorder**

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### **ABSTRACT**

Autism Spectrum Disorder (ASD) is a complex neurological disorder characterized by impaired social interaction and atypical behaviors. Children with ASD appear to have lower muscular function and low bone mineral density (BMD). Recent studies have indicated that adolescents with ASD develop obesity and bone fracture incidence at a higher rate compared to typically developing children (TDC). However, it is unclear if such weakened musculoskeletal function is a consequence of the neurological disorder state in ASD or if it is due to the limited opportunity for physical activity and exercise in the ASD population. **PURPOSE:** To identify the effect of progressive resistance training on BMD and muscular strength in prepubescent ASD children compared to TDC. **METHODS:** A total of 29 children participated; 7 TDC and 3 ASD children completed 3 months of an integrated group exercise program which consists of progressive resistance training, 2-3 times/week for an hour. Muscular strength (i.e., torque, work, and power) during knee extension and flexion was measured at 90, 150, and 210°/sec using Humac Norm Isokinetic Dynamometer. Maximal forearm strength was measured using a handgrip dynamometer. Dual Energy X-ray Absorptiometry was used to identify the body composition and regional BMD at the lumbar spines, proximal femur, and forearm. **RESULTS:** After training, body mass index was significantly reduced in TDC (20.4±2.7 pre vs. 17.6±1.6 post, kg/m<sup>2</sup>) while it did not change in ASD (19.6±2 pre vs. 18.9±3.3 post, kg/m<sup>2</sup>). Compared to TDC, ASD had lower total bone mass prior to training (2.00±0.35 TDC vs. 1.80±0.29 ASD, p<0.05, lbs). However, total bone mass significantly improved in both groups after training (Δ0.12±0.03 TDC vs. Δ0.12±0.03 ASD, lbs). Both groups had significant increases in forearm strength while leg strength stayed similar in both groups. While BMD at the femur and lumbar spine improved significantly in TDC, ASD only showed a tendency to improve after training. **CONCLUSION:** Our preliminary results suggest that resistance training may have a selective impact on improving muscular strength in both children with and without ASD. While TDC experienced a substantial exercise training effect on regional BMD, ASD had a minimal effect. In addition, improvement of bone mass could be due to natural child growth or the effect of resistance training.

Supported by CASA RSCA Infusion, Central RSCA, Multidisciplinary RSCA Stimulus Grant, and Undergraduate Research Grant, SJSU