

Benefits of a Fitness Program for Individuals with Autism Spectrum Disorder: Physical, Behavioral, and Emotional Outcomes

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Background

- Individuals with autism spectrum disorder (ASD) engage in significantly less physical activities than typically developing peers (e.g. Pan, 2009).
- A sedentary lifestyle can result in serious negative consequences on multiple aspects of an individual's well-being:
 - Physical health (e.g. cardiovascular disease, obesity)
 - Behavioral issues (e.g. emotional regulation, sleep disturbance)
 - Cognition (e.g. memory, concentration)
 - Emotional well-being (e.g. stress, depression, anxiety)
- The quality of life aspects described above are also common areas of difficulty for individuals with ASD (Bauman, 2010; Mannion & Leader, 2013).
- Abundant research demonstrates that regular physical activity has a positive impact on physical health, behavioral issues, cognition and emotional well-being in samples of typically developing individuals (see Fedewa & Ahn, 2011), however, research on this topic for individuals with ASD is limited.
- The limited literature in ASD (Bremer, Cozier, & Lloyd, 2016; Lang et al., 2010; Sorensen & Zarrett, 2014) has examined five types of exercise for their benefits in this population: horseback riding, jogging, yoga/dance, swimming, and martial arts. In general, across these different types of exercise programs, reductions in stereotyped behaviors and improvements in social-emotional functioning were the most commonly noted benefits for the participants with ASD.

Objective:

- The current study examined the physical, behavioral, and emotional benefits of a specialized physical exercise program in a sample of individuals with ASD.

Method

Sample:

- The sample for this study was comprised of 11 youth and young-adults with ASD (63.6% white) who were regularly receiving trainer-led one-on-one workout sessions at the ASD Fitness Center in Orange, CT.
- Gender – The sample was primarily male (n=9, 81.8%).
- Age – The age range of the sample was 7-24 years old. The mean age of the sample was 14.7 years old (SD=6.59).
- Diagnoses – Recorded diagnoses of participants were based on parent-report of formal ASD diagnosis by a healthcare professional:
 - Autism Spectrum Disorder: n=7, 63.6%
 - Autistic Disorder: n=3, 27.3%
 - Asperger's Syndrome: n=1, 9.1%
- Rater – Parent-report measures were primarily completed by mothers of the participants (n=9, 81.8%).

Procedure:

- Data was collected for each participant at two time points:
 - Baseline (enrollment in the study)
 - Follow-up (after 15 trainer-led workout sessions)
- The average duration between data collection time points for participants was 14.5 weeks (SD=7.23).

Method

Measures:

- Physical Data (collected by ASD Fitness Center trainers):
 - Physical Fitness – Body Mass Index (BMI)
 - Upper-body Strength – Overhead Medicine Ball Press (weight x reps); Medicine Ball Push/Throws (weight x reps)
 - Core Strength – Push Up Plank Hold (duration of plank in seconds)
 - Lower-body Strength – Hurdle Steps (number of hurdles); Hamstring Bridge Hold (duration of bridge hold in seconds)
- Parent-report Measures (collected by Yale Child Study Center researchers):
 - Social Responsiveness Scale, 2nd Edition (SRS-2; Constantino & Gruber, 2012) – Social Communication and Interaction, Restricted Interests and Repetitive Behaviors
 - Child Sleep Habits Questionnaire (CSHQ; Owens, Spirito, & McGuinn, 2000) – Daytime Sleepiness, Bedtime Resistance, Total Score
 - Behavioral Assessment System for Children, 3rd Edition (BASC-3; Reynolds & Kamphaus, 2015) – Anger Control, Anxiety, Attention Problems, Depression, Hyperactivity, Resiliency
- Statistical analyses were conducted using IBM SPSS software (ver. 24).

Facilities:



- The ASD Fitness Center is a sensory-friendly facility that has been providing personalized and varied fitness programs for clients with ASD since 2014.
- Every member participating in one-on-one training receives a personalized "Individual Fitness Program" based on a comprehensive intake process which evaluates the challenges and abilities of each member and defines short- and long-term goals toward achieving an overall healthier lifestyle.

Results



- BMI scores were reduced in over half (n=6) of the participants, but overall there was no change in mean BMI score from baseline (M=23.8, SD=5.8) to follow-up (M=23.9, SD=6.5). Improvements were found, on average, across all strength assessments with significant improvement in core strength [increased **Plank Hold**, $t(10)=-2.4$, $p<.05$] and marginal changes in lower-body strength [increased number of **Hurdles**, $t(10)=-2.1$, $p=.06$; increased **Hamstring Bridge** time, $t(10)=-2.2$, $p=.06$].



- SRS-2 scores produced a non-significant reduction in mean **Social Communication and Interaction** scores from baseline (M=79.5, SD=13.1) to follow-up (M=76.9, SD=8.9) and a significant reduction in **Restricted Interests and Repetitive Behaviors** from baseline (M=82.5, SD=12.4) to follow-up (M=73.7, SD=9.7) [$t(10)=2.5$, $p<.05$].



- CSHQ scores produced a non-significant reduction in overall sleep disturbance scores (**Total Score**) from baseline (M=43.4, SD=8.0) to follow-up (M=41.3, SD=6.5); no change in **Bedtime Resistance** from baseline (M=8.3, SD=2.9) to follow-up (M=8.6, SD=3.1); and a marginal reduction in **Daytime Sleepiness** from baseline (M=11.6, SD=5.2) to follow-up (M=10.0, SD=4.2) [$t(10)=1.90$, $p=.09$].



- BASC scores indicated parent perceived reductions in **Anxiety, Depression, Attention Problems** and **Hyperactivity**, as well as improvements in **Anger Control** and **Resiliency**. However all of these changes from baseline to follow-up were not statistically significant.

Conclusions

- Results of this study provide preliminary support for the positive impact of specialized physical exercise programs for individuals with ASD.
- While positive patterns of change in the assessed measures of participant physical, behavioral, and emotional attributes following 15 trainer-led workout sessions aligned with findings from the exercise literature in typically developing samples, most of these impacts were not substantial enough to reach statistical significance – perhaps due to the small sample size and/or the short duration of the intervention.
- Participants did demonstrate significant improvements in core strength, significant reductions in restricted and repetitive patterns of behaviors, nearly significant improvements in lower-body strength, and marginal reductions in issues with daytime sleepiness.
- Considering the potential wide-ranging benefits that regular physical activity can have on the well-being of individuals with ASD, it is critical for further research to be done on this topic, so that we may have a greater understanding of its benefits, and to encourage the development of physical activity/fitness programs specifically designed for the needs of individuals with ASD.

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