



# The Impact of Regular Physical Activity Participation on Physical Fitness and Problem Behaviors in Children with Autism Spectrum Disorder

**\*Dong-Il Kim<sup>1,2,3</sup>**

1. *Division of Health and Kinesiology, Incheon National University, Incheon, Republic of Korea*
2. *Sport Science Institute, Incheon National University, Incheon, Republic of Korea*
3. *Sports Functional Disability Institute, Incheon National University, Incheon, Republic of Korea*

**\*Correspondence:** Email: [dikim@inu.ac.kr](mailto:dikim@inu.ac.kr)

**(Received 16 Jun 2024; accepted 24 Jun 2024)**

## Dear Editor-in-Chief

The survey on the status of people with disabilities in Korea (1) reported a substantial increase in the number of registered individuals with Autism Spectrum Disorder (ASD), rising to 20,962 in 2020. This reflects a 98.27% increase, or an addition of 10,390 individuals, since 2015. Children with ASD typically exhibit significantly lower levels of physical activity compared to their peers without disabilities. Additionally, they often display decreased physical fitness and problem behaviors. Regular participation in physical activity and exercise is a primary strategy for mitigating issues associated with ASD. Regular exercise and physical activity are vital for enhancing overall fitness and preventing chronic diseases such as diabetes, hypertension, and cardiovascular diseases (2) in individuals with ASD. These activities also help reduce obesity, improve muscle strength and endurance, diminish problem behaviors, and enhance the health-related quality of life in individuals with ASD.

This study enrolled fourteen children, aged 8 to 13 years, with ASD residing in Korea. Participants were excluded if they had any comorbid disabilities other than ASD, experienced difficulties in

participating in physical exercise, or had any diseases or medical conditions that could limit their ability to engage in physical activities. The study involved nine children with ASD participating in an aquatic rehabilitation exercise program (AREP) and five children participating in a land-based rehabilitation exercise program (LBREP). Both programs (AREP & LBREP) were conducted over a 5-week period, with sessions held three times per week, each lasting 60 minutes, for a total of 15 sessions. The 6-minute walk, sit-up, and frequency of problem behaviors (3) of the participants were measured. This study received approval from the Institutional Review Board (IRB) at Incheon National University (IRB No. 7007971-202106-006A).

Statistical analyses were conducted using SPSS, Windows version 28.0 (IBM Corp., Armonk, NY, USA). Pre- and post-training differences within each study group were analyzed using Wilcoxon signed-rank tests for variables that were not normally distributed. The  $P$  values  $<.05$  were considered significant.



Table 1 shows that participation in both types of exercise programs resulted in significant improvements in cardiovascular fitness, as assessed by the 6-minute walk (though the increase in the AREP

group was not statistically significant), and in muscular function, as measured by sit-up. Additionally, the exercise programs [AREP (n=9), LBREP (n=5), AREP+LBREP (n=14)] were effective in significantly reducing problem behaviors.

**Table 1:** The effects of two types of exercise programs on physical fitness and problem behaviors in children with ASD

Variable	Physical Fitness				Problem behaviors (number)	
	6min Walk (m)		Sit-up (repetitions)		Pre	Post
	Pre	Post	Pre	Post		
AREP (n=9)	329.55±99.47	366.67±86.88	16.44±8.01	21.55±8.15*	4.33±3.77	2.22±3.19*
LBREP (n=5)	280.20±123.57	353.90±127.21*	11.60±4.03	20.40±7.82*	4.60±4.39	2.40±2.70*
AREP+LBREP (n=14)	311.92±106.72	362.10±98.30*	14.71±7.09	21.14±7.75*	4.42±3.83	2.28±2.92*

Values are mean±SD, ASD: Autism Spectrum Disorder, AREP: Aquatic Rehabilitation Exercise Program, LBREP: Land-Based Rehabilitation Exercise Program, \*significantly different from pre,  $P<0.05$

In conclusion, whether through aquatic or land-based rehabilitation exercises, regular physical activity is essential for maintaining and improving health in children with ASD and may contribute to the mitigation of problem behaviors. Therefore, consistent participation in any form of exercise is imperative. Furthermore, the development of evidence-based exercise programs tailored specifically for children with ASD is crucial to enhance the effectiveness of these interventions.

### Conflict of Interest

The author declares that there is no conflict of interest.

### References

1. Korean Statistical Information Service National survey on persons with disabilities. [cited 2024 June 1]. Available from: [https://kosis.kr/statHtml/statHtml.do?or-gId=117&tblId=DT\\_11732S0102&conn\\_pat h=I2](https://kosis.kr/statHtml/statHtml.do?or-gId=117&tblId=DT_11732S0102&conn_pat h=I2) (Korean)
2. Dhanasekara CS, Ancona D, Cortes L, et al (2023). Association between autism spectrum disorders and cardiometabolic diseases: A systematic review and meta-analysis. *JAMA Pediatrics*, 177(3), 248-257.
3. Cooper JO, Heron TE, Heward WL (2007). *Applied behavior analysis*. 3rd ed. ISBN-13978-0134752556. Publisher Pearson.