Incorporating a Pedal-less Bicycle Curriculum into a K–5th Grade After-school Program to Improve Stability for ASD Children

Andrew L. Shim, Sean Peterson & Jan Turbes

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Incorporating a Pedal-less Bicycle Curriculum into a K–5th Grade After-school Program to Improve Stability for ASD Children

Andrew L. Shim
Sean Peterson
Jan Turbes

Autism spectrum disorder (ASD) is described as a complex neurodevelopment disorder, characterized by communication and behavioral difficulties. Although ASD can vary in severity, it affects every racial, ethnic and socioeconomic group. One in 68 children are identified with ASD according to the Autism and Developmental Disabilities Monitoring (ADDM) network. Boys are four times more likely to have ASD than girls (National Institutes of Health [NIH], 2015). As a result of the delays in gross motor-skill development, the risk of obesity remains high among children with ASD due to the lack of adequate movement and reduced muscle tone. Children with ASD are three to four times more likely to be obese compared to children in the general population (Rimmer, Yamaki, Davis Lowery, Wang, & Vogel, 2010).

There is an expectation for physical educators to develop proper activities that promote psychological and physiological benefits for all children, especially those of special needs during their preadolescent years. One of these skill components should be the development and acquisition of stability or balance. The improvement and mastering of balance has been considered an important motor-skill concept for children (Graham, Holt, & Parker, 2013). Balance in ASD children is greatly affected if they are overweight and have reduced muscle tone. Balance studies specifically targeting children have been extremely limited (Granacher, Muehlbauer, Maestrini, Zahner, & Gollihofer, 2011; Shim, Norman, & Kim, 2013); however, a recent study by the University of Ahvaz in Iran demonstrated that a balance training program using unstable surfaces through standing positions could improve postural control in ASD children within six weeks (Cheldavi, Shakerian, Boshahri, & Zarghami, 2014).

Pedal-less bicycles have been around for the past several centuries and were originally designed for adult transportation before pedals were added to them 30 years later. Recently, Briar Cliff University and the Pier Center of Autism developed a partnership for offering an after-school bicycle riding program for ASD children ages six to 10 to see if limit of stability (LoS) scores could improve within six weeks of riding for 20–30 minutes, three times per week, using pedal-less bicycles. Presently, pedal-less bicycles are publicly available at retail...
or online stores all across the United States and in other foreign countries. The bicycles are relatively affordable for school districts, especially if PEP grants and/or community or civic donations are used to purchase these devices. Bringing in all levels of these stakeholders will ensure greater success of the program. The school district, physical or occupational therapy clinics, hospitals, churches, local autism groups and/or centers, elementary school teachers, and local media should all be involved in the program development, site and funding. It starts with one phone call or visit to pick up interest and momentum. Once you have the stakeholders on board, these recommendations will assist you with the program.

**Curriculum Safety Tips**

The skill theme or unit is Balance Development and Progression. Each class can range from five to 10 ASD children at a school or program site. According to Graham et al. (2013), safety is the most important factor when teaching any balance skill or theme. Depending on the facility or site, this curriculum can be developed to be used outdoors or indoors, depending on weather conditions.

- It is recommended that tall, bright cones be used to construct the outline of the course. A minimum of two elevated, slanted ramps could be built or purchased to promote the sensitivity of the central nervous system and build confidence throughout the course (see Figure 1 for a sample bicycle-course setup).

- All pedal-less bicycles should be checked daily for proper air inflation, tire wear or damage, seat adjustment, and overall cleanliness.

- Bicycle seats must be adjusted to promote sitting with the feet touching the ground, knees flexed while at rest.

- Bicycle helmets are mandatory during each session and should also be checked for damage or missing and/or tangled straps.

- Adult supervision for each ASD child is highly recommended for safety and encouragement purposes. Sometimes, it might be necessary for an ASD child to have two escorts, depending on the severity of their motor-skill limitations.

- Start with having the children walk through the course and over each ramp to understand the direction and the route of the course for the first few days with their escort.

- Have the adult assistants or teacher aides hold each bicycle handle as they carefully attempt to perform a complete cycle of the course to promote safety and confidence, unless the child complains due to sensitivity.

- Verbal encouragement from the adult supervisors and the group team is highly recommended during each cycle.

- A physical demonstration of how to use the bike is essential. However, it will be helpful to have other children around for reinforcing the technique of moving the bike throughout the course.

- No more than one bike rider on a ramp at one time and no passing should be allowed on a ramp.

- When riding, a child should not come in contact with another rider at any time. Each escort will have to prevent this from happening.

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**Figure 1.**

Sample course setup

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Lesson Plan Progression

- For the first lesson, teach children how to recognize the surroundings of the course and enjoy the experience of being on a new instrument.
- After several riding attempts, the child will eventually sit on the bicycle seat instead of walking the bike on the course.
- Once a child is sitting on the seat of the bike, using the feet as propulsion will be the focus of the progression of individual movement.
- Encourage the children to try to “coast” or “glide” when they feel confident after the first week of training, especially when going down the ramp.
- Use a verbal count for determining how long each child can ride before they become fatigued, or count the laps they performed and keep a running chart of their progress.

Teaching Tips and Cues for Teachers

- Place the cones and ramps in the same pattern until mastery of propulsion is attained.
- Incorporate counting laps and keep a record of how many successful laps students have completed in the past.
- Depending on the number of pedal-less bicycles the physical educator has, the ASD children should each have their own bike and helmet.
- Use other activities such as the swing set or a jungle gym as a management tool. If the child begins to show signs of behavioral decline, reinforcing the balance training with other activities has proven to be effective.

Providing alternative strategies to improve balance will enhance any after-school program while exposing children to bicycle riding. When improvement in riding skills occurs, children not only demonstrate improved balance and stability but also express enjoyment and confidence while having fun learning a lifetime skill.

References


